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# Adverse Childhood Experiences (aces) And Their Influence On Social Connectedness

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# Adverse Childhood Experiences and their influence on social connectedness

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## **ABSTRACT**

Emerging evidence suggests that Adverse Childhood Experiences (ACEs) are prevalent within the population and are linked to various negative long-term health and social consequences. The effect childhood maltreatment has on an individual's ability to maintain social connectedness may be a potential pathway as to how early adversity increases the likelihood of future negative health consequences. Using the 2011/12 National Survey of Children's Health, this thesis will explore the influence ACEs has on three areas of social connectedness: bonding, bridging, and linking. Results from the multivariate logistic regression model show that there was a significant association between ACEs and bonding as well as between ACEs and linking after adjusting for covariates. For every one-unit increase in ACE count, a child was 9% less likely to be engaged in bonding (OR: 0.91; 95% CI: 0.87, 0.94). For every one-unit increase in ACE count, a child was 6% more likely to experience linking (OR: 1.06; 95% CI: 1.02, 1.10). ACEs were also common within the estimated population, with children across the nation estimated to have an average of 1.1 ACEs (SD: 1.50).

The results of this thesis suggest the importance of providing opportunities for youth to become socially engaged outside of the home. In particular, youth with high ACE counts may benefit the most since the likelihood of being bonded with the family significantly decreases with each additional ACE. Implementation of programs that promote early childhood development and improve parent-child interactions may also be another strategy to prevent youth from falling into isolating social environments that can be detrimental to their immediate and future wellbeing.

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## **INTRODUCTION**

Studies on Adverse Childhood Experiences (ACEs) have shown that stressful childhood experiences (i.e. abuse, neglect, other traumatic stressors) are prevalent within the population. Approximately 4-16% of children are physically abused and 10% are neglected or psychologically abused in high-income countries<sup>1</sup>. ACEs are also linked to various negative long-term health and social consequences. Children subjected to maltreatment are at an increased risk for behavioral and psychological problems including depression, eating disorders, substance abuse, as well as other chronic health conditions<sup>2-4</sup>. Understanding the mechanism of how early adversity increases the likelihood of negative health consequences can help direct efforts to address this major public health and social-welfare problem.

One potential pathway may involve the effect childhood maltreatment has on an individual's ability to achieve and maintain social connectedness. Social connectedness describes the relative strength of families and communities. Under the framework of Szreter and Woolcock, three areas of social connectedness exist: bonding, bridging, and linking<sup>5</sup>. Bonding refers to the trusting and cooperative relationships between members of a network who see themselves as being similar. Bridging includes the relationships of respect and mutuality between individuals who know they are not alike in social identity (i.e. differing by age, ethnic group, class, etc.). Lastly, linking encompasses the relationships between people who interact across formal or institutionalized authority gradients in society<sup>5</sup>.

Research within the past decades has shown that the connections young people share with adults, the schools they attend, and their community help define individual role identities<sup>6,7</sup>. These relationships provide youth with not only a sense of belonging and emotional attachment, but also important opportunities to learn and practice healthy adaptive responses to adverse

experiences<sup>8</sup>. The social contexts of children's upbringing therefore play a critical role in shaping health trajectories. Adolescents, in particular, are especially susceptible to the social patterns and structures referred to as the social determinants of health. These conditions shape health and health behaviors that are typically carried from adolescence into adulthood<sup>9</sup>. For example, participation in school-related extracurricular activities has been associated with improved psychological wellbeing and the lower likelihood of future suicide<sup>10</sup>. Teen employment has also been linked to a lower likelihood of teenagers in high poverty urban areas to drop out of high school<sup>11</sup>. As a whole, positive social relationships serve as a buffer against the influences of negative life events.

Adverse Childhood Experiences, however, may affect a youth's ability to form and maintain these social connections. *Attachment theory* describes how children's ability to socially connect with others is largely based on how they were attached to their parents as infants<sup>12</sup>. Youth who have been maltreated often form insecure attachment relationships with their caregivers. These children, as a result, have significantly poorer social competency, are less successful in initiating interactions with others, and struggle to maintain self-control compared to their peers with no history of maltreatment<sup>13</sup>. Furthermore, maltreated children are typically raised in chaotic and disorganized home environments that are characterized by the presence of ACEs and the lack of social support outside of the family<sup>13</sup>. This social isolation hinders affected children from being exposed to socially engaging opportunities and also interacts with early adversity to influence health. Norman, et al. discussed that individuals subjected to higher levels of childhood trauma displayed significantly elevated blood pressure levels and that this relationship was moderated by levels of perceived social isolation<sup>14</sup>.

Despite the existing research that points towards the potential relationship between child maltreatment and the ability to form social connections, limited studies at a national level have examined how different types of maltreatment cumulatively affect social connectedness<sup>15,16</sup>. The lack of a standard metric to evaluate social connectedness further hinders the ability to understand this issue. In this thesis, the 2011/12 National Survey of Children's Health data was used to explore the relationship between ACEs and three dimensions of social connectedness: bonding, bridging, and linking. The National Survey of Children's Health (NSCH) is a nationwide telephone survey, sponsored by the Maternal and Child Health Bureau of Health Resources and Services Administration, that collects data pertaining to the developmental and behavioral health of children in the United States<sup>17</sup>. For the first time in 2011/12, the NSCH has begun collecting information regarding the ACE history of children around the nation. Analyzing the 2011/12 NSCH data serves as a valuable opportunity to fill the currently existing knowledge gap on ACEs and social connectedness.

The importance of understanding the influence ACEs has on social connectedness is twofold. Firstly, when a child is maltreated, the effects of the original traumatic experience may not manifest until much later on in life. Identifying the immediate consequences of ACEs can provide health care providers, educators, social service organizations and policy makers with a strategy to identify children who are at risk for more serious health issues pertaining to their ACE history. Secondly, this information can guide how public health efforts can be directed to promote the development of prevention strategies targeting those at highest behavioral and health risk.

## **SPECIFIC AIMS AND HYPOTHESES**

The objective of this thesis is to explore the relationship between Adverse Childhood Experiences (ACEs) and three dimensions of social connectedness: bonding, bridging, and linking through the analysis of a national children's health survey (2011/12 National Survey of Children's Health). The four specific aims and hypotheses of this thesis include:

**Aim #1:** To examine the influence of ACEs on the domain of family connectedness, or bonding.

**Hypothesis #1:** As the number of ACEs increases, children will be less likely to be engaged in the type of social connectedness referred to as "bonding", as compared to children with no ACEs.

**Aim #2:** To examine the influence of ACEs on the domain of social/ community connectedness, or bridging.

**Hypothesis #2:** As the number of ACEs increases, children will be less likely to be engaged in the type of social connectedness referred to as "bridging", as compared to children with no ACEs.

**Aim #3:** To examine the influence of ACEs on the domain of institutional connectedness, or linking.

**Hypothesis #3:** As the number of ACEs increases, children will be less likely to be engaged in the type of social connectedness referred to as "linking", as compared to children with no ACEs.



**Aim #4:** To examine the influence of ACEs on all three types of social connectedness: bonding, bridging and linking.

**Hypothesis #4:** As the number of ACEs increases, children will be less likely to be engaged in all three types of social connectedness, as compared to children with no ACEs.

## **METHODS**

### **Data**

Data will be drawn from the 2011/12 NSCH. The major topics covered by the survey include (1) child and family demographics, (2) children's health and functional status, (3) age-specific developmental health status, (4) health insurance coverage, (5) health access and utilization, (6) presence or absence of a "medical home", (7) family functioning, (8) parental health, and (9) neighborhood and community characteristics.

### **Sampling**

The NSCH is a nationally representative survey administered by the Centers for Disease Control and Prevention's (CDC) National Center of Health Statistics as a module of the State and Local Area Integrated Telephone Survey (SLAITS) program, a telephone survey mechanism based on a large Random Digit Dial (RDD) sample design. The Health Resources and Services Administration's Maternal and Child Health Bureau provided direction and principal funding for the survey. From February 2011 to June 2012 households with children in the 0-17 year old age range were selected using a random-digit-dialed sample. For the 2011/12 NSCH, an additional independent random-digit-dial sample of cell phone numbers was also selected.

Children ages 0-17 years who lived in a home with a landline or cell phone within the 50 states and the District of Columbia were surveyed. A total of 95,677 child-level interviews representing an estimated 73,716,714 children nationwide were conducted. Around 1,811 to 2,200 interviews were completed in all 50 states and the District of Columbia. The respondents were parents or guardians with knowledge of the health and health care of the sampled child in the household. Out of all the completed NSCH interviews, 68.8% of the respondents were mothers, 24.2% were fathers, and 7.2% were other relatives or guardians. The NSCH interview completion rate was 54.1% for the landline sample and 41.2% for the cell-phone sample. Detailed information about the design of the survey is available at [www.nschdata.org](http://www.nschdata.org).

This thesis will specifically focus on the adolescence (12-17 years) population in order to capture the study participants' social connectedness within the classroom and in the workplace. A total of 34,601 surveys were completed for 12-17 year olds representing an estimated population of 25,110,211 children nationwide.

## **Measures**

The survey includes questions that cover a broad range of information on children's health and wellbeing. For the purpose of this thesis, questions pertaining to Adverse Childhood Experiences (ACEs) and measurements of social connectedness were examined. ACEs were included in this survey to capture psychosocial risk factors that affect children. Most of the questions in this survey evaluating ACEs were based on the items from the Behavioral Risk Factor Surveillance System (BRFSS) ACE Module. A Technical Expert Panel (TEP) developed four additional questions specifically adapted to the survey population. Both the BRFSS ACE module and TEP utilized results from the original ACE study, an ongoing longitudinal study

exploring whether childhood trauma is associated with elevated health, social, and economic risks amongst members of the San Diego, California Kaiser Health Plan<sup>18,19</sup>.

The ACE measurements in this survey consist of: (1) socioeconomic hardship, (2) divorce/separation of parent, (3) death of parent, (4) parent served time in jail, (5) witness to domestic violence, (6) victim of neighborhood violence, (7) lived with someone who was mentally ill or suicidal, (8) lived with someone with alcohol/drug problem, (9) treated or judged unfairly due to race/ethnicity. Items 2,4,5,7, and 8 were based on the BRFSS ACE Module while the other four items were developed by the TEP. The exact questions included in the survey were:

- (1) Since the child was born, how often has it been very hard to get by on your family's income—hard to cover the basics like food or housing? Would you say very often, somewhat often, often, rarely, or never?
- (2) Did the child ever live with a parent or guardian who got divorced or separated after the child was born?
- (3) Did the child ever live with a parent or guardian who died?
- (4) Did the child ever live with a parent or guardian who served time in jail or prison after the child was born?
- (5) Did the child ever see or hear any parents or adults in his/her home slap, hit, kick, punch, or beat each other up?
- (6) Was the child ever the victim of violence or witness any violence in his/her neighborhood?
- (7) Did the child ever live with anyone who was mentally ill or suicidal, or severely depressed for more than a couple of weeks?

- (8) Did the child ever live with anyone who had problems with alcohol or drugs?
- (9) Was the child ever treated or judged unfairly because of his/her race or ethnic group?

A response of 'somewhat often' or 'very often' regarding socioeconomic hardship was coded as an adverse childhood experience. The other adverse childhood experiences were dichotomous 'Yes/No' responses.

For the measurement of social connectedness, specific questions from the survey were used to construct three indicators— bonding, bridging, and linking. Questions were selected to be representative of each area of social connectedness based on definitions found within existing literature on the topic.

Bonding encompasses what is called “inward looking” social networks that reinforce exclusive identities in closed networks and homogenous groups<sup>20</sup>. In the context of this thesis, bonding referred to a child’s ties with his or her family members. The three questions used to evaluate this family connectedness include: (1) “During the past week, how many days did all the family members who live in the household eat a meal together?”, (2) “How well can you and your child share ideas or talk about things that really matter?”, (3) “Regarding your child’s friends, would you say that you have met all, most, some or none of his/her friends?”. A response of “everyday” for Question (1), “very well” for Question (2), and/or “met all” for Question (3) indicated the presence of bonding (family connectedness).

Bridging involves the “outward looking” social networks that exist across different social groups that do not necessarily share similar identities<sup>20</sup>. For this thesis, the relationships a child shared with his or her school and community were used to evaluate this area of social connectedness. The four questions included were: (1) “During the past 12 months, was your

child on a sports team or did he/she take sports lessons after school or on weekends?”, (2) “During the past 12 months, did your child participate in any clubs or organizations after school or on weekends?”, (3) “During the past 12 months, did your child participate in any other organized activities or lessons, such as music, dance, language, or other arts?”, (4) “During the past 12 months, has your child ever been involved in any type of community service or volunteer work at school, church, or in the community?”. A response of “yes” for any of the four aforementioned questions indicated the presence of bridging (school/community connectedness).

Linking refers to the networks across power or authority gradients<sup>20</sup>. For the purposes of this thesis, this form of connectedness was determined by whether the child has been employed, both formally and informally. The specific question included in this indicator was: “During the past week, did your child earn money from any work, including regular jobs as well as babysitting, cutting grass, or other occasional work?”. A response of “yes” for the aforementioned question indicated the presence of linking (institutional connectedness).

A composite indicator referred to as “all dimensions of social connectedness” was developed to represent the simultaneous engagement in all three areas of social connectedness (bridging, bonding, and linking).

### **Data Analytic Strategy**

The National Survey of Children’s Health (NSCH) employs complex sampling schemes, including sample weighting and stratification. Therefore, all data analyses were conducted on SAS 9.2 as well the SAS-callable software SUDAAN in order to account for the population weights applied within the NSCH dataset. Population weights were constructed by the 2011/12 NSCH to account for nonresponse, household without landlines, and demographics. The single

sample weights assigned to each record in the survey allow the data analyses performed within this thesis to be representative of all non-institutionalized children aged 12-17 years in the United States and in each state. Specific details on the methodology of the NSCH is available online at the National Center for Health Statistics <sup>21</sup>.

The distributions of general population characteristics, along with the exposure and outcomes of interest, were determined. Age was categorized into 12-14 years old and 15-17 years old to reflect two of the child developmental stages described by the CDC <sup>22</sup>. Sex of the child was reported as either male or female. Race/ethnicity was categorized into: white, non-Hispanic; black, non-Hispanic; Hispanic; and other, non-Hispanic. Federal Poverty Level (FPL) was grouped into four percentage categories: <100% FPL, 100-199% FPL, 200-399% FPL, 400%+ FPL. Finally, the number of ACEs was examined as a continuous variable.

Bivariate analyses tested for the association between each area of social connectedness and key variables (age, sex, race/ethnicity, %FPL), without controlling for other factors. Chi-square tests were performed to test for statistical differences in categorical variables. T-tests were used to test for statistical differences in continuous variables.

Logistic regression models were used to determine the association between ACEs, as a continuous variable, and social connectedness. Each area of social connectedness (bonding, bridging, linking) was examined independently and as a composite variable (all three dimensions of social connectedness) to obtain respective odds ratios (ORs) and 95% confidence intervals (CIs). Population characteristics significantly associated with each area of social connectedness at the 0.05 significance levels in the bivariate analyses were included as covariates in the fully adjusted logistic regression models.

Estimated population and weighted percentages shown in this report were calculated excluding missing values for the variable in question. Responses of “refused” or “I don’t know” were omitted from the denominator. For the “bonding” model, 397 (1.1%) records were missing or had unknown information on either ACEs or bonding. An additional 430 (1.2%) records were dropped due to missing or unknown information on the covariates of interest. This resulted in a final size of 33,774 records. For the “bridging” model, 406 (1.2%) records were missing or had unknown information on either ACEs or bridging. An additional 430 (1.2%) were dropped due to missing or unknown information on the covariates of interest. This resulted in a final size of 33,765 records. For the “linking” model, 507 (1.5%) records were missing or had unknown information on either ACEs or linking. An additional 417 (1.2%) records were dropped due to missing or unknown information on the covariates of interest. This resulted in a final size of 33,677 records. For the composite social connectedness model, 486 (1.4%) records were missing or had unknown information on either ACEs or all three forms of social connectedness, An additional 421 (1.2%) records were dropped due to missing or unknown information on the covariates of interest. This resulted in a final size of 33,694 records.

## **RESULTS**

### **Population Characteristics**

Table 1 provides demographic data at the estimated population level. The number of respondents who provided valid responses is also reported. The 2011/12 NSCH collected a sample of 34,601 children aged 12-17. This represented an estimated population of 25,110,211. Nearly half of the estimate population sample included in these analyses fell into the 12-14 years early adolescent age group and the other half in the 15-17 years middle adolescent age group

(49.3%, n=12,372,050 and 50.7%, n=12,738,160 respectively). Males and females were approximately equally represented, with 51.2% (n=12,850,431) of the estimated population being males and 48.8% (n= 12,230,928) being females. The majority of youths were white, non-Hispanic (56.1%, n=13,775,176) and the greatest percentage of respondents fell into the 400%+ Federal Poverty Level (31.2%, n=7,843,688). Children nationwide were estimated to have an average number of 1.10 ACEs (SD: 1.50).

### **Population Distribution of Social Connectedness**

Table 2 summarizes the distribution of social connectedness in the estimated population. Approximately 77.7% of youth were reported to demonstrate any form of bonding. The most commonly reported form of bonding was the talking and sharing of ideas between the family and child (64.9%). This was followed by the respondent reporting that the family ate meals together everyday (33.7%) and that the family knew all of the child's friends (21.8%). Approximately 92.2% of youth were reported to demonstrate any form of bridging. Over half of the estimated youth population aged 12-17 participated in three of the activities under the bridging indicator: participation in sports (59.0%), clubs (61.2%), and volunteer work (78.7%). Approximately 28.1% of youth were reported to demonstrate linking. Collectively, 20.7% of the estimated youth population was engaged in all three dimensions of social connectedness.

### **Bivariate associations between study variables and presence of any ACEs**

Table 3 examines the associations between the study variables and engagement in different areas of social connectedness. Engagement in bonding significantly differed across age, race/ethnicity, and federal poverty level ( $p < 0.05$  for all three associations). Engagement in



bridging significantly differed across ACEs, race/ethnicity and federal poverty level ( $p < 0.001$  for all three associations). Engagement in linking significantly differed across the two age groups, sex of child, race/ethnicity, and federal poverty level ( $p < 0.05$  for all four associations). Finally, engagement in all forms of social connectedness significantly differed across age, sex of child, race/ethnicity, and federal poverty level ( $p < 0.05$  for all four associations).

### **Unadjusted and adjusted odds ratios between ACEs and social connectedness**

Table 4 summarizes the unadjusted and adjusted odds ratios between ACEs (as a continuous variable) and social connectedness. In the unadjusted model, for every additional ACE, the likelihood of experiencing bridging significantly decreased by 13% (OR: 0.87; 95% CI: 0.82, 0.91). For every additional ACE, the likelihood of experiencing bonding significantly decreased by 7% (OR: 0.93; 95% CI: 0.90, 0.97). After adjusting for covariates, the difference in the bridging model became no longer significant. The likelihood of experiencing bonding for every one-unit increase in ACE count, however, remained statistically significant in the adjusted model (OR: 0.91; 95% CI: 0.87, 0.94). In addition, there was a significant increase in likelihood of experiencing linking for every one-unit increase in ACE count (OR: 1.06; 95% CI: 1.02, 1.10).

## **DISCUSSION**

The original hypotheses of this thesis were developed around the central assumption that ACEs affected children's mental wellbeing in a way that negatively influenced their ability to be engaged in different areas of social connectedness. The results of the analyses support the first hypothesis stating that as the number of ACEs increases, children will be less likely to be

engaged in “bonding”. Contrary to the original hypothesis, however, children are more likely to be engaged in “linking” as the number of ACEs increases. Results regarding the engagement in bridging and in all forms of social connectedness as the number of ACEs increases were inconclusive. Several explanations may account for the findings observed within this thesis.

Firstly, the survey’s measurement of ACEs count may help explain the significant results regarding bonding and linking. Within the 2011/12 NSCH, the list of ACE items predominantly encompassed different dimensions of family dysfunction. A higher ACE count therefore indicates greater family dysfunction. Research examining the effects of parental post-traumatic stress disorder (PTSD) on parenting has noted that parental PTSD diagnosis was significantly associated with more aggressive parenting style, negative parental perceptions of children, and parent-child conflict <sup>23,24</sup>. Since the ACE counts of this survey reflect varying degrees of trauma that are similarly observed in individuals with PTSD (i.e. depression, substance abuse, and violence), caregivers of children with high ACE counts may also assume parenting styles similar to that of individuals with PTSD. The result is the creation of family environments less conducive to the fostering of parent-child interactions. Children raised in these households may lack proper role models to guide them in understanding the importance of bonding. Negative health consequences, including the development of personality issues commonly associated with poor family dynamics, may manifest and reinforce the lack of bonding in these households. <sup>25</sup>

Disadvantaged family environments can also prompt youth to seek employment. On one hand, youth may begin working as a way to establish autonomy or financial independence. On the other hand, circumstances such as socioeconomic hardship that are prevalent within households with high number of ACEs may cause youth to decide to work in order to support the family. Evaluating the number of hours spent each week at work and gathering information on

the motivations behind seeking employment can help determine which of these two explanations play a larger role in explaining the observed findings. Regardless of the reason to seek employment, long working hours can play a role in reinforcing social isolation by taking away time that can otherwise be spent connecting with the family, school, or community <sup>26</sup>.

The null results of this thesis can be explained by the individual biological and developmental characteristics that help define a child's social competency and ability to be socially connected. One of these traits, resilience, develops naturally from the normative functions of human adaptation systems <sup>27</sup>. The degree of development varies across individuals and these distinct levels of innate resilience can lead to differences in how ACEs impact a child's social and emotional wellbeing. Without including the degree of resilience exhibited by children in the models, the true association between ACEs and social connectedness could be attenuated.

Another important consideration is the influential role parents and guardians have as gatekeepers of children's lives and health. Although factors such as youth's social competency and availability of opportunities to socialize contribute to a child's capacity to socially connect with others in different settings, parents and guardians have the ability to either encourage or discourage the construction of these connections. Parents and guardians are typically the ones who monitor and allow for youth to become engaged in various activities. As a result, differences in parenting styles rather than actual exposure to ACEs may dictate whether engagement in areas of social connectedness occurs.

Lastly, the construction of each social connectedness domain may have contributed to the observed results. Each of the three types of social connectedness indicators was constructed using questions asked within the NSCH. Because the NSCH was not designed to specifically measure social connectedness, the questions available for qualifying each indicator may not have

fully captured children's social engagement. For example, youth employment was the only measurement used to construct the linking indicator of social connectedness. Besides having relationships that extend across power or authority gradients, trust in formal or institutionalized power is another aspect of linking<sup>20</sup>. The inclusion of other aspects such as trust in the community and law enforcement personnel, if this information had been available, could have better characterized this domain and provided further understanding into the significant relationship between increased number of ACEs and the greater likelihood of experiencing linking.

Despite the lack of statistical support for three of the four original hypotheses, several findings were consistent to those of existing studies on ACEs. Firstly, ACEs appear to be common amongst youth within the United States. Children aged 12-17 were estimated to have approximately 1.1 ACEs on average, which is in line with the original ACE Study's finding that almost two-thirds of study participants had at least one ACE<sup>18</sup>.

The significant associations between %FPL and engagement in bonding, bridging, and all forms of social connectedness, respectively, suggest that children from lower socioeconomic backgrounds are more likely than those from higher socioeconomic backgrounds to be socially isolated. This result parallels that of existing studies. Socioeconomic disadvantages in childhood are correlated with higher levels of exposure to childhood maltreatment and adversities such as family mental and physical disorders<sup>28</sup>. Furthermore, there exist strong associations between growing up in poverty and the lack of access to resources that stimulate young children's development. These resources include enriched home learning environments and childcare settings outside the home<sup>28,29</sup>. The aforementioned factors collectively contribute to a lower

likelihood of being in contact with opportunities necessary for the development and maintenance of social connectedness.

Although the NSCH is one of the largest and most comprehensive surveys examining children's health in the United States, several limitations exist. Data from the survey were collected in a cross-sectional manner, meaning that causality cannot be established. ACEs reported by respondents may not have necessarily occurred before establishment of social connectedness. Additionally, these responses may be affected depending on the mental health status of the parent or guardian.

The data analytic strategy used for the purposes of this thesis should also be considered. ACEs were analyzed as a continuous variable in the logistic regression models used for this thesis. Other approaches of categorizing ACEs may provide additional insight as to how this exposure influences social connectedness. Moreover, it is important to note that model-adjusted odds ratios rather than risk ratios were presented in this thesis. Existing literature has discussed the benefits of estimating model-adjusted risk ratios from logistic regression models in complex survey settings when the prevalence of the outcome of interest is greater than 10%<sup>30</sup>. Compared to model-adjusted risk ratios, odds ratios have a tendency to overinflate associations in these types of datasets. However, this should not be a major issue in this thesis since the observed magnitudes of associations between ACEs and engagement in different areas of social connectedness were small. There should therefore be no real appreciable differences between the odds ratios and the model-adjusted risk ratios<sup>31</sup>.

Despite the limitations of this thesis, this study is one of the first to examine the association between ACEs and social connectedness using data from a nationally representative sample of children. The results reflect the complicated nature of ACEs and how many variables

play a role in dictating whether adverse experiences affect the immediate and long-term health of individuals. However, recognizing that ACEs are common within the population should reconfirm the importance of encouraging health professionals to identify and understand the ACE history of individuals, especially amongst children who may be still at risk for accumulating more adverse experiences.

Future studies can explore ways to better understand the relationship between ACEs and social connectedness. Incorporating potential mediators such as opportunities available to be socially engaged, parental ACEs history, and parental mental health status into the current models may provide further insight on this topic. The development of a standardized method of measuring ACEs and social connectedness can similarly improve the understanding of this relationship. As more research studies focus on this topic, it becomes crucial for standardized scales to exist so that various study results are comparable to each other and generalizable to the public. The interaction ACEs had with percent federal poverty level in several of the models should also be considered in light of existing research suggesting the inclusion of socioeconomic status in future revisions of the ACE scale<sup>32</sup>.

The main public health implication of this thesis is for health professionals to focus on providing opportunities for youth to become socially engaged outside of the home. Youth with higher ACE counts, in particular, should be targeted since the likelihood to be bonded with the family decreases with each additional ACE. For these youth, being socially connected to the community and other formal institutions will allow them to build the resilience and social capital necessary to achieve and maintain positive health outcomes. Identifying the families of children with high ACE counts and providing them with home visits and parenting training can also help promote early childhood development and improve parent-child interactions. The ACE history of

working youth, in particular, should be monitored since those with higher ACE count are more likely to be employed. Finally, further research is necessary to examine the consequences of youth employment. A specific area to explore is whether employment status prevents youth from taking full advantage of other extracurricular and community activities. Together, these efforts will prevent youth from falling into isolating social environments that can be detrimental to their immediate and future wellbeing.

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## TABLES

**Table 1.** Population Characteristics of Sample Aged 12-17 Based on NSCH 2011/12 Data

Characteristic	Estimated Population N=25,110,211	Estimate <sup>b</sup>	95% Confidence Interval	Respondents N= 34,601 <sup>a</sup>
Adverse Childhood Experiences	24,824,679	1.10 ± 1.50	--	34,233
Age				
12-14 years old	12,372,050	49.3	(48.1, 50.5)	16,157
15-17 years old	12,738,160	50.7	(49.5, 52.0)	18,444
Sex				
Male	12,850,431	51.2	(50.1, 52.5)	18,110
Female	12,230,928	48.8	(47.5, 50.0)	16,453
Race/ethnicity				
White, non-Hispanic	13,775,176	56.1	(58.4, 57.4)	23,698
Black, non-Hispanic	3,521,733	14.4	(13.5, 15.2)	3,190
Hispanic	5,003,812	20.4	(19.2, 21.7)	3,780
Other, non-Hispanic	2,250,542	9.2	(8.4, 10.0)	3,218
Federal Poverty Level (%FPL)				
< 100% FPL	4,855,085	19.3	(18.3, 20.4)	4,436
100-199% FPL	5,156,730	20.5	(19.5, 21.6)	5,805
200-399% FPL	7,254,707	28.9	(27.8, 30.0)	10,684
400%+ FPL	7,843,688	31.2	(30.2, 32.3)	13,676

<sup>a</sup> Numbers of respondents that provided valid responses regarding the specific population characteristic.

<sup>b</sup> Table values are **mean ± SD** for continuous variables and **weighted percent estimates (%)** for categorical variables.

**Table 2.** Population Distribution of Social Connectedness Based on NSCH 2011/12 Data

Domain of Social Connectedness	Estimated Population N=25,110,211	Weighted Percent Estimate (%)	95% Confidence Interval	Respondents N= 34,601 <sup>a</sup>
Bonding (Family)	19,482,970	77.7	(76.7, 78.7)	34,553
Family eats meal together everyday	8,420,641	33.7	(32.5, 34.8)	34,502
Family talks and shares ideas with child	16,248,680	64.9	(63.7, 66.1)	34,530
Family knows all of child's friends	5,439,674	21.8	(20.8, 22.7)	34,473
Bridging (School/ Community)	23,062,688	92.2	(91.5, 92.8)	34,559
Child participates in sports	14,815,541	59.0	(57.8, 60.3)	34,576
Child participates in clubs	15,346,567	61.2	(60.0, 62.4)	34,568
Child participates in other organized activities	8,646,270	46.1	(44.7, 47.5)	25,842
Child participates in volunteer work	19,671,788	78.7	(77.7, 79.8)	34,497
Linking (Institution)	7,009,388	28.1	(27.0, 29.1)	34,454
Child earns money from work	7,009,388	28.1	(27.0, 29.1)	34,454
All dimensions of social connectedness <sup>b</sup>	5,164,254	20.7	(19.8, 21.6)	34,470

<sup>a</sup> Number of respondents who provided valid responses regarding engagement in the specific area of social connectedness.

<sup>b</sup> All dimensions of social connectedness refers to engagement in bonding, bridging, and linking.

**Table 3.** Bivariate associations between study variables and engagement in social connectedness<sup>a</sup>

Characteristic	Bonding	P <sup>b</sup>	Bridging	P <sup>b</sup>	Linking	P <sup>b</sup>	All forms of social Connectedness <sup>c</sup>	P <sup>b</sup>
Adverse Childhood Experiences	1.4 ± 0.04	0.120	1.6 ± 0.08	<0.001	1.2 ± 0.02	0.790	1.2 ± 0.02	0.470
Age		0.049		0.098		<0.001		<0.001
12-14	87.9		92.2		21.8		16.5	
15-17	86.1		90.9		34.2		23.8	
Sex		0.852		0.105		0.016		0.031
Male	87.1		90.9		29.3		21.1	
Female	86.9		92.2		26.7		19.0	
Race/ethnicity		< 0.001		< 0.001		< 0.001		<0.001
White Only	85.9		93.8		35.2		25.5	
Black Only	90.7		89.1		21.3		15.0	
Hispanic	88.1		85.7		16.4		11.8	
Other	84.8		93.2		20.8		14.0	
Federal Poverty Level (%FPL)		< 0.001		< 0.001		<0.001		< 0.001
< 100% FPL	90.4		79.9		16.6		11.3	
100-199% FPL	88.9		87.2		25.2		18.0	
200-399% FPL	86.9		95.2		32.9		23.4	
400%+ FPL	83.8		97.2		32.5		24.0	

<sup>a</sup> Table values are **column %** for categorical variables and **mean ± SD** for continuous variables.

<sup>b</sup> P-value is **χ<sup>2</sup> test** for categorical variables and **t-test** for continuous variables.

<sup>c</sup> All dimensions of social connectedness refers to engagement in bonding, bridging, and linking.

**Table 4.** Unadjusted and adjusted odds ratios (OR) between Adverse Childhood Experiences (ACEs) and social connectedness

Characteristic	Bonding		Bridging		Linking		All Dimensions of Social Connectedness <sup>a</sup>	
	OR (95% CI) Unadjusted	OR (95% CI) Adjusted <sup>b</sup>	OR (95% CI) Unadjusted	OR (95% CI) Adjusted <sup>b</sup>	OR (95% CI) Unadjusted	OR (95% CI) Adjusted <sup>b</sup>	OR (95% CI) Unadjusted	OR (95% CI) Adjusted <sup>b</sup>
Number of ACEs	0.93 (0.90, 0.97)	0.91 (0.87, 0.94)	0.87 (0.82, 0.91)	0.97 (0.92, 1.03)	1.00 (0.97, 1.04)	1.06 (1.02, 1.10)	0.99 (0.95, 1.03)	1.04 (0.99, 1.08)

<sup>a</sup> All dimensions of social connectedness refers to engagement in bonding, bridging, and linking.

<sup>b</sup> Odds ratios adjusted for age, race, sex, and %FPL.