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## Association between adverse childhood experiences, socioeconomic status, access to care and depression in adults

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# Association between adverse childhood experiences, socioeconomic status, access to care and depression in adults

## Abstract

In the United States, estimates suggest that 45% of adults endorse having experienced at least one of the ten items of the Adverse Childhood Experiences Questionnaire (Sacks, 2018). Having adverse experiences in childhood is strongly related to the development of a wide range of health problems later in life, including depression (SAMHA, 2018; CDC, 2016). However, it is not fully understood what accounts for this association. One factor that may account for the relationship between ACEs and depression could be lower socioeconomic status (SES). Specifically, I am proposing an explanatory model built upon the following linkages that are supported in the literature. First, having a higher number of adverse experiences (ACEs) in childhood is associated with coming from a background of lower-income (Font and Maguire-Jack, 2016). Second, SES has been found to be a consistent predictor of symptoms of depression in adults (Kessler et al. 1994). Finally, given these relationships, I am proposing that the association between ACEs and symptoms of depression will be mediated by SES. Additionally, a lower SES may restrict access to care for individuals, resulting in untreated mental health symptoms (Adler & Newman, 2002). The purpose of this study was to determine whether socioeconomic status (SES) and access to care account for the relationship between ACEs and depression. Data were collected from 77 participants taking an anonymous online survey through a link on social media sites. Results showed that the higher number of reported ACEs was associated with lower SES and less access to care, and these factors were associated with an increased risk of depression. Mediation analyses showed that higher ACE scores significantly predicted lower socioeconomic statuses/limited access to care and high depression levels. Also, low socioeconomic status/access to care significantly predicted high depression levels. Therefore, targeted interventions may be necessary for an individual's overall wellbeing and sustainability in society.

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ASSOCIATION BETWEEN ADVERSE CHILDHOOD EXPERIENCES,  
SOCIOECONOMIC STATUS, ACCESS TO CARE AND DEPRESSION IN ADULTS

By

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With Honors in Psychology

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### Abstract

In the United States, estimates suggest that 45% of adults endorse having experienced at least one of the ten items of the Adverse Childhood Experiences Questionnaire (Sacks, 2018). Having adverse experiences in childhood is strongly related to the development of a wide range of health problems later in life, including depression (SAMHA, 2018; CDC, 2016). However, it is not fully understood what accounts for this association. One factor that may account for the relationship between ACEs and depression could be lower socioeconomic status (SES). Specifically, I am proposing an explanatory model built upon the following linkages that are supported in the literature. First, having a higher number of adverse experiences (ACEs) in childhood is associated with coming from a background of lower-income (Font and Maguire-Jack, 2016). Second, SES has been found to be a consistent predictor of symptoms of depression in adults (Kessler et al. 1994). Finally, given these relationships, I am proposing that the association between ACEs and symptoms of depression will be mediated by SES. Additionally, a lower SES may restrict access to care for individuals, resulting in untreated mental health symptoms (Adler & Newman, 2002). The purpose of this study was to determine whether socioeconomic status (SES) and access to care account for the relationship between ACEs and depression. Data were collected from 77 participants taking an anonymous online survey through a link on social media sites. Results showed that the higher number of reported ACEs was associated with lower SES and less access to care, and these factors were associated with an increased risk of depression. Mediation analyses showed that higher ACE scores significantly predicted lower socioeconomic

statuses/limited access to care and high depression levels. Also, low socioeconomic status/access to care significantly predicted high depression levels. Therefore, targeted interventions may be necessary for an individual's overall wellbeing and sustainability in society.

## Association Between Adverse Childhood Experiences, Socioeconomic Status, Access To Care And Depression In Adults

Adverse Childhood Experiences (ACEs) are strongly related to the development and prevalence of a wide range of health problems throughout a person's lifespan, including depression (Substance Abuse and Mental Health Services Administration [SAMHSA], 2018; Centers for Disease Control and Prevention [CDC], 2016). However, it is not fully understood what accounts for this association. One factor that may account for the relationship between ACEs and depression could be lower socioeconomic status (SES). Lower SES could predict higher vulnerability to experiencing ACE events, and that ACE events predict depressive symptoms (Font and Maguire-Jack, 2016) and SES is related to depression across the general adult population (Kessler et al., 1994). Additionally, a lower SES may restrict access to care for individuals, resulting in untreated mental health symptoms (Adler & Newman, 2002). The purpose of this study is to determine whether SES and access to care account for the relationship between ACEs and depression.

This paper will begin by defining key terms that are frequently used throughout sections, such as adverse childhood experiences, depression, socioeconomic status and access to care. I will then discuss why these terms are highlighted and the importance of them, as well as how they are interrelated with one another. I will provide my specific aims and hypotheses, followed by methods and results. Then, I will conclude with final remarks in the discussion.

### **Definitions and Prevalence**

**Adverse childhood experiences (ACEs).** ACEs are events that are stressful and life-changing, including abuse and neglect at some point in an individual's life by the age of eighteen (SAMHSA, 2018; CDC, 2016). ACEs include child maltreatment such as physical abuse and neglect, sexual abuse, verbal abuse, and emotional neglect (Norman et al., 2012), as well as household dysfunction including a family member going to prison, parental divorce or separation, and caregiver mental illness or substance abuse (Felitti et al., 1998). Felitti and colleagues (1998) were the first to study ACEs as a cumulative risk factor. In a study of 9,508 participants, Felitti and colleagues (1998) examined the effects of seven adverse childhood experiences, which were psychological abuse, physical abuse, or sexual abuse; living with household members who abused any substance or substances, family members who were mentally ill or suicidal, if a family member was ever imprisoned, and violence against their mother (Felitti et al., 1998). They found that those individuals who experienced four or more categories of adverse childhood exposure, as opposed to those had not been exposed, were at 4 times the risk for some outcomes like smoking, poor self-rated health, more sexual intercourse partners, and sexually transmitted disease; and up to 12 times the risk for other outcomes such as alcoholism, drug abuse, depression, and suicide attempts (Felitti et al., 1998). They found that when the number of ACEs increased, so did the risks (adjusted odds ratio) for depression (Felitti et al., 1998). The odds ratio for depression ranged from 1.5 to 4.6 meaning that the risk of depression given a certain number of ACEs varied on factors such as age, gender, race, and educational attainment (Felitti et al., 1998). The National Survey of Children's Health (2011) examined the prevalence of ACEs during different

periods of childhood and found that the percentage of children who have two or more adverse family experiences between the ages of 0-5 is 12.5%; for 6-11 years old it is 24.4% and for 12-17 years old it is 30%. Another study estimated 46 percent of children in the United States (<18 years of age) had experienced at least one or more ACEs in their lifetime (Sacks et al., 2014). Women reportedly have higher rates of childhood emotional abuse (odds ratio of 2.7) than men (Chapman, et al., 2004). Of 9,460 participants, individuals with at any one ACE varied based on health-related concerns, from three percent to thirty percent; results showed that 20.8% of women and 14.0% of men had experienced three or more ACEs while growing up, (Chapman et al., 2004).

**Depression.** Depression is an extremely common and serious mood disorder. Roughly 16.2 million adults in the United States have experienced a depressive disorder (National Institute of Mental Health [NIMH], 2016). This mood disorder affects how you emotionally react, think, and can affect one's daily activities – e.g., sleeping, eating, or interacting with others (American Psychiatric Association, *Depression*, 2018).

Depression can also cause a lack of positive emotions and pleasure in previously pleasurable activities, also known as anhedonia (Teer & Treadway, 2017). Depression is one of the highest burdens of diseases in society (Liu, 2017). A global burden of diseases (GBD) measures the quantity of health loss from hundreds of diseases, injuries, as well as risk factors so that health systems can improve and disparities can be eliminated (Institute for Health Metrics and Evaluation [IHME], 2018). Some other diseases with high burdens are HIV/AIDS, prematurity and low birth weight, and tuberculosis (World Health Organization, 2004). The prevalence of depression in women is almost twice as

high as in men, 10.4% to 5.5% (Brody et al., 2018). Those individuals that are depressed or experience depressive symptoms can also experience suicidal symptoms. This results in depression being the leading cause of suicide and suicide attempts in adults (Fiske, 2009). Suicide was the tenth leading cause of death in 2016 (Centers for Disease Control and Prevention [CDC], 2015). Ninety percent of suicidal victims battle with at least one, if not more, psychiatric illnesses and the most common illness is depression at 57%-87% (Gonda, 2007). More than two-thirds of those with suicidal behaviors have untreated depression or depressive symptoms (Coryell & Young, 2005).

**Socioeconomic status (SES) and Access to Care.** SES is determined by the education level, income, and occupation of an individual or group (American Psychiatric Association [APA], *Socioeconomic Status*, 2017). Socioeconomic status largely determines what opportunities and privileges an individual or class of people can afford (American Psychiatric Association, *Socioeconomic Status*, 2017). Those experiencing poverty are often unable to fulfill their most basic needs in life due to their low SES (Kapferer & Michaut-Denizeau, 2014). Sachs (2005) defines poverty as the inability to meet a range of basic personal, nutritional, healthcare, sanitation and education. In 2010, 46.2 million Americans fell below the federal poverty line of \$22,314 for a family of four (Kneebone & Berube, 2011).

One way that SES affects health is through access to care. Access to care refers to the availability of affordable, quality health care for physical, social, and mental health needs (County Health Ranking and Roadmaps, Access to Care, 2018). Ziller & Leonard (2017) found that adults who had high rates of low educational attainment, low income,

and public insurance or no insurance also had barriers that make health care services extremely difficult to obtain. In 2006, there were forty-seven million citizens uninsured in the U.S. (Goodnough, 2007). There are different individualized characteristics that influence healthcare and service usage, such as socioeconomic status (Andersen, 1995). Families that have a higher socioeconomic status are able to access a better quality of services that may be needed for themselves and their children (Brooks-Gunn & Duncan, 1997). Meaning, families that have a lower socioeconomic status lack access to the same resources, potentially increasing the chance for health and developmental problems (Brooks-Gunn & Duncan, 1997). Four and a half percent of people cannot obtain health care because of how much it costs and 11.7% of people get their health care exclusively at hospitals (Centers for Disease Control and Prevention [CDC], 2017). This is not always beneficial because they miss out on opportunities for preventative care and maintaining or bettering their health status. Only obtaining medical care when it is urgent depletes their overall health and is very costly as well. Socioeconomic status contributes to the overall functioning of an individual, this also pertains to their mental health (American Psychiatric Association [APA], *Socioeconomic Status*, 2017).

### **The Relationship Between Adverse Childhood Experiences and Depression**

The probability of an individual being depressed or having depressive symptoms after ACE exposure is high; this is because ACEs and depression are strongly correlated (Liu, 2017). The more ACEs an individual has been exposed to, the greater the chance of them also having depressive symptoms or Major Depression Disorder (Merrick et al., 2017). Merrick and colleagues also found that of 7,465 adult participants, those who

reported having six or more ACEs had 2.73 times higher odds of being depressed during their adulthood. Another study explored ACEs in a sample of college students (Karatekin, 2017). They discovered that when ACEs are combined with current stress factors such as the death of a parent or failing a course in one semester, it worsened their overall mental health levels (Karatekin, 2017). This might be explained by the stress sensitization theory, which supports the idea that Adverse Childhood Experiences induce depressive responses for an individual experiencing stressful events (Simons, 1991).

The stress sensitization theory posits that an individual becomes sensitized to stress over accumulated time, resulting in a lower stress threshold. This, in turn, causes individuals to experience stressful episodes more intensely (Stroud, 2018). The stress sensitization theory supports the idea that ACEs can also lead to an individual to become sensitized to stress, increasing the likelihood of risk for mental health disorders such as depression following stressful life events (Stroud, 2018). This relates to the previously mentioned studies by correlating ACEs and depression. There is a high probability between ACEs and depression; meaning individuals that experience ACEs are likely to also have some level of depressive symptoms.

A study conducted by Hammen and colleagues (2000) examined 121 young women that were transitioning from high school to early adulthood with similar socioeconomic statuses. These women had varying levels of prior exposure to stressful life events causing depressive reactions (Hammen et al., 2000). The authors state that those who were exposed to one or more ACEs had a lower threshold and become depressed following less total stress than those women without ACE exposure. These

results mean that the young women that experienced more ACEs were at a greater risk for depression than those with less ACE exposure. This relates to the previously mentioned stress sensitization theory by providing statistics that suggest there is a high probability between ACEs and depression for individuals that have experienced stressful situations.

More generally, women compared to men, are more likely to develop depression when exposed to specific ACEs; such as domestic violence and parental disorders and alcoholism (Hammen et al., 2000). This could account for some of the gender differences in depression mentioned earlier because depression is more prevalent in women than men who experience ACEs, and some ACEs are more prevalent in females than males (Hammen et al., 2000).

Depression also impacts people that lack social support. Overall, adults with poor social support during early childhood stressful events (such as physical abuse, a subtype of ACEs), are at an increased risk of depressive symptoms later in their lifetime (Cheong, 2017). The rate of depression is increased in adults that have experienced maltreatment during their childhood. (Fergusson, Boden, & Horwood, 2008). Ege and colleagues (2014) examined 8,051 individuals aged 60 years or greater and found that ACEs are affiliated with a significantly higher cumulative risk of depression that can occur later on in life in adults by the age of 60(+).

Given the literature summarized above, the impact of adverse childhood experiences on risk for depression is quite strong. Despite having to continue to navigate through life after encountering an adverse childhood experience, many individuals also

have to battle depression along the way. Nonetheless, the high probability of depression does not mean that people exposed to ACEs are guaranteed to become depressed; there are factors that contribute to a person's depression. Therefore, placing importance on the aim of this research, which is to determine what accounts for the relationship between adults and depression.

### **Adverse Childhood Experiences and Socioeconomic Status/Access to Care**

There are many categories of socioeconomic status that can correspond to adverse childhood experiences (Glasscock et al., 2013). One study by Font (2015) found that the higher an adult's ACEs score is, the lower their income, academic success, and people with higher ACEs and lower SES are less likely to ever get married. Baum, Garofalo, and Yali (1999) suggested stressful and negative early life events could result in low socioeconomic status. Other negative experiences, like child abuse, appear to predict both lower educational attainment and wages (Currie & Widom, 2010). The confluence of these negative outcomes tends to predict further social difficulties for individuals thusly affected.

As mentioned previously, SES is related to access to health care. Adverse childhood experiences contribute to the negative effects on health (Chartier et al., 2010). The utilization of preventative healthcare such as annual checkups is scarce for people over the age of 18 that have endured adverse childhood traumatic events (Alcalá et al., 2017). Alcalá and colleagues observed 101,527 respondents and discovered evidence that suggested sexual abuse and physical abuse are the primary ACEs that lead people to utilize health care more frequently than the other ACEs. These are the main ACEs that a

person would utilize outpatient healthcare for because of the headaches, pelvic pain, and gastrointestinal disorders that can occur after the traumatic event (Alexander et al., 2005). Health care is highly utilized from young adulthood (18-29 years of age) to late adulthood (50-59 years of age) with exposure to four or more ACEs through the use of general practice (GP), emergency care (EC) and hospitalization (Bellis et al., 2017). One concern that arises when utilizing EC and being hospitalized is the cost of service. On average, the co-pay for a hospital visit is between the range of fifty dollars to one-hundred dollars (Hunt, 2018). EC is also very costly to society as a whole, especially when people do not have insurance and cannot pay (Debt.org, 2018). The cost varies for those with or without insurance and can sometimes surpass the coverage cost for those with Medicare (John Hopkins Bloomberg School of Public Health, [JHSPH], 2015). Keeping in mind that medication can be prescribed during discharge at the hospital for the maintenance of chronic health conditions (Alexander et al., 2005). One reason healthcare is scarcely utilized may be that individuals that have experienced one or more ACEs are less likely to have a personal healthcare provider or be insured (Alcalá et al., 2017). This may result in mild to moderate symptoms going untreated (for both physical and mental health), which may worsen over time. An individual experiencing ACEs would be more likely to utilize expensive emergency room services (Chartier et al., 2010).

Given that there are ten adverse childhood experiences in total and only one or two adverse childhood experiences, (sexual and physical abuse) that increase an individual's healthcare utilization is quite alarming. Not all adults that have been exposed

to ACEs have access to affordable healthcare, which may contribute to the depression and possible suicide rates of those individuals, which will be discussed below. The issue is that healthcare services are not easily accessible.

### **Socioeconomic Status/Access to Care and Depression**

Lower socioeconomic status heightens the risk for a mental disorder (Eaton et al., 2001). Of 2,962 individuals, Fiscella & Franks (1997) found that those with low incomes are significantly higher (1.6–2.0 times) to display depressive symptoms, hopelessness, and life dissatisfaction. Thirty-one percent of adults with depression had an income below \$15,000 (Ziller & Leonard, 2017). Low SES environments may also have fewer available resources for psychological care which could limit the access an individual has to mental health care (Chen, 2007). One example of how a lack of access to care could lead to worsening depression symptoms would be if an individual has lost a loved one and is feeling pretty down, however, since they do not have health insurance they ignore their sadness because it's cheaper to deal with their thoughts. Before long, their symptoms get worse, they begin to miss out on family events, work and other daily activities they once enjoyed. Eventually, the individual confesses having suicidal thoughts while in the process of attempting suicide to a close friend, the friend then reports the individual and they have to go to the emergency room for attempting suicide. The clinical level of depression and suicidality might have been prevented with access to regular and affordable health care.

The relationship between socioeconomic status and depression might be bidirectional. Adults that are depressed could have less desire to work, bringing in a

lower income or, they could be depressed because of their financial stressors. Both socioeconomic status and depression seem to have a bidirectional correlation to human suffering, such as self-blame and guilt for having depression as a hinderer to the attainment of a higher SES or having a lower SES and showing depressive symptoms (Matza, 1967). This is important because this affects the functioning of the individual with either outcome and relates to the relationship between SES and depression by decreasing their income opportunity and keeps the individual bound to a cycle of poverty and reduces their overall well-being. It relates to the relationship between SES and depression because the socioeconomic status and access to care of an individual are extremely important in relation to the mental health of an individual. Ziller and Leonard (2017) state that people with mental health concerns, such as depression, could potentially be at heightened risk of access to care barriers due to more limited financial resources needed to gain access to services. Only 40.5% of adults received care for their depressive symptoms in the United States (Han et al., 2016). This percentage could be due to the cost of healthcare; because it is known that the cost of health services is overwhelming high for low-income populations (Adepoju et al., 2015). In addition to the difficulties finding and affording healthcare services for treatment, greater challenges of finding healthcare arise when an individual has a rare and extremely specific health concern (Roy-Byrne et al., 2009). The greater challenges that arise when seeking care for rare and extremely specific healthcare include which setting the treatment is available, the quality of psychotherapy and the types of medication specific to the individual are not

readily accessible (Roy-Byrne et al., 2009). Aspects like these quickly become challenges because they are expensive, excluding more individuals that have a low income.

Race is also a factor when measuring the relationship between socioeconomic status and depression (McLloyd, 1997). African Americans and Hispanics are more likely to experience poverty; in areas such as low income, lack of education, no health insurance, jobless families and poor environmental-living areas than Caucasians (Reeves et al., 2016). The rate of unemployment in African Americans is doubled when measured against Caucasian Americans (Rodgers, 2008). Similarly, Hispanics, when compared to Caucasians are nearly 10 times more likely to have low-income rates, without possession of a high school or college degree, and be uninsured (Reeves et al., 2016). Freeman and colleagues (2016) analyzed data with a two to one ratio of African Americans and Hispanics to Whites. They found that major depressive disorder (MDD) was the most prevalent in Hispanics (10.8%) and also prevalent in African Americans but slightly lower at 8.9%. One of the focuses of this study was to examine health needs and concerns in association with depression, which included chronic diseases, functional limitations, and health behaviors. They also found that the lack of resources in the areas of education, income, health insurance or employment increased the frequency of depression (Reeves et al., 2016).

Research has found that individuals with lower socioeconomic status or those that have experienced poverty may not always have access to necessary healthcare; as well as suggesting why individuals should have access to the various treatments to be able to sustain living and function accordingly in society. Knowing that those with low

socioeconomic status have limited resources to access care, low SES also increases the risk of depression in minority groups. So with this information, does socioeconomic status and access to care account for the relationship for ACEs and depression?

### **Adverse Childhood Experiences, Socioeconomic Status/Access to Care and Depression**

There is a growing body of research that explores how adverse childhood experiences are related to socioeconomic status, access to healthcare, and depression; however, few of these studies have examined the mediating roles of SES and access to healthcare in the association of ACEs with depressive symptoms. One study that begins to address this question was conducted by Font and Maguire-Jack (2015). Their goal was to understand whether or not the association between poor health outcomes and ACEs might be mediated by socioeconomic status, and if childhood abuse has a more direct correlation than the other adversities they've encountered throughout their childhood (Font & Maguire-Jack, 2015). When assessing 29,229 participants, they found that there is a direct association with ACE scores and the probability of being diagnosed with a depressive disorder. Meaning, as the rate of ACEs increases, so does the rate of depression for an individual. These authors also found that income is negatively associated with depressive disorders. Interestingly, they found that access to health care was actually positively related to a diagnosis of depression, meaning that those with more access to care had higher rates of depression. The authors believe that access to care could increase the likelihood of finding a depressive disorder, but might not be related in the same way to depressive symptoms. In addition, and of particular relevance for the

current study, Font and Maguire-Jack found that SES appeared to act as a significant mediator in the relation of ACEs with depression. Their research suggested that there is a high probability between ACEs and depression (Font & Maguire-Jack, 2015). Individuals who have experienced ACEs are likely to also have some level of depressive symptoms (Font & Maguire-Jack, 2015). More specifically, the more ACEs a person reports having experienced in their childhood, the more likely they are to also report experiencing lower SES as adults, and the more likely they are to be diagnosed with a depressive disorder.

While Font and Maguire-Jack (2015) examined the mediational role of SES on the relationship between ACEs and depressive disorders, the current study differentiates itself from this previous work by operationalizing depressive symptoms as a continuous rather than categorical variable. That is, while Font & Maguire-Jack operationalized their negative effect variable as the presence or absence of a diagnosis of a depressive disorder, the current study operationalizes the depressive effect as a continuous variable.

### **Study Aims**

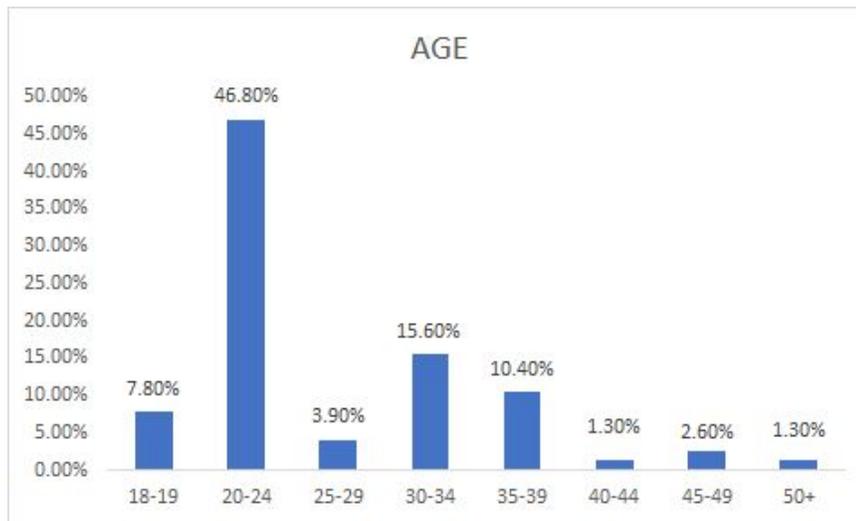
With this research, I also hypothesized that ACE scores would be negatively correlated with both participants' SES and their reported access to healthcare resources. Further, I also hypothesized that ACE scores would be positively correlated with participants' endorsement of depressive symptoms. Finally, I hypothesized that a combined variable that assessed both respondents' SES and their limited access to healthcare might act as a mediator between the previously established association between respondents' ACE scores and their endorsement of depressive symptoms.

### **Methods**

## Participants & Recruitment

This study had 77 participants. Eligibility criteria for the study included individuals over the age of 18, who read English. The average age of participants was 26.5 years old (SD = 8) and ranged from 18 to 55 (see Figure 1).

Figure 1. Age distribution of participants



Twelve percent of participants identified as males, 85% identified as female and 3% identified as transgender or non-binary. About 51% identified as White, 39% Black/African American, 5% Asian, 1% Pacific Islander and 1% race was not listed. Three percent of the participants had a high school diploma only, 46% had some college, 3% had an Associates Degree (e.g. AA, AS), 22% had at least a Bachelor Degree (e.g. BA, BS, BSW), less than 2% had a professional degree (e.g. MD, DDS, DVM, and JD) and 16% had a Doctorate degree (e.g. Ph.D., EdD).

## Procedure

Participants were recruited as a convenience sample through a shared link that was posted on social media sites (e.g. Twitter, Facebook, and Instagram). When they click on the linked, they were asked to complete an online informed consent form. Following the form is a list of mental health resources (in the event that the questions cause any distress). Then participants proceeded to the actual survey. The survey could have been taken in the privacy of the participant's homes on their own devices. This study was approved by the institutional review board.

### **Measures**

**Depressive symptoms.** Depressive symptoms were measured using the Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001; see Appendix A). The PHQ-9 is a self-administered, depression assessment, which scores each of the 9 DSM-IV criteria as "0" (not at all) to "3" (nearly every day). Some advantages of the PHQ-9 are that the depression scale is half the length of other depressive measures, the questionnaire also has dual-purpose of being used to measure depressive symptoms and/or major depressive disorder (MDD). Internal reliability of the measure has been reported as Cronbach's alpha = .86-.89. Test-retest reliability was also strong in past research,  $r = .84$  (Kroenke et al., 2001). Using a clinical cutoff of 10 or above, the sensitivity of this measure is 88% and specificity is 88% (Kroenke et al., 2001).

**Adverse Childhood Experiences.** Participants also were asked to complete the Adverse Childhood Experiences survey (ACEs; Felitti et al., 1998; see Appendix B). The ACEs Score self-report survey consists of 10 binary items, asking whether each of 10 adversities (verbal/emotional, physical, and sexual abuse; emotional and physical neglect;

exposure to domestic violence; and parental divorce/separation, substance use, mental illness, and incarceration) occurred between 0 to 18 years. The original ACE survey was created by combining questions from the Conflicts Tactics Scale (Straus & Gelles, 1990), from Wyatt (1985), and the 1988 National Health Interview Survey (1988). ACEs have been found to be related to a number of health outcomes (Felitti et al., 1998). Test-retest reliability has been reported as weighted Kappa = .64 (Dube et al., 2004) and internal consistency as Cronbach's alpha = .88 (Murphy et al., 2014).

**Socioeconomic Status.** Additionally, SES and access to healthcare were assessed using a demographic and health questionnaire created through Qualtrics (see Appendix C). A composite variable was created for this study, which included four factors: Participants' (1) annual income, (2) level of education, (3) access to healthcare (i.e., answering "yes" to any of the following questions: In the last year, have you gone without health insurance for any period of time? In the last year have you decide not to see a physician or other provider for a health problem that was concerning you because you were worried about the cost? Over the past year, at any point did you or your family go without access to physician visits, dental visits, or a usual source of health care?), and (4) risk total – i.e., the presence (+1) or absence (0) of any of the following factors were summed to arrive at the risk total: receiving food stamps, receiving WIC, receiving unemployment compensation, receiving disability insurance, receiving social security insurance, receiving Aid to Families with Dependent Children, being insured through Medicaid or Medicare, reporting looking for work. Each of the four factors was standardized. Care barriers and risk factors were reversed, and then all four factors were

combined into the SES/Access to care composite. Higher numbers on this composite mean higher SES.

### Data Analysis

Data analysis was completed in Statistical Package for the Social Sciences (SPSS; version 25; IBM, 2017). Descriptive analyses included frequencies, descriptives, and correlations. The PROCESS macro (version 2; Hayes, 2017) was used for mediational analysis to test the main study aim and used bootstrapped coefficients to test the significance of the indirect effect of ACEs on Depression symptoms through SES.

## Results

### Descriptives

The mean number of ACEs reported by participants in the study was 2.4 (SD=2.1, 78% > 1 ACE) and the mean number of depression symptoms was 8.3 (SD=6.6, 39% > clinical cut off of 10; see Table 1).

Table 1. Descriptive statistics for Adverse Childhood Experiences and Depression symptoms

	M (SD)	Range	Percent
ACEs	2.4 (2.1)	0-8	78% ≥ 1 ACEs 22% ≥ 4 ACEs
Depression Symptoms	8.3 (6.8)	0-24	39% > Clinical Cut Off (10)

In terms of SES and access to care, the median income was \$100,000, the median education was “Some college,” 48% reported at least 1 A2C barrier, and 32.5% reported at least one risk factor (see Table 2 for descriptive statistics, see Figure 2 for income distribution).

Table 2. Descriptive statistics for Socioeconomic Status and Access to Care

Income	8% Less than \$10,000 29% between \$10,000-69,999 13% between \$70,000-\$99,999 21% between \$100,000-\$149,999 22% Above \$150,000 7% chose not to disclose
Education	3% had a high school diploma 46% had some college 3% had an associate degree 22% had at least a bachelor’s degree 9% had a master’s degree < 2% had a professional degree 16% had a doctorate degree
Access to Care Barriers	48% reported at least 1 Access to care barrier
Health insurance	17% did not have insurance 80% did have insurance
Primary care access	19% reported not having primary care 81% reported having primary care
Cost prevented obtaining services	34% reported yes 66% reported no
Risk	31% reported at least 1 risk factor
Receiving food stamps	7% received food stamps
Receiving WIC	0% reported receiving WIC
Receiving unemployment compensation	1% reported receiving unemployment compensation

Receiving disability insurance	4% received disability insurance
Receiving social security insurance	4% received SSI
Receiving Aid to Families with Dependent Children	1% reported yes to family aid
Being insured through Medicaid or Medicare	8% reported being insured through Medicaid or Medicare
Reporting looking for work	7% reported looking for work

Figure 2: Income distribution



**Bivariate Correlations**

Adverse childhood experiences, socioeconomic status/access to care and depression were all moderately correlated. The higher the adverse childhood experience score reported, the lower the socioeconomic status/access to care was, making the correlation negatively correlated at  $r = -.536$  ( $p < .001$ ). There was a positive correlation between adverse childhood experiences and depression; the more adverse childhood experiences an individual experienced, the higher the depressive symptom rate ( $r = .602$ ,

$p = <.001$ ). Finally, the relationship between socioeconomic status/ access to care and depression was negative as well; the lower the socioeconomic status/ access to care the higher the depression level for the individual ( $r = .579$ ,  $p < .001$ ) See Table 3.

Table 3: Bivariate correlations

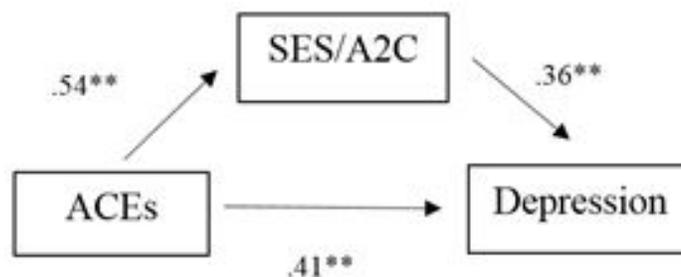
	ACEs	SES/A2C
ACEs	1	-
SES/ A2C	<b>-.536**</b>	1
Depression	<b>.602**</b>	<b>-.579**</b>

Note: \*\* $p < .001$

### Mediational Analyses

Regression analyses were used to test the hypothesis that the socioeconomic status/access to care variable would mediate the association between adverse childhood experiences and depression. This hypothesis was confirmed. Specifically, results indicated that higher ACE scores significantly predicted lower socioeconomic statuses/limited access to care and high depression levels. Also, low socioeconomic status/access to care significantly predicted high depression levels. The indirect effect of ACEs on depression through SES/A2C was also significant,  $b = .19$ ,  $SE = .06$ , 95% CI = .07-.31, see Figure 3. The relationship between ACEs and depression remained significant even after accounting for the indirect effect through SES/A2C, indicating partial mediation.

Figure 3: Mediational model



**\*p < .05, \*\* p < .01**

### **Discussion**

The results of this study helped us understand what accounts for the relationship between ACEs and depression. Results showed that adverse childhood experiences are related to a person's socioeconomic status/limiting their access to care, which is then related to a higher risk of the individual developing depression or having depressive symptoms. According to these results, the more adverse childhood experiences one has, the higher the risk of having a lower socioeconomic status and less access to affordable healthcare available. People with lower SES would be more likely to be depressed because they have more financial stressors and do not have access to healthcare for their mental needs. When an individual with low income has restricted access to care, they may not have access to psychological resources to prevent or lessen the rate of depressive symptoms that could arise which could cause more stress for the individual.

The results also confirmed past research (Liu, 2017) by showing the rate of ACEs an individual has the higher their risk for having depressive symptoms. The results of the study helped us understand what accounts for the relationship between ACEs and depression. Additionally, these results suggest preventative interventions targeted at improving SES and access to care for people with high levels of ACEs are needed (Ziller & Leonard, 2017).

According to The National Alliance on Mental Illness [NAMI (2016)], all mental health and related services should be accessible and provide individuals with an

opportunity to achieve recovery and resiliency in their lives. People living with mental illness should be integrally involved in decisions about their own treatment and ultimately decide which treatment is best for them (The National Alliance on Mental Illness [NAMI] (2016)). Sections 6.1.1-3 of The National Alliance on Mental Illness titled Health Care Reform [NAMI, (2016)] supports this idea that health care for all persons with mental illnesses that is affordable, nondiscriminatory, and includes coverage for the most effective and appropriate treatment. Treatment and services are to be equal access to affordable health care for every American. If the person cannot afford healthcare at all for their psychological concerns; NAMI supports mandatory coverage and full parity for mental illnesses that are equal in scope and duration to coverage of other illnesses, without lifetime maximum-benefit caps and other limits more restrictive than those required for other illnesses or disorders, and covers all clinically effective treatments appropriate to the needs of individuals with mental illnesses.

Despite a person having low education levels and low employment wages that are affected by ACEs, individuals have a right to access resources to better sustain their living in society. These people did not ask to be exposed to stressful and extremely detrimental events at all, especially not early on in their lives. Having access to affordable healthcare services would likely decrease the depression and possible suicide rates of those individuals with are exposed to adverse childhood experiences (Ahmedani & Vannoy, 2014). One of the most crucial time periods for the vast majority of an individual's life is the transition from high school to adulthood (Venezia & Jaeger, 2013). It is known that ACEs affect a student's academic success (Blodgett & Lanigan 2018),

meaning that ACEs may also be responsible for the completion level of education. This, in turn, may later contribute to their socioeconomic status or how much access to care an individual is able to obtain. Therefore, targeted interventions may be necessary for those transitioning from high school to college with high ACEs scores.

### **Limitations**

Some methodological limitations should be taken into consideration when interpreting the findings of this research. First, this was a cross-sectional study, given to participants via social media from March 9th, 2019 to March 27th, 2019 (19 days or 2.5 weeks). Therefore, this research is not able to establish causality to say that one factor causes another factor; this research supports the idea that these factors are related. Additionally, this may have an effect on the range of depressive symptoms or limited access to care outcomes. Since individuals had to report on their access to care retrospectively rather than accessing prospectively, they either had these barriers or they did not. There was not an option for them to develop any barriers. This research was taken through a convenience survey due to having a short timespan between data collection and presenting the research found. Also, there were no funds provided to conduct a more in-depth experiment so we used accessible forms like the PHQ-9 (Kroenke, Spitzer, & Williams, 2001), ACE survey (Felitti et al., 1998) through Qualtrics (a web-based survey generator) (Qualtrics, 2019) instead of inviting individuals to participate in more comprehensive surveys and compensate/reimburse them (e.g. gift cards).

The age range could be an indicator as to why the access to care government assistance rates were low. This study was distributed to participants through social media platforms by myself and my advisor with audiences mostly between the ages of 18-22 and over 30. This resulted in a bimodal distribution in regards to age, income level, education level, as well as race/ ethnicity. Adults between the ages of 18-22 may still be dependent on parental support than government support and Adults over the age of 30 may have an established income and do not need government support or if they do (such as social security checks) do not depend on them to sustain a living.

These results suggest that the next step is to create concrete resources and more access to care to help individuals exposed to ACEs throughout the community; such as clinics, schools, hospitals and daycare centers. Lowering depression rates could better their parenting techniques (Goodman, 2007). Lowering the cost of healthcare or having health care access could enhance family income distributions to go towards other necessities for the family. By providing parents access to healthcare to manage their stress/ depressive levels may help better their parenting techniques without mental barriers preventing the opportunity to do so.

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*Mental Health Status and Access to Health Care Services for Adults in Maine.*



Appendix A

Patient Health Questionnaire (PHQ-9)

1. Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling down, depressed, or hopeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble falling or staying asleep, or sleeping too much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling tired or having little energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poor appetite or overeating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling bad about yourself - or that you are a failure or have let yourself or your family down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Trouble concentrating on things, such as reading the newspaper or watching television

Moving or speaking so slowly that other people could have noticed. Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual

Thoughts that you would be better off dead, or of hurting yourself

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

- Not at all difficult
- Somewhat difficult
- Very difficult
- Extremely difficult

## Appendix B

## Adverse Childhood Experiences Score Questionnaire

Please mark "Yes" or "No" for each statement below.

While you were growing up, during your first 18 years of life:

1. Did a parent or other adult in the household often or very often swear at you, insult you, put you down, or humiliate you? or Act in a way that made you afraid that you might be physically hurt?
2. Did a parent or other adult in the household often or very often push, grab, slap, or throw something at you? or Ever hit you so hard that you had marks or were injured?
3. Did an adult or person at least 5 years older than you ever touch or fondle you or have you touch their body in a sexual way? or Attempt or actually have oral, anal, or vaginal intercourse with you?
4. Did you often or very often feel that no one in your family loved you or thought you were important or special? or Your family didn't look out for each other, feel close to each other, or support each other?
5. Did you often or very often feel that you didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? or Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?
6. Were your parents ever separated or divorced?
7. Was your mother or stepmother often or very often pushed, grabbed, slapped, or had something thrown at her? or Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard? or Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?
8. Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?
9. Was a household member depressed or mentally ill, or did a household member attempt suicide?
10. Did a household member go to prison?

## Appendix C

## Socioeconomic Status and Access to Care Questions

Please select your gender

- Woman
- Man
- Transgender
- Genderqueer/non-binary
- Not listed \_\_\_\_\_
- Prefer not to answer

What is your age (years)?

---

What is the highest level of education you have completed?

- Less than a high school degree (enter last grade completed)

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- High school degree
- GED
- Some college (enter years completed)

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- Associates degree (e.g. AA, AS)
- Bachelor's Degree (e.g. BA, BS, BSW)

- Master's Degree (e.g. MA, MS, MEd, MSW, MBA)
- Professional Degree (e.g. MD, DDS, DVM, JD)
- Doctorate degree (e.g. PhD, EdD)

What is your race? (select all that apply)

- White
- Black or African American
- American Indian or Alaska Native
- Asian
- Native Hawaiian or Pacific Islander
- Not listed \_\_\_\_\_

What is your ethnicity?

- Hispanic or Latino
- Not Hispanic or Latino

In the last year, have you gone without health insurance for any period of time?

- Yes, for how long? (in months)  
\_\_\_\_\_
- No

In the last year have you decide not to see a physician or other provider for a health problem that was concerning you because you were worried about the cost?

- Yes
- No

Over the past year, at any point did you or your family go without access to physician visits, dental visits, or a usual source of health care?

- Yes
- No

What is your current relationship status? (select all that apply)

- Married
- Divorced
- Separated
- Widowed
- Never married
- In a committed relationship

Please check which category on this list is closest to your household income last year:

- Less than \$10,000
- Between \$10,000-19,999
- Between \$20,000-29,999

- Between \$30,000-39,999
- Between \$40,000-49,999
- Between \$50,000-59,999
- Between \$60,000-69,999
- Between \$70,000-79,999
- Between \$80,000-89,999
- Between \$90,000-99,999
- Between \$100,000-109,999
- Between \$110,000-119,999
- Between \$120,000-129,999
- Between \$130,000-139,999
- Between \$140,000-149,999
- More than \$150,000
- Prefer to not disclose

In what way(s) does your household receive income? (Check all that apply)

- Employment
- Unemployment compensation
- Disability/workman's compensation
- Social security/SSI
- Aid to Families with Dependent Children (AFDC)
- Child support or alimony

- Food stamps
- Medicaid or Medicare
- WIC/Women Infants and Children
- Investments or rent
- Family support (e.g. from parents, other relatives)

What is your current employment status? (mark all that apply)

- Employed full time
- Employed part time (not looking for additional employment)
- Employed part time (and currently looking for additional employment)
- Unemployed looking for work
- Unemployed (stay at home with child(ren)/not looking for work)
- Retired
- Student
- Disabled