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Adverse childhood experiences and internalizing symptoms among American Indian adults with type 2 diabetes

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Abstract

Background—Decades of evidence links adverse childhood experiences (ACEs) to worse health. Despite disproportionate rates of ACEs and health disparities in tribal communities, a gap exists in understanding the effects of ACEs on American Indian (AIs) health. The purpose of this study is to estimate the frequency of eight categories of ACEs, assess the risk for internalizing symptoms by each ACE category, and determine if moderate and high levels of ACEs exposures have differential, increasing risk associated with internalizing symptoms for a sample of AI adults with T2D.

Methods—Five tribal communities participated in a community-based participatory research study. Data from AI adults with T2D were analysed (N=192). Frequency of eight childhood events and situations were assessed and exposure levels of low (0–1), moderate (2–3), and high levels (4+) of ACEs were calculated. Odds of screening positive for depression and generalized anxiety disorder (GAD) by each ACE type and moderate and high levels of ACEs were estimated using regression analyses.

Results—Relative to other studies, exposure estimates for each of the eight ACE categories and moderate and high levels of ACEs were high. Sexual and physical abuse, neglect, and household mental illness were positively associated with depressive symptoms and physical abuse was positively associated with anxiety symptoms. Exposures to moderate and high levels of ACEs were associated with increased odds of screening positive for current depression in a dose-response fashion. A high level of ACEs exposure was also associated with an increased odds of a positive GAD screening.

Conclusions—This research extends limited knowledge about ACEs and health among AIs. More research is needed to understand the health consequences of ACEs for a population exhibiting health inequities. Components of strategies for addressing ACEs, mental health, T2D complications, and comorbidities are proposed for AIs generally and AI adults with T2D specifically.

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Compliance with Ethical Standards:

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

Conflict of Interest: Jessica H. L. Elm declares that she has no conflict of interest.

Keywords

ACEs; adversity; child abuse; stress; intimate partner violence; depression; anxiety; diabetes mellitus; health disparities; health equity; Native American; historical trauma

The landmark CDC-Kaiser studies (data collected from 1995–1997), revealed that ten types of childhood stressors [i.e., emotional, physical and sexual abuse, emotional and physical neglect, intimate partner violence (IPV), living with a parent with a substance or mental health problem, parental separation or divorce, and incarceration of a household member before the age of 18], are common experiences, frequently co-occur, and exert influence on mental and physical health into adulthood [1–6]. These indicators of child maltreatment and maladaptive family functioning are conventionally and collectively known as adverse childhood experiences (ACEs) [1], [7], [8]. Research consistently demonstrates relationships between an increasing numbers of ACEs exposures and greater risk for mental health impairment [1], [4], [9], [10]. Two mental health categories linked to ACEs are depressive disorders and generalized anxiety disorder (GAD) [11]. For example, odds of major depressive disorder increases by at least two and a half times for individuals exposed to four or more types of ACEs, compared to those with no exposure [4], [5], [9], [10] and exposure to increasing numbers of ACEs is associated with increased risk for GAD [10], [14]. However, research regarding GAD in context of ACEs is limited and inconsistent [15], as most studies that include GAD assess one to a few categories of childhood stressors or a cluster anxiety disorders as the outcome of interest (e.g., [7], [16] [17]). Regarding physical health, ACEs have been linked to numerous chronic physical health conditions via direct and indirect pathways [3]. One leading cause of morbidity and mortality that is associated with ACEs is type 2 diabetes (T2D) [1], [18]. ACEs exposures are also associated with precursors and comorbidities of T2D, some of which are lead to T2D-related complications [18]–[20].

Despite decades of evidence that ACEs lead to worse health [1, 3, 5, 6] and that AIs experience disproportionate rates of ACEs [6], [10], [21]–[23] and disease [24], [25], there is a gap in understanding the effects of ACEs on health for American Indians (AIs). The present study estimates the frequency of eight types of ACEs and examines risk for depression and generalized anxiety disorder (GAD) by each singular ACE type and determines whether moderate and high levels of ACEs exposures have differential, increasing risk for internalizing symptoms for a sample of AI adults with T2D. This important research begins to identify factors to be addressed within prevention and early intervention programming, as well as mental health treatment, specifically for AIs managing a chronic health condition. This knowledge such as this is valuable to tribal leaders and health administrators for decision making processes regarding primary and secondary public health prevention priorities and strategies.

Materials and Methods

Study design, sample, and procedure

The Gathering for Health (G4H) study is a collaborative research endeavor between the University of Minnesota, and five tribal nations in the Midwest, Great Lakes region. The

broad goal of the project was to advance measurement of stress processes, investigate stress process interactions, and evaluate T2D disease progression and treatment compliance in context of stressor exposures and physical responses to stressors for AIs with a T2D diagnosis. Each of the participating nations passed a tribal resolution in support of the parent study prior to the submission of the research proposal. The study followed community-based participatory research (CBPR) principles. Project methodology and human subjects approval was granted by the University of Minnesota institutional review board (IRB) and the Indian Health Service (IHS) National IRB. All papers resulting from the study are reviewed by the local Community Research Councils (CRCs) from each participating reservation and the IHS National IRB prior to submission for publication.

The G4H study involved two major phases. The first was a qualitative phase with two sets of focus groups conducted to identify community relevant stressors and to review and adapt survey instruments. Following the qualitative phase, the CRCs worked in close collaboration with the research team to review items and instruments for breadth, redundancy, and cultural relevance. The second phase of the study involved collection of survey data using computer-assisted personal interviews (CAPI) and laptops, and saliva samples across four waves. Cross-sectional data presented in this study are from Phase II, baseline (wave 1) CAPI responses. Baseline data collection began in November 2013 and concluded in November 2015. Participants received a $50 incentive for completion of the CAPI.

Tribal health clinics from each tribal community were active partners involved in sampling procedures. Staff at each clinic generated simple random samples based on clinic records and mailed invitations and brochures to potential participants. Inclusion criteria were recent diagnosis of T2D, age 18 or older, and self-reported AI or Alaska Native. A total of 344 individuals were selected for invitation to participate in the study, of which 43 were ineligible, 96 declined participation, and 11 could not be contacted. The baseline study response rate was 67% with 194 participants enrolling in the study. Because our sampling protocol relied on clinic-based staff to send study invitations and record refusals, we could not reliably document reasons for refusal to participate in the study. For these analyses, we included responses from 192 participants who completed the baseline CAPI.

Interview visits were conducted by trained community interviewers and scheduled at a location of participants' choosing. Interviewers gathered signed informed consent and HIPAA authorization forms prior to administering surveys. Survey questions were asked and recorded by the interviewers except for sensitive questions including the childhood adversity series. Participants read, listened, and responded to sensitive questions privately on laptops.

Measures

Dependent variables—Depressive symptoms were measured using responses to the nine-item Patient Health Questionnaire (PHQ-9; [26]). Individuals were asked to report if they have been bothered by various symptoms over the past 2 weeks (0 = not at all, 1 = several days, 2 = more than half the days, and 3 = almost every day), with a possible range from 0 to 27 and higher scored indicating worse symptoms. Based on recommended scoring, participants with scores of 10 or higher were considered to have met the criteria for

moderate depressive symptoms [27], [28] and were coded as '1'. Cronbach's alpha for the PHQ-9 was .88 in this study.

The seven-item Generalized Anxiety Disorder-7 (GAD-7) instrument was used to assess fear and anxiety-type symptoms [29]. Participants were asked how often, during the last 2 weeks, they were bothered by each symptom (0 = not at all, 1 = several days, 2 = more than half the days, and 3 = almost every day), with a possible total score range from 0 to 21 and higher scored indicating worse symptoms. A score of 10 on the GAD-7 is considered an appropriate cut-off score for assessing moderate to severe anxiety. Thus, a dichotomous variable was created to indicate moderate to severe symptomology (>/= 10) [29]. Cronbach's alpha for the GAD-7 was .92 in this study.

Independent Variables—Eight categories of childhood adversities were assessed using items from the Adverse Childhood Experiences – International Questionnaire (ACE-IQ) [30]. The ACE-IQ retrospectively measures ACEs that occurred during the first 18 years of life. With the exception of neglect, items and methods for scoring were chosen to closely align with those used in the Behavioral Risk Factor Surveillance System survey [31]. For sexual abuse (4 items), emotional abuse (1 item), physical abuse (2 items), neglect (1 item), and exposure to household violence (1 item), participants were 'given the options to respond: 'never', 'once', 'a few times', 'many times', and 'don't know / refused'. For items related to living with a substance abuser, someone with mental illness, and someone who had been incarcerated during childhood, participants were asked to respond 'yes', 'no', 'don't know / refused'. A dichotomous variable for each ACE category was created. Participants were considered exposed if they answered 'once', 'a few times', 'many times' to any question in a category, or 'yes', respectively (0 = not exposed, 1 = exposed). One exception was neglect, which is not included in the BRFSS survey yet remains a salient ACE category [1], [32] was dichotomized as 1 (exposed) if the participant responded 'many times', otherwise the participant was considered not exposed [30]. A count 'ACE score' index was calculated by summing the exposures to the eight ACE variables (range = 0 to 8) for respondents who completed questions for at least 4 of the ACE categories.

Two control variables were included in analyses: age (in years) and gender (male = 0, female = 1).

Analyses

Statistical analyses were conducted using Stata, version 14 and listwise deletion. Descriptive statistics (Tables 1 and 2) and bivariate correlations were calculated for all variables. Separate logistic regression models were conducted to estimate the associations between each of the eight ACE variables and positive depression and GAD screenings (Table 3). Logistic regressions were also used to estimate the risk of a positive depression and GAD screen by moderate (2 – 3) and high (4 – 8) ACE scores (referent group: low score = 0 – 1) (Table 4). Both unadjusted and adjusted models were generated. Adjusted models controlled for gender and age. Significance was set at $p < .05$.

Results

Just over one-half (56%) of the study participants were female. The mean age of the sample was 46.3 years (SD = 12.21). Average per capita household income was $9,767 (SD = $8,901). Other sociodemographic characteristics of study participants are summarized in Table 1. Eighteen percent (18.3%) of participants screened positive for depression and 14.5% screened positive for GAD (not shown in tables).

Among [name of study] participants, the highest reported adversity was physical abuse (59.6%). Similar rates were estimated across emotional abuse, exposure to household violence, and household substance abuse (48.9%, 47.8%, and 48.1%, respectively). Sexual abuse was reported by almost a third of respondents (29.1%), as was having a household member who was incarcerated while growing up (31.8%). Almost a quarter of the sample reported living with a household member with mental illness or suicidality (21.7%; Table 2.).

Eighty-three percent (83.0%) of the [name of study] sample reported exposure to at least one ACE type. Frequencies of exposure to one and two types of ACEs were 15.9% and 15.4%, respectively. Thirteen percent (12.6%) of study participants endorsed three types of ACE exposures. Thirty-nine percent of respondents had an ACE score of four or more (not shown in tables).

ACE categories and internalizing symptoms

Table 3 shows the relationship between individual ACE categories and depression and GAD symptoms in unadjusted and adjusted models. In unadjusted models, there was a statistically significant increase in odds for screening positive for depression or GAD for 6 out of 8 ACE categories (range in odds = 2.19 – 4.04). After adjusting for age and gender, physical abuse was the only ACE to be associated with an increase in odds of screening positive for both internalizing disorders (depression OR = 4.11; GAD OR=3.01). Independently, sexual abuse, neglect, and household mental illness each increased the odds of screening positive for depression by about three times (OR range 2.95 – 3.10). The relationships between emotional abuse and a positive depression screen (OR = 2.16, p= .06) and household substance abuse and depression and GAD screeners (OR = 2.23, p = .08) approached statistical significance.

Levels of cumulative ACEs and internalizing symptoms

Levels of ACE exposure (i.e., low, moderate and high) were created using 8 ACE variables. Moderate (2 – 3) and high (4 – 8) ACEs scores were distinguishable in terms of increasing odds of positive depression and GAD screeners, as compared to the referent group (low ACEs, 0 – 1). Specifically, controlling for gender and age, participants with a moderate ACE score had 3.62 times the odds of screening positive for depression compared to those with a low ACE score. Respondents who were classified as having high ACE scores had five and a half (5.56) and nearly four (3.80) times the odds of screening positive for depression and GAD, respectively.

Discussion

Although all populations are at risk for exposure to childhood stressors [6], AIs experience inequities related to ACEs as a result of historically traumatic events and intergenerational effects. Understanding the process and outcomes of colonization and genocide is key for insight into disproportionate rates of ACEs in tribal communities. One example from recent history involves the coerced placement of AI children into long term boarding schools for the purpose of assimilation [33], [34]. Under the “care” of the government and in collaboration with churches, Indigenous students were abused and neglected [35]–[37]. This era of ethnocide not only interrupted the transmission of knowledge regarding healthy child-rearing practices, but resulted in symptoms which include complex grief and trauma, guilt, anger, shame, and substance abuse [37]–[40]. Like other oppressed groups who have experienced massive group trauma, effects of historically traumatic events often reverberated transgenerationally [41]–[43]. Ultimately, parenting capacity and parent-child attachment remain compromised for distal generations of AIs [43], [44]. In summary, cumulative individual, interpersonal, and community-wide traumatic interruptions dismantled traditional child rearing and increased incidence of mental health and substance abuse struggles for AI parents. These intergenerational effects continue to leave some Native children vulnerable to adversity [45]. Thus, today’s disproportionate rates of ACEs in Indian Country reflect colonial atrocities of the past and contribute to AI health inequities. Recalling America’s genocidal past supports ethical rationale about why research about ACEs and health inequities in tribal communities is important.

This study is among the first to investigate ACEs and internalizing symptoms for AIs. Frequencies of eight types of ACEs and levels of low, moderate, and high ACEs scores were calculated for an adult sample of AIs with T2D. Risk of internalizing symptoms was also estimated by each of the eight categories and by moderate and high levels of ACEs exposures. Major findings from this study were that exposure to a high level of ACEs significantly increased the odds of screening positive for current depression by roughly five and a half times and screening positive for current GAD by nearly four times compared to participants exposed to a low level of childhood adversity. Another important result is that the moderate ACEs exposure level was associated with increased odds of a positive depression screen by over three and a half times compared to a low ACE score. Findings on increased risk for depression by moderate and high ACEs levels follow a similar dose-response relationship pattern identified in prior ACEs studies [1], [5]. Regarding GAD, little research has been conducted on associations with ACEs. Findings from this study contibute to the knowledge about risk for GAD in context of expoure to a high levels of ACEs. Prior research is inconsistent regarding persistence of GAD as a result of ACES [7] which may help explain the lack of association between current GAD symptoms and moderate ACEs exposure. It is probable that some particpants previously experienced GAD and recovered, or that some may experience increased anxiety symptoms in the future [7].

Findings from the current study demonstrate an elevated proportion of participants exposed to a high number of ACEs and each of the eight ACEs categories compared to other studies. In this study, 39% of participants reported experiencing four or more types of ACEs; whereas the most recent national report on ACEs estimates that 15.6% of Americans

experience four or more types of ACEs [6]. Sexual abuse was reported by 29% of the [name of study] sample; whereas for both a national sample of adults with T2D and nationally representative sample the rate was 12% (Table 2) [43–44] and in another recent AI adult study, sexual abuse was estimated to be 16% [10]. Rates of emotional abuse appear to be disproportionately high among [name of study] participants. Close to half of [name of study] respondents reported experiencing emotional abuse compared to 34% of the nationally representative sample with T2D [46]. In prior AI studies, estimated emotional abuse rates range from 23% to 48% [10], [22], [45], [48]. For physical abuse, comparing rates across studies is challenging because of overestimation in these data (i.e. our estimate includes spanking). However, we take note of the difference across studies (59.6% versus 17% −18%) (See also Table 2.) because physical abuse was the only form of adversity significantly correlated with positive screenings of both depression and GAD. In the [name of study] study, the prevalence of living with an individual with mental illness or who exhibited suicidality was the lowest of all ACEs that were investigated (21.7%); however, this rate was still high compared to other national studies (16 – 17%) [46], [47]. Furthermore, approximately 18% of nationally representative samples, with and without T2D, reported witnessing IPV when growing up versus 48% of the [name of study] sample who witnessed IPV or other forms of household violence. In this study, having grown up among household substance abuse was high (48.1%) compared to the national samples (27.6 – 29.9%) [46], [47]. Lastly, in our study, we found that over one-third (31.8%) of respondents reported having grown up with a household member who went to jail or prison versus 6.6 – 7.9% in national samples [46], [47].

These analyses identify positive correlations between four categories of ACEs (i.e., sexual and physical abuse, neglect, and having grown up with a household member with mental illness) and a positive depression screen, when controlling for age and gender. Physical abuse was also significantly associated with a positive GAD screen. Exposure to emotional abuse and a household member with substance abuse challenges, approached significance for increased risk for depressive symptoms, while the same was true for household member substance abuse and a positive GAD screen. Despite the low sample size, this study observed trending associations between both household violence and incarceration with a positive internalizing disorder screening.

Implications

Primary prevention of ACEs and secondary prevention and treatment of internalizing symptoms and comorbidities are important goals, particularly for populations at greater risk for poor health and early mortality. Our research team supports tribal nations as they exercise their sovereign rights to define their own trauma-informed approaches to disease prevention and health promotion and services. Potential disease prevention and health promotion and services strategy components regarding ACEs, mental health struggles, T2D-related complications, comorbidities are discussed here. First, this study supports the need for integrated health care with an effective screening, referral, assessment, and treatment system within AI serving health clinics. As supported by prior research and analyses from this study, universal mental health screenings are appropriate for all AIs, including patients with T2D, because of widespread high levels of ACEs exposures; serious threats to mental

health and comorbidites [10]. This is exemplified in recent findings that AIs remain at highest risk for exposure to four or more types of ACEs compared to other racial groups. This same study estimated that elimination of ACEs could reduce depression by 44.1% [6]. Aligned with prior study findings and as shown in the current study, a positive screen for internalizing symptoms likely indicates early life stressor exposures that contribute to current mental health status. Thus, a positive depression or GAD screening in the primary care setting should result in referral to behavioral health for a comprehensive biopsychosocial assessment to determine need for mental health treatment. For those reffered to treament, ACEs are likely a relevent factor in addressing internalizing symptoms. AIs with T2D and internalizing symptoms, tend to have reduced medication adherence [49] and increased risk for secondary complications [20]. In addition to improving quality of life for TD2 patients who reduce internalizing symptoms, mental health treatment may act as prevention for T2D-related complications (e.g., amputation, blindness) and multimorbidities [20], [50], [51].

For tribal communities, many barriers stand in the way of implementing well functioning integrated health care, such as referrals from primary care to behavioral health and services often not available at tribal health clinics. One major challenge is that Congressional allocations for IHS consistently fall short of meeting the level of need for patient services. This can leave administrators and providers with difficult decisions regarding prioritizing service delivery. For example, screening is one specific service that suffers as a result of inadequate resources [52]. Thus the above recommendation to implement consistent screening, referral, assessment, and treatment as part of a larger integrated care and behavioral health agenda is far from reality for many tribal clinics unless Congress acts to incarease appropriations for IHS. Findings from this study regarding the high levels of trauma-based behavioral health challenges among those with chronic physical health issues suggest that increased funding to support implementation and expansion of integrated health care may have dramatic effects in reducing health care costs long-term. It is recommended that Congess propose to fully fund IHS in order to support effective integrated health care.

The Special Diabetes Program for Indians (SDPI) is a federal funding mechanism that fills health services gaps while addressing the T2D epidemic in tribal communities. Tribal programming focused on improving physical health, diabetes education, and T2D prevention is supported through SDPI and has been modestly successful thus far (e.g., reducing levels of obesity through lifestyle modifications) [53]. The present study supports updating SDPI program development guidelines to increase tribal capacity for mental health screenings, referral, assessment, and treatment which may boost the effectiveness of SDPI programs. Furthermore, it is echoed that additional research findings be translated into policy and practice for promoting mental health for AIs managing T2D (e.g., increased access to cultural activities) [54].

Existing models and programs for preventing and addressing ACEs and promoting intergenerational health can be adopted or adapted to serve tribal communities [55–56]. One model is *Self-healing Communities* which helps build capacity by relying on strong leadership to link, enrich, and establish strategies and service systems to improve wellbeing. The model works by engaging community members, service providers, experts, funders, and

other key partners to create linkages and foster dynamic, adaptable support systems that assist individuals on a continual basis; not limited by the duration of involvement with an individual service. This ongoing support is achieved through embedding resources within a community context and through taking a social network approach [55]. Programs such as *Family Spirit*, an early childhood home visiting program for AI mothers and children, may have long-term effects in reducing intergenerational ACEs exposure. This program decreases internalizing symptoms and substance use among AI mothers [56], reducing the likelihood that the next generation will grow up in a household with mental illness and substance abuse.

Limitations and future research

Similar to other studies examining the effects of ACEs, this study uses cross-sectional retrospective data. Although caution should be taken when drawing causal inferences from these associations, well-established methods were used in this study to draw comparisons between nationally representative samples and AIs. Data derived from this research involves a retrospective report of childhood events that, for many respondents, took place decades ago. For the current generation, childhood adversity frequencies could vary significantly.

Future studies should use prospective data to examine causal relationships between ACEs and health outcomes, as well as additional stressors that contribute the mental distress for AIs, particularly those with T2D [57], [58]. Longitudinal analyses should also examine ACEs in relation to T2D management and complications, such as internalizing symptoms as mediating factors. Future work should consider a more expansive assessment of mental disorders, beyond those screened for in this study, and which have been found to influence physical health for AIs with diabetes [59]. Along these lines, co-morbid mental health conditions in context of living with T2D are deserving of additional attention from researchers. Other considerations for future research should include addressing potential shortcomings involved when administering the conventional Kaiser/CDC ACEs index. This index has limited validity testing with diverse populations and with current pediatric populations [60], [61]. There may be alternative or additional ACEs, outside of those presented in this study, that drive health outcomes for AIs and other people of color (e.g., discrimination). Lastly, it is also important to determine if there are distinct patterns and compositional variations of ACEs that AIs experience.

Conclusion

This research expands knowledge about ACEs among AIs, particularly those living with T2D. Frequency for eight categories of ACEs and levels of low, moderate, and high ACEs were calculated. Risk for internalizing symptoms was assessed for each of the eight ACE categories and for moderate and high levels of ACEs. High frequencies of each of the ACE categories and for high ACEs exposures were identified. Risk for screening positive for depression and GAD increased in relation to higher levels of ACEs. Components for strategies for addressing ACEs, mental health, T2D complications, and comorbidities were offered with acknowledgement that tribes are sovereign entities and make their own decisions. More research is needed to understand the health consequences that may result from childhood adversities for AIs.

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Table 1.

Sociodemographic characteristics of Gathering for Health study participants (N= 192)

	Percent (%)	Mean (SD)
Age (years)		46.3 (12.2)
Female	56%	
Resides on reservation	78%	
Relationship status		
Married	31%	
Divorced	23%	
Other	46%	
Employment status		
Full time	49%	
Part-time	11%	
Unemployed	12%	
Disabled	12%	
Retired	4%	
Student	3%	
Other	9%	
Educational attainment		
Less than high school	13%	
High school / equivalent	32%	
Some college / vocational *	41%	
College degree	13%	
Advanced degree	1%	
Per capita household income		$9767 ($8901)

* Some college, technical or vocational certificate, or associate's degree

Table 2.

Proportion of American Indian adults with type 2 diabetes (T2D) from the Gathering for Health study and adults from a nationally representative sample (BRFSS) with T2D who experienced each ACE category

	[name of study]	BRFSS with T2D
Sexual abuse (n=175)	29.1%	11.6%
Emotional abuse (n=182)	48.9%	33.7%
Physical abuse (n=178)	59.6%	16.7%
Neglect (n=181)	12.4%	n/a
Household violence (n=180)	47.8%	18.0%
Household substance abuse (n=181)	48.1%	29.9%
Household mental illness/suicide (n=180)	21.7%	16.1%
Household incarceration (n=179)	31.8%	6.6%

Table 3.

Odds of a positive screen for depressive and generalized anxiety disorder by adverse childhood experiences category (N=186)

	Depressive Symptoms OR (CI) - unadjusted	Anxiety Symptoms OR (CI) - unadjusted	Depressive Symptoms OR (CI)	Anxiety Symptoms OR (CI)
Sexual abuse	3.04 (1.36, 6.80) **	2.31 (.97, 5.54) a	2.95 (1.26 – 6.89) *	2.01 (.76, 4.67)
Emotional abuse	2.23 (1.03, 4.84) *	1.97 (.85, 4.58)	2.16 (.99, 4.72) a	1.81 (.746, 4.40)
Physical abuse	4.04 (1.58, 10.38) **	2.77 (1.06, 7.27) *	4.11 (1.60, 10.61) **	3.01 (1.09, 8.29) *
Neglect	3.32 (1.30, 8.50) *	2.93 (1.07, 8.01) *	3.10 (1.17, 8.18) *	2.43 (.81, 7.29)
Household violence	1.54 (.73, 3.28)	1.78 (.77, 4.09)	1.46 (.68, 3.13)	1.60 (.66, 3.87)
Household substance abuse	2.19 (1.00, 4.78) *	2.48 (1.05, 5.87) *	2.08 (.95, 4.58) a	2.24 (.90, 5.56) a
Household mental illness/suicide	3.26 (1.42, 7.45) **	2.72 (1.12, 6.63) *	3.01 (1.26, 7.16) *	1.81 (.68, 4.82)
Household incarceration	1.24 (.56, 2.74)	1.95 (.84, 4.52)	1.30 (.55, 2.81)	1.88 (.76, 4.67)`

Adjusted models control for age and gender

* p = < .05

** p = < .01

a approached significance p <= .09

Table 4.

Odds of screening positive for depression and generalized anxiety disorder by moderate and high adverse childhood experiences scores among [name of study] participants (n=178)

	Depressive Symptoms OR (CI) – unadjusted	Anxiety Symptoms OR (CI) - unadjusted	Depressive Symptoms OR (CI)	Anxiety Symptoms OR (CI)
Moderate ACEs (2 or 3, referent 0–1)	3.35 (.98, 11.45) p=.053	2.56 (.72, 9.06)	3.62 (1.04, 12.49) *	3.45 (.91, 13.11) p=.07
High ACEs (4 or more, referent 0–1)	5.73 (1.83 – 17.94) **	3.89 (1.21 – 12.48) *	5.56 (1.76 – 17.54) **	3.80 (1.12 – 12.87) *

Adjusted models control for age and gender

* = <.05

** = <.01