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Adverse Childhood Experiences, Gender & Adult Alcohol Use:

A Systematic Literature Review

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Abstract

Adverse childhood experiences (ACEs) are common for today’s youth and have a direct impact on adult health outcomes across the lifespan. Traumatic childhood events are associated with mental and physical illnesses and have been closely linked to alcohol and drug use. Although both males and females use substances as a coping mechanism to dull the effects of stress resulting from the negative childhood experiences, frequency of alcohol use among genders remains dissimilar. The purpose of this systematic literature review was to examine differences in the prevalence rates of alcohol abuse among males and females who experience physical and emotional abuse as children. The Social-Ecological Model was employed to offer a more comprehensive understanding of the biological, social and structural conditions related to this topic. A review of the existing literature found evidence of significant associations between the ACE variables and alcohol use. Gender differences were found among the categories of adult alcohol use. A notable gap was uncovered in the literature regarding the relationship between specific ACEs, gender and adult alcohol use.
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Adverse Childhood Experiences, Gender & Adult Alcohol Use:

A Systematic Literature Review

Prior to 1998, there was a paucity of research detailing the relationship between childhood trauma and adult health conditions. The significance of these adverse childhood experiences (ACEs) were first revealed in a collaborative study between the Center for Disease Control (CDC) and Kaiser Permanente. Using data gathered from over 9,000 individuals from the Family Health History and Health Appraisal questionnaire, Felitti et al. (1998) found a dose-response relationship between childhood trauma and adult health outcomes. This breakthrough study led to a multitude of research over the past several decades which established, then clarified the relationship between traumatic childhood events and adult health and well-being.

The popularity of the initial ACE study and its significance to overall health outcomes led to the development of a more comprehensive child adversity survey incorporating physical, emotional and sexual abuse, physical and emotional neglect, and five areas of household dysfunction. Using the newly refined standardized survey, childhood trauma is typically assessed using a self-reporting method. The respondents are given a 10-item questionnaire and asked yes/no answers. Measurements of ACEs before the age of 18 are generally measured cumulatively but can also be measured by categorizing ACEs into types of trauma or severity profiles.

Prevalence of Adverse Childhood Experiences

A recent study using 2011-2014 information from the Behavioral Risk Factor Surveillance System (BRFSS) survey highlights the prevalence of ACEs using the most diverse and extensive sample size to date. Analyzing the data from over 214,000 respondents, Merrick et al. (2018) found 61% experienced at least one ACE and 24% faced three or more types of trauma
under the age of 18. Of the eight categories of childhood adversity measured, researchers found emotional abuse (34%) and parental separation/divorce (27%) to be the most widespread. The data revealed several sociodemographic characteristics strongly correlated with childhood adversity. Participants who identified as either black, multiracial, bisexual, having low income or education were significantly more likely to report having ACEs (Merrick et al., 2018).

Additional research from the National Survey of Children's Health (NSCH) found 55% of children ages 12-17 experience at least one form of adversity. Notably, the researchers found children experiencing one ACE frequently faced other forms of trauma. Children subjected to violence in the home were 95% more likely to be affected by additional ACEs (Bethell et al., 2017). Although childhood adversity was found to be common among all income groups, nearly 60% of those with ACEs have incomes of at least 200% below the federal poverty level. Similar to the BRFSS findings, black children are disproportionately represented, with 63% experiencing at least one form of childhood adversity (Bethell et al., 2017). These noteworthy studies not only uncover the pervasiveness of childhood adversity but help identify those most vulnerable.

Studies collecting data from the BRFSS, Kaiser Permanente Family Health History (FFH) questionnaire and the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) have indicated that females have a significantly greater likelihood of experiencing three or more ACEs, childhood sexual abuse, household substance abuse and household mental illness. (Evans et al., 2017; Giano et al., 2020; Strine et al., 2012). Additional research, collecting data from over 65,000 individuals, found male children had a greater likelihood of experiencing emotional abuse and having an incarcerated parent. (Crouch et al., 2018; Lee & Chen, 2017).
ACES and Physical Health

In the two decades following the original ACE study, researchers have uncovered relationships between childhood trauma and poor physical health outcomes. The health consequences associated with ACEs contribute to over half of the ten leading causes of death throughout the U.S. (CDC, 2019). A nationally representative survey conducted by Merrick et al. (2019) found significant associations between coronary heart disease, stroke, asthma, cancer and children who experienced multiple ACEs. In similar findings, researchers found those experiencing four or more ACEs had an increased risk of developing 23 poor health-related outcomes, including cancer, liver disease and respiratory disease. The study uncovered additional factors associated with childhood trauma, which directly contribute to poor physical health, including physical inactivity, obesity, smoking, and self-harm. (Hughes et al., 2017). Additional research has identified a link between adverse childhood experiences and adult diabetes. A study funded by the National Institute of Health (NIH) found a positive correlation between the severity and frequency of childhood abuse and the development and exacerbation of diabetes in adulthood (Huffhines et al., 2016). These well-described physical health consequences of childhood adversity highlight the importance of identifying and preventing these traumatic events to advance public health.

ACES and Mental Health

In addition to poor physical health outcomes, ACEs have a detrimental impact on mental health. Researchers estimate childhood abuse, neglect and household dysfunction directly contribute to one-third of all mental disorders (Kessler, 2010). There is ample evidence to suggest that childhood trauma elevates an adult's odds of severe depressive symptoms, suicide attempts/ideation, PTSD, borderline personality disorder and psychiatric hospitalization (Breuer
et al., 2020; Choi et al., 2020; Lee et al, 2017). In further research, Karatekin (2018) found those experiencing two or more ACEs were more than twice as likely to develop an anxiety disorder and show signs of mental deterioration. Moreover, research indicates the type and severity of childhood trauma may impact the likelihood of experiencing mental health issues. McGrath et al. (2017) found children facing sexual abuse were eight times more likely to experience adult psychotic episodes than those not subjected to abuse. When comparing children with severe and multiple ACEs to children with less severe experiences, Cavanaugh et al. (2015) found respondents in the severe/multiple profiles were up to eighty-nine times more likely to suffer from a mental health disorder. Studies such as these help illuminate the connection between childhood adversity and adult mental health outcomes.

ACEs and Substance Abuse

Recent research provides evidence to support the link between childhood trauma and substance use. Two nationally representative studies collecting data from the BRFSS and the NESARC found strong associations between children experiencing high/multiple ACEs and adult substance use disorders (Cavanaugh et al., 2015; Shin et al., 2018.) Researchers Bryant et al. (2020) found the odds of having a substance use disorder nearly doubled for those who reported having any adverse childhood experience. In a sample of over 34,000 U.S. adults, Merrick et al., (2020) found those who experienced three or more ACEs were seven times more likely to misuse opioids. Moreover, among active drug users, those with higher ACE scores have a greater likelihood of experiencing adverse effects such as relapse and drug-induced psychosis (Derefinko et al., 2019; Ding et al., 2014).
ACEs and Alcohol Use

Prior to the seminal ACE study in 1998, much of the research on childhood trauma and adult alcoholism was limited to males or females with a history of childhood sexual abuse (Chandy et al., 1996; Garnefski & Arends, 1998; Wilsnack et al., 1997). The findings by Felitti et al. (1998), found children experiencing four or more ACEs are over seven times more likely to have problems with alcohol, have led to more thorough research on the topic. Data from the BRFSS conducted in twenty-five states throughout the U.S., found respondents with four of more ACEs were nearly twice as likely to report being a heavy drinker (Merrick et al., 2019). Additional research by Jung et al. (2020) found ACEs, specifically physical abuse and physical neglect, caused individuals to be over five times more likely to engage in high-intensity binge drinking. Childhood trauma contributes to early initiation and alcohol misuse as well. Not surprisingly, young adults whose parents have substance use problems or who have experienced sexual abuse are more likely to engage in early experimentation with alcohol and have a greater likelihood of alcohol problems (Duke, 2018).

U.S. Alcohol Consumption

According to the Substance Abuse and Mental Health Services Administration (SAMSA), U.S. alcohol consumption patterns have increased for the past 25 years. Among U.S. adults, alcoholism is prevalent, with nearly 15 million adults meeting the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria for Alcohol Use Disorder (AUD) (American Psychiatric Association, 2013; SAMSA, 2019). Alcohol Use Disorder is characterized by the inability to regulate or discontinue alcohol use despite social, occupational or health consequences (American Psychiatric Association, 2013). Binge drinking and heavy drinking are common characteristics of AUD. Binge drinking, defined by the National Institute
on Alcohol Abuse and Alcoholism (NIAAA) as 4-5 drinks in a 2-hour period, has been reported by 25% of adults in the past 30 days. SAMSA defines heavy alcohol consumption, reported by nearly 7% of the adult population, as binge drinking at least five days out of the past month (SAMSA, 2019).

Heavy alcohol consumption poses significant health risks to both men and women and may lead to premature death. Alcohol-related liver and heart diseases are common and throughout the U.S., 690,000 individuals die annually from the two conditions (CDC, 2020a). Approximately 50% of liver disease deaths can be directly attributed to alcohol and prolonged alcohol use may compromise the immune system. Chronic drinking can significantly increase the risk of colorectal, esophageal and breast cancer (CDC, 2020a; National Cancer Institute, 2015). Although females drink less alcohol, less frequently than men (McCance-Katz, 2019), they are at greater risk for liver, heart and brain damage. Women who drink are more likely to develop alcoholic hepatitis, are more susceptible to alcohol-related heart disease and suffer brain damage more quickly than men (Erol & Karpyak, 2015; Hommer, 2019). The negative consequences associated with alcohol use cannot be overstated. Excessive drinking increases morbidity and mortality, and also results in negative outcomes such as alcohol-related sexual assault to traffic accidents.

Data from the National Survey on Drug Use and Health (NSDUH), found alcohol disorders and consumption patterns vary by gender. Men are more likely to report binge drinking and heavy drinking and are nearly two times as likely to be diagnosed with AUD than women (McCance-Katz, 2019). Much of the research to date has taken a biopsychosocial perspective on explaining these differences (Highland et al., 2013; MacKillop & Ray, 2018). Although, neurobiological factors, mental health, personality traits and religiosity have all been researched
to help explain gender differences, stress is fundamentally regarded as the principal factor
motivating individuals to drink and impacts males and females differently (Becker, 2017; Peltier
et al., 2019). Considerable interest is paid to the coping mechanisms used by each gender.
Several studies to date have found females were significantly more likely to internalize disorders
and males more likely to externalize disorders (Eaton, 2012; Meng & D'Arcy, 2016). Behaviors
on the externalizing spectrum include conduct that is ‘manifested outside’ such as hostility,
disobedience and aggression. Internalized behaviors are expressed inwardly and reveal
themselves through somatic complaints, social withdrawal and inhibition (Willner et al., 2016).
These findings can help explain the higher rates of depression, anxiety and social phobia in
women and the increased prevalence of defiance, antisocial and alcohol/substance use disorder in
men.

Theory

Although historically, health outcomes were frequently seen as a result of individual
choices, novel advancements in public health research have recognized the importance that both
social and environmental determinates play in both social inequities and health disparities. This
literature review was informed by the Social-Ecological Model formalized by Urie
Bronfenbrenner as a framework for interpreting and understanding human development. This
theory postulates that a person's entire ecological system should be considered to adequately
understand human behavior. An individual's behavior and development is seen as a result of the
dynamic interplay of the micro and macro systems they belong to (Bronfenbrenner, 1992).
Healthy People 2020 uses an action model incorporating each level of the Social-Ecological
Theory as part of the methodology for reaching their goals (U.S. Department of Health and
Human Services, 2008). Moreover, the Social Ecological Model is commonly used by the CDC
as a framework for prevention and to better understand the variables which influence health outcomes (CDC, 2020b). The CDC incorporates four levels of the social-ecological model:

- The Individual level encompasses psychological makeup, genetic, developmental history, identity, gender, age and health
- The Relationship level incorporates family members and peers, and how these factors influence behavior
- The Community level recognizes schools, neighborhoods and surrounding culture as critical elements of a person's behavior and development.
- The Societal level considers social classes/conditions, economic and educational opportunities and norms and values of the society as crucial factors contributing to health outcomes.

The factors that influence ACEs and the circumstances which contribute to both males and females' alcohol use are critical to ameliorating the prevalence of childhood adversity and its detrimental impact on alcohol consumption. The Social-Ecological Model is a valuable resource for identifying and understanding the web of multi-level factors that contribute to the issue. The significant association between ACEs and negative health outcomes necessitates a thorough evaluation of the scholarly articles through the lens of this model. Notably, most literature reviews to date that investigate ACEs and adult alcohol use, either fail to include substantive gender information in the results or fail to adequately address the reasons that childhood adversity may lead to alcohol use. Additionally, much of the research that incorporates gender differences in alcohol use among ACE victims neglects to specifically document the exact types of adverse experiences. Instead, the studies primarily analyze cumulative ACEs or group childhood experiences into exclusive but broad categories (i.e., mild, moderate or severe forms
of abuse). The prevalence of ACEs, the considerable number of studies which document a strong correlation between childhood trauma and alcohol use and the devastating effects of alcohol warrant further exploration of this topic. This article aims to extend the literature by reviewing the existing research related to ACEs and adult alcohol use, highlighting gender differences and prevalence rates.

**Research Goal & Specific Aims**

Each year tens of thousands of Americans die from alcohol-related illnesses and accidents (CDC, 2021). Government agencies such as SAMSA and the NIAAA work tirelessly to inform prevention and treatment efforts but have negligible impact on reducing U.S. alcohol consumption. Although the last two decades have provided substantial research on ACEs, there remains a paucity of data relating to specific types of childhood adversity, gender and alcohol use. A significant portion of the studies are directed toward screening, prevention and intervention efforts. Yet, childhood adversity and the ensuing negative health outcomes continue to persist for both men and women. However, there remains a critical need to identify, evaluate and document the relevant literature to expose specific gaps and summarize the available knowledge.

Therefore, the research question of this systematic literature review is: Are there gender differences in the prevalence rates of alcohol abuse among adults who experience physical and emotional abuse as children as measured by the Adverse Childhood Experiences (ACE) survey tool? Additionally, the specific aims of this study are to:

a. Determine the impact of gender on alcohol use prevalence rates for adults who have suffered physical and emotional adverse childhood experiences.
b. To examine how individual, relationship, community and societal variables impact ACEs and the differences in adult alcohol use between males and females by applying the Social Ecological Model.

**Methods**

The present study used a systematic literature review to identify the role of childhood physical and emotional abuse on adult alcohol use and how prevalence rates may vary between males and females. The search was designed to focus on the most current, high-quality, methodologically sound studies in the fields of public health, adolescent health, psychology and addiction.

**Search Strategy**

The electronic databases PubMed, PsycINFO, CINAHL, SAGE and ScienceDirect were assessed. Additionally, federal & private data sources such as the National Survey of Children's Exposure to Violence and National Epidemiological Survey on Alcohol Related Conditions were explored to find relevant data published between 2010-2021. Each study and report was examined for applicability by initially reviewing the title and abstract. Studies examining only one gender (i.e., ACEs, alcoholism and females) were incorporated due to the paucity of existing research and the ability of such articles to inform the current review. The search terms used to identify applicable publications were "adverse childhood experiences" or "ACEs" AND "adult alcohol use disorder" OR "alcoholism" OR "addiction". In combination with the above search terms, the keyword "gender" was used in combination with the AND statement throughout the search query to target relevant results. Additionally, the present study reviewed Google Scholar, and reference lists at the end of pertinent articles to identify studies that had not yet been
retrieved. It is important to note, the findings only reference the binary male/female construct of gender.

**Inclusion Criteria**

This literature review is limited to peer-reviewed articles, as well as data (i.e., surveys), from federal and private data sources conducted and published within the United States. All articles must be written in the English language and must specifically document children's physical and emotional abuse under 18 years of age using the ACE survey questionnaire.

**Exclusion Criteria**

Research articles and reports do not meet the requirements for this review if they have not gone through the peer-review process or were published prior to 2010. Additionally, studies using a qualitative methodology, international studies and those using child abuse/trauma measurements other than the ACE survey tool were not incorporated.

**Study Characteristics**

This literature review is comprised of cross-sectional and prospective cohort studies. The preponderance of studies employ data from BRFSS, NESARC and Kaiser Permanente's FHH questionnaire. Study samples ranged from 1,476 to 60,598 and include both nationally representative and state-based data. Data from the studies was attained by using a correlational research design employing linear and logistic regression and utilizing participants with no ACEs as controls (i.e., 'emotional abuse' versus 'no emotional abuse'). In addition to documenting childhood physical and emotional abuse, self-reported alcohol problems, binge drinking, heavy drinking and AUD are reported. Additionally, the connection between ACEs and alcohol use during pregnancy is reported for the studies focusing exclusively on females.
To supplement the findings on physical and emotional abuse and adult alcohol use, additional literature closely related to the topic was explored through the lens of the Social Ecological Model. The all-encompassing nature of this model does not allow for every variable associated with ACEs and adult alcohol to be researched. Rather, notable peer-reviewed studies were chosen to offer a more comprehensive understanding of the biological, social and structural conditions related to this topic.

ACE Scale

The current review utilized research incorporating the ACE scale to detail childhood physical and emotional abuse and adult alcohol use. Although the ACE scale has received criticism for weighing all types of trauma the same and failing to take variables such as poverty, severity of abuse and age of abuse into consideration, the questionnaire remains prominent in the research field (Winninghoff, 2020). The shortcomings of the ACE scale limits our understanding of exactly how childhood trauma can impact adult health outcomes (McLennan et al., 2020). Despite these limitations, the ACE scale is employed by organizations such as the CDC and SAMSA to collect nationally representative data for evaluation. This review incorporates data from the ACE scale with an understanding that no child maltreatment questionnaire can take all variables into consideration. Furthermore, the preponderance of current available studies utilize ACE data in contrast to other child trauma questionnaires. The present literature review carefully considered the positive and negative aspects of the ACE questionnaire and determined that it was appropriate for the current project.
Results

Data Analysis

This review is guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) (Page & Moher, 2017) flow-chart (Figure 1). Of the 926 articles identified by the keywords in the initial search, 642 were excluded by title, 146 were excluded by abstract and 131 additional articles were excluded by screening the full text. No duplicate articles were found among the databases. The vast majority of the articles screened and excluded either failed to incorporate the ACE screening tool, neglected to incorporate gender information into the results, or placed traumatic childhood experiences into broad categories, rather than documenting the specific types of abuse. Data from the remaining seven articles was extracted, examined and incorporated into this literature review. The paucity of available literature on the topic make it unlikely to identify plausible domains. Therefore, as a practical measure, the results will be categorized by alcohol use/outcome. The studies will be analyzed and documented according to the following areas: Binge drinking/heavy drinking, alcohol use disorder, self-reported alcohol problems and alcohol use during pregnancy.

Binge Drinking and Heavy Drinking

The three articles documenting the association between childhood physical and emotional abuse and adult binge/heavy drinking include data from the BRFSS, and each incorporates a cross-sectional study design. For females, the prevalence of having one ACE varied from 20% to 22% and females reporting four or more ACEs varied between 7% and 22%. For males, the likelihood of having one ACE ranged from 24% to 27% and those reporting four or more ACEs varied from 13% to 16% (Crouch et al., 2018; Fang & McNeil, 2017; Remigio-Baker et al., 2017).
Self-reported binge drinking and heavy drinking were higher for men than for women among the articles. For women, the likelihood of physical abuse ranged from 14% to 15% and between 24% to 35% of females reporting emotional abuse. On average, 13% and 30% of men reported physical and emotional abuse, respectively (Crouch et al., 2018; Fang & McNeil, 2017; Remigio-Baker et al., 2017).

Data analysis from Remigio-Baker et al. (2017) found females who experienced emotional abuse were 57% more likely to be binge drinkers than those who did not experience childhood adversity. Similar findings are documented by Fang & McNeil (2017), reporting females who suffer from emotional abuse as children are significantly more likely (OR=1.26) to binge drink. The study by Crouch et al. (2018) found emotional abuse significantly increased the likelihood of female binge drinking (OR=1.42) and heavy drinking (OR=1.83). Only one article indicated an association between physical abuse and heavy drinking. Fang & McNeil (2017) found childhood physical abuse increased a female's odds of drinking by 34%.

For males, physical abuse was not associated with binge drinking but increased the likelihood of heavy drinking by 31%. The same study found an increased likelihood of binge drinking of only 3% for males suffering from emotional abuse (Crouch et al., 2018). Fang & McNeil (2017) found males who experienced emotional abuse as children were 32% more likely to binge drink than those not reporting ACEs. Researchers from this study did not find any significant results associating physical abuse and heavy drinking for males.

**Alcohol Use Disorder**

Using a nationally representative sample from the NESARC-III of 36,309 males and females over the age of fifty, Choi et al. (2017) found 23% of females experienced at least one ACE and 11% suffered four or more. Among this sample, 24% of males experienced one form of
childhood adversity and 11% experienced at least four. The most prevalent form of childhood adversity among this sample of aging adults, was similar for both males and females. Parental drug use was found to be the most common. As for the outcomes of interest, data from this study confirmed only one significant result. Among males, reports of physical abuse prior to the age of 18 was found to increase the likelihood of AUD by 62% (Choi et al., 2017).

**Self-Reported Alcohol Problems**

One study in this review examined the association between ACEs and self-reported alcohol problems for Kaiser Permanente members (N=7,279) using the FHH questionnaire. Strine et al. (2012) found 24% of females experienced one ACE and 15% faced at least four prior to the age of 18. Males were more likely to experience one form of childhood adversity (27%) and less likely to experience four or more (10%). Females were significantly more likely to experience emotional abuse compared to men (11% versus 8%). Detailing the relationship between emotional and physical abuse and self-reported alcohol problems, the researchers found several significant results. Women who experience emotional abuse are nearly two times (OR=1.7) as likely to report alcohol problems. Also, females who experience physical abuse (OR=1.5) are 50% more likely to report alcohol problems than those who do not report abuse. Only physical abuse in men was found to increase the likelihood (OR=1.4) of self-reported alcohol problems (Strine et al., 2012).

**Alcohol Use During Pregnancy**

Research using state-based data from the BRFSS and sampling 1,967 females examined the association between alcohol use during pregnancy and ACEs. Frankenberger et al. (2015) found that in a sample of primarily white (69%) middle-aged (mean age 34) females, 21% experienced physical abuse and 31% experienced emotional abuse as children. Moreover, these
two independent variables were found to be significantly correlated with the outcome of interest. Females who admitted to using alcohol sometime during their pregnancy were significantly more likely to report physical abuse (31.2% versus 19.7%) and emotional abuse (46.7% versus 30.1%) than those not consuming alcohol while pregnant (Frankenberger et al., 2015).

Researchers Chung et al. (2010) conducted a prospective survey (N=1,476) of pregnant women from the first prenatal visit to a year after giving birth. The sample consisted of poor (annual income less than $10,000), relatively young (mean age 24), black (71%), single (75%) females. The researchers found 30% experienced one ACE and 21% experienced at least three. Of all the ACEs studied, physical abuse (52%) and emotional abuse (27%) were the most prevalent. Furthermore, both physical abuse and emotional abuse both significantly increased the likelihood of alcohol use during pregnancy (Chung et al., 2010). Little data is given on the specifics of those results.

**Discussion**

The present literature review explores childhood physical and emotional abuse and adult alcohol use, emphasizing gender differences and prevalence rates. We found evidence of significant associations between the ACE variables and gender differences among the four distinct categories of adult alcohol use identified. Although there were some inconsistencies, the findings from the present study found females who experienced emotional abuse as children were more likely than males to binge drink, heavy drink and report alcohol problems. However, males who experienced physical abuse as children had an increased likelihood of alcohol use disorder. Two studies highlighted alcohol use during pregnancy. The findings from both studies indicate a strong correlation between physical and emotional abuse during childhood and the likelihood to use alcohol while pregnant.
Due to the limited number of studies available, it is difficult to draw strong conclusions from these sparse results. The findings were gathered from both retrospective cross-sectional studies and prospective cohort studies. Additionally, among the studies explored, the researchers applied different research methodologies and incorporated inconsistent ethnic groups. For example, ethnic groups varied from nationally representative samples to those consisting of a majority of Asian women. Moreover, the operational definition of 'alcohol use' was inconsistent among studies. Some studies relied on self-reported alcohol use and others utilizing the DSM criteria of AUD, binge and heavy drinking.

The findings from this review identify two critical gaps in the current literature. First, many of the peer-reviewed articles to date fail to analyze gender differences in the statistical analysis. A considerable amount of this research differentiates between males and females when documenting ACE prevalence. Still, it neglects to incorporate gender differences when examining the associations between childhood adversity and adult alcohol use. This lack of gender-specific data prevents a thorough understanding of the male/female differences that exist. Members of the scientific community are left to extrapolate and generalize the results, which both inhibits knowledge and leads to speculation as to the most appropriate health-related decisions. A set of guidelines are needed which require peer-reviewed articles, where applicable, to analyze gender differences in a more comprehensive manner. Such policies would expose additional risk factors and allow interventionists, clinicians, and public health officials to provide more appropriate care to individuals (Wizeman, 2012). Therefore, further research is needed to understand the relationship between ACEs, alcohol and gender adequately. Necessitates

Second, nearly all the existing research documenting the relationship between ACEs and adult alcohol use utilizes either a cumulative ACE exposure or divides ACEs into broad
categories (i.e., abuse and household dysfunction). This method of grouping ACEs limits our understanding of exactly how each form of childhood trauma impacts adult's health outcomes and hinders efforts to synthesize the available literature. Additionally, further work is needed to develop a more exhaustive survey tool and a consistent operationalized definition of childhood adversity as a predictor variable. For example, a modified childhood adversity scale incorporating additional factors such as bullying and peer/community dysfunction as well as severity, timing and patterns of abuse may be a valuable addition to the current survey tools. Moreover, the modified questionnaire would require a set of guiding principles to standardize precisely how each form childhood adversity is measured.

Among the seven articles highlighted in this review, there are additional important details to take into consideration. When generalizing the results from the articles, physical and emotional abuse, sexual abuse and living in a household with substance use, were the variables with the most consistently significant associations for adult alcohol use. Although additional research is necessary to corroborate these findings, distinguishing the specific types of childhood traumas that trigger alcohol use would be particularly valuable for both public health officials and interventionists. Furthermore, the study conducted by Strine and colleagues (2012) found that psychological distress can act as a mediating variable among ACEs and self-reported alcohol problems. For females, psychological distress was shown to mediate 18% of the relationship between emotional abuse and alcohol problems and 15% of the relationship between physical abuse and alcohol problems. Among males, psychological distress was shown to mediate 19% of the relationship between physical abuse and alcohol problems. The authors explained that, “temporary or permanent maladaptive psychological functioning as the result of stressful life events” may reveal a pathway or mechanism that helps explain the relationship between ACEs
and alcohol use (Strine et al., 2012, p. 411). This finding corresponds to the original ACE study suggesting that behaviors such as alcohol use may be used as a means to cope with unresolved childhood trauma (Felitti et al., 1998)

Throughout the seven articles reviewed, the strength of the relationship between physical and emotional abuse and adult alcohol use remained relatively low. The study conducted by Fang and McNeil (2017) suggests an additional contextual factor, income, may help explain the relationship between females and problem drinking. The researchers found females in the highest income up bracket ($75,000 & over) were four times more likely to heavy drink and two times more likely to binge drink than those with an income below $15,000/year. These findings indicate much stronger associations between females and alcohol use than any specific form of childhood trauma and alcohol use throughout the articles reviewed. According to Fang and McNeil (2017), this relationship between female alcohol use and income may be a upper-middle class phenomenon suggesting increased resources or availability as an explanation. These results run counter to the research indicating a strong correlation between income and health (Bor et al., 2017). The alcohol-harm paradox can help explain these conclusions. Probst et al. (2020) assert that low income individuals face significantly more alcohol-related harm than wealthy individuals, even when the rates of alcohol consumption is the same for both groups. This health disparity can be partly explained by inequalities in medical care, social and environmental stress and educational attainment creating substantial obstacles for low income individuals (Braveman & Gottlieb, 2014).

**The Social-Ecological Theory**

The limited amount of available research on this topic fails to provide a clear understanding of the relationship between childhood physical and emotional abuse and adult
alcohol use. However, an examination of additional literature closely related to this topic may offer valuable insights regarding the impact of ACEs on males and females and the mechanisms which lead to different degrees of alcohol use. A practical place to begin is with the social-ecological theory as utilized by the CDC (CDC, 2020b). The material below is not meant to be exhaustive, nor are the categories mutually exclusive, as all levels are interconnected, each influencing the other.

**The Individual Level**

Genetic research has made significant contributions to our understanding of adult alcohol use. Genes associated with impulse control disorders and emotional regulation have been linked to excessive alcohol use. Researchers have found individuals who inherit the D2A1 gene may experience developmental abnormalities inhibiting dopamine receptors. Those affected by this gene are significantly more likely to have difficulties controlling their impulses and are potentially more likely to seek out pleasurable activities such as alcohol use (Skewes & Gonzalez, 2013). Additional research links the A+ allele to an increased vulnerability of adult alcohol use. Highland et al. (2013) explored the relationship between the A+ allele and alexithymia – an inability to describe or recognize emotions. The study found emotional abuse during childhood was strongly correlated with alexithymia. Further research has demonstrated that alexithymia is an independent risk factor for increased alcohol consumption and alcohol dependence (Betka et al., 2018; Cruise & Becerra, 2018).

With regard to gender differences, the role of genetic factors is inconclusive among many studies, although Skewes & Gonzalez (2013) maintain male children of alcoholic parents are at significantly greater risk of experiencing an AUD than females whose parents suffer from alcoholism. Other studies assert females who encounter childhood trauma are more likely to have
difficulty regulating emotions due to altered gene expression. Damage caused to the stress-
response circuitry was found to cause biological changes making women more vulnerable to
substance use disorders than men (Myers et al., 2014; Young-Wolff et al., 2012).

Notably, the impact of epigenetic mechanisms have become increasingly apparent and
advance our understanding of genetic heritability and gene expression. These gene-environment
interactions have the ability to alter genetic activity in children exposed to trauma. To date,
research suggests that repeated exposure to ACEs, particularly sexual abuse, can lead to
increased methylation. Methylation is thought to alter the function of genes and gene expression
in response to chronic stress and trauma (Lang et al., 2019; Matosin et al., 2017). This
‘reprogramming’ of genes during childhood can have negative ramifications for children with
genetic predispositions. Blum and colleagues found individuals who are genetically predisposed
to alcoholism and who suffer from trauma at a young age may be at greater risk for problematic
alcohol use (Blum et al., 2015).

The impact of the individual level operates well beyond genetic factors. Research by
Keyes et al. (2012) investigated gender differences as they relate to childhood abuse and the
likelihood of individuals to internalize or externalize behaviors. The researchers analyzed five
types of childhood abuse and found noteworthy correlations. Male children who experience
physical abuse are significantly more likely to externalize behaviors than those who do not suffer
from abuse. Female children who experience physical abuse are significantly more likely than
controls to internalize behaviors. Further research has concluded that externalizing behaviors are
independent risk factors for AUD (Farmer et al., 2016; Meque et al., 2019). The results from
these studies correspond to the findings from this literature review, asserting males who
experience physical abuse have an increased likelihood of alcohol use disorder and alcohol problems.

*The Relationship Level*

Adult alcohol use can be highly influenced by the amount of emotional and family support received during childhood. Galaif et al. (2001) found a strong parent/child bonding experience acted as a protective factor against problematic alcohol use for both males and females.

Lending support to this perspective, further research has concluded family cohesion and family support are significantly and directly associated with lower rates of AUD and severity of alcohol use among both sexes (Caetano et al., 2017; Cano et al., 2018). Children raised in a fearful, unsupportive environment may develop insecure attachment patterns leading to poor self-image, mistrust, dysfunctional attitudes and difficulty regulating emotions. Both physical and emotional abuse experienced during childhood can lead to insecure attachment and the effects can perpetuate into adulthood (Bowlby, 1969). Studies investigating these relationships found individuals reporting insecure attachment were significantly more likely to be dependent upon alcohol and to rely on alcohol when coping with relationship problems than individuals reporting secure attachment (Levitt & Leonard, 2015; Wyrzykowska et al., 2014)

*The Community & Societal Level*

The social and environmental determinates of health have a profound impact on both ACEs and adult alcohol use. Although a complete list of these risk factors are well beyond the scope of this review, substantial research has revealed determinates such as housing instability, poverty, unemployment, proximity to liquor stores, and healthcare are not only associated with
ACEs and adult alcohol use, but add to the toxic stress of the child’s environment (Compton, 2014; Foster et al., 2018; Merrick et al., 2018; Murphy et al., 2014; Rhew et al., 2017).

Recent technological advancements have profoundly affected the way alcohol is advertised to consumers. Young adults are particularly susceptible to marketing on social media and more easily persuaded to consume alcohol (Grenard, Dent & Stacy, 2013). Online advertisers have the ability to choose platforms, most likely to influence purchasing behaviors. This form of marketing can be tailored to specific age groups, genders, ethnicities and income levels which facilitates brand identity. Strong evidence indicates the importance of developing brand preferences for alcohol at an early age. Young adults who identify with a specific brand of alcohol are more likely to begin drinking earlier (Morgenstern et al., 2014).

Interestingly, community and societal influences may affect gender differences in alcohol use. Research suggests alcohol use among the Latino culture is strongly influenced by both gender roles and social stigma. Males in these cultures are more likely to drink because they perceive the behavior as ‘masculine’. Latinas may also have a greater fear of social stigma and the perceived consequences related to women who drink excessively. Ethnic identity and motherhood act as protective factors for Latin women as well (Perrotte & Zamboanga, 2019). Conversely, a 30-year longitudinal study found among (majority white) women parenthood was more strongly associated with alcohol abuse and dependence for females than for males (Fergusson et al., 2012).

The World Health Organization has recognized the importance of resilient communities and supportive environments. The Health 2020 program understands the collective impact of social and environmental influences on individual and population health. (World Health Organization, 2017). Moreover, cooperative programs such as Building Resilient Communities
(BRC) and the Maine Building Resilience Network have proven to be instrumental in ameliorating childhood adversity and reducing disparities. These organizations strive to improve ACE screening, and health care delivery while educating the community regarding the negative impacts of childhood trauma (Ellis & Dietz, 2017; Forstadt et al., 2015). To date, there is limited consensus regarding how social and environmental determinates of health impact males and females differently. Future research should be considered to help clarify this detail.

**Strengths and Limitations**

This systematic literature review has several strengths. By identifying a critical gap in the research, future studies may be inspired to prioritize both specific ACEs and gender differences when exploring adult alcohol use. The focus of the present study highlights the need for gender targeted programs and gender-specific public health messages to dramatically decrease adult alcohol use and the consequences associated with ACEs. Recognizing how specific ACEs and gender impact males and females differently may also have vital implications in the areas of education, healthcare and social services. Furthermore, because females have been underrepresented in past alcohol research (Brady et al., 2009) a crucial strength of this review is the intentional representation of women detailing articles of alcohol use during pregnancy. By identifying these gender-specific risk factors and the subsequent negative health outcomes, this review has expanded the research on women’s health and explored the meaningful differences between males and females regarding abuse and alcohol use.

The findings contained within this systematic literature review should be considered within the context of some limitations. First and foremost, the ACE inclusion criteria of physical and emotional abuse led to a significant reduction in the number of articles available to analyze. Considering this, future literature reviews may choose to incorporate a more comprehensive
ACE variable (i.e., abuse) or elect to include research conducted outside the U.S. to procure additional studies. Also, the measure of physical and emotional abuse (as measured by the ACE survey tool) fails to distinguish between timing, seriousness or duration of abuse. Also, the ACE scale fails to take factors such as socioeconomic status and peer influence into consideration. Certainly, without assessing these factors, the stated relationships between the variables would be inexact at best. Additionally, six of the seven articles included in our review incorporated a retrospective cross-sectional study design. Importantly, results from these studies can be inaccurate due to recall and social desirability bias (Althubaiti, 2016). A comprehensive review was performed in line with our inclusion/exclusion criteria, and unquestionably the scope of research was limited. A more thorough examination of the mediating and confounding factors that influence gender and adult alcohol use may be beneficial.

**Public Health Implications**

This literature review has critical implications for public health policy. Results of the present study indicate a strong relationship between childhood physical and emotional abuse and adult alcohol use can be used to inform surveillance, intervention and prevention efforts. Furthermore, the substantial gap in the literature associated with gender highlights the need for increased awareness and further exploration of the topic.

BRFSS and other nationally representative data are customarily used to measure childhood adversities in the U.S. The findings, detailing traumatic childhood experiences and their association with negative adult health outcomes, necessitates increased surveillance. Perhaps screening for childhood trauma in primary care settings and employing additional data from child protective services (CPS), local authorities or other public databases could advance our knowledge of the prevalence and help detect those most vulnerable. Moreover, the limited
consensus on the measurement and definition of ACEs calls for further investigation. An expanded ACE scale, documenting adverse childhood experiences such as bullying, and peer/community dysfunction combined with standardized measuring techniques may lead to an enhanced understanding of the those at greatest risk (Karatekin & Hill, 2019). These revisions may improve our understanding of the negative consequences associated with childhood trauma and help public health officials tailor policies and services to more effectively serve those in need.

With regard to adult alcohol use, our findings can enable interventionists and policymakers to better understand the relationship between childhood abuse and adult alcohol use allowing more specialized strategies to be developed targeting all levels of the social-ecological model. In practice, our findings suggest an increased need to incorporate gender specific interventions and alcohol treatment strategies that include a more thorough assessment and awareness of the possible trauma faced during childhood. Our increased understanding of the social and environmental determinates of health should be taken into consideration when establishing education programs or when helping communities recognize populations at greatest risk.

Given the increased likelihood of alcohol abuse among abused females, the value of gender specific interventions becomes especially salient with regard to pregnancy. Recent data provided by SAMSA (2018) reveals nearly 5% of pregnant females report binge drinking during the prior month and 26% report consuming four or more drinks sometime during their pregnancy. Frequent drinking during pregnancy puts the unborn child at substantial risk for fetal alcohol syndrome (FAS). The birth defects resulting from FAS occur on a spectrum and include developmental, cognitive and behavioral disorders. Although prevalence rates vary considerably,
Recent research by May et al. (2018) found nearly 10% of children in several U.S. communities suffer from the effects of FAS. Prenatal alcohol exposure is recognized as one of the primary preventable causes of birth defects and is an ideal focus of gender specific interventions. Comprehensive programs incorporating education and counseling where females can address their feelings regarding past abuse learn the risks associated with alcohol use during pregnancy may be particularly valuable.

Prevention efforts aimed at reducing the structural factors which contribute to ACEs while augmenting protective factors may be a particularly sensible investment. Programs such as the ACEs Aware initiative, dedicated to reducing childhood adversity by one half in California, focuses on prevention, early recognition and evidence-based interventions. The network of social workers, doctors and therapists are taught to recognize vulnerable populations and respond to signs of trauma exposure (ACEs Aware, 2020). This model may be used in conjunction with parent training and family support programs to reduce childhood trauma and heal toxic stress throughout the U.S. Additionally, the structural factors that impact ACEs such as poverty ought to be considered. Comprehensive strategies which lower inflation, decrease unemployment and improve income distribution are needed to reduce the intergenerational transmission of poverty.

**Conclusion**

The present literature review details role of childhood physical and emotional abuse on adult alcohol use and how prevalence rates may vary between males and females. The research available on the topic suggests that females who experienced emotional abuse as children were more likely than males to binge drink, heavy drink and report alcohol problems. However, males who experienced physical abuse as children had an increased likelihood of alcohol use disorder. The limited research available on this subject restricts our understanding of the topic. By
applying the Social-Ecological Model, additional variables were found to have a significant impact on adult alcohol use as it relates to both gender and child adversity. Given this, future research and preventative frameworks should consider the broad spectrum of variables capable of influencing the relationship between child trauma and alcohol use.
References


https://doi.org/10.2147/JMDH.S104807

https://doi.org/10.1176/appi.books.9780890425596.dsm05


Bryant, D. J., Coman, E. N., & Damian, A. J. (2020). Association of adverse childhood experiences (ACEs) and substance use disorders (SUDs) in a multi-site safety net healthcare setting. Addictive behaviors reports, 12, 100293.


Figure 1

PRISMA diagram detailing systematic review process of pertinent articles. The primary investigator initially located 926 articles among the five databases. Evaluation of the titles and abstracts excluded 788 articles and an assessment of the full text excluded an additional 131 articles given that they did not conform to the inclusion criteria. A total of 7 articles remained and were incorporated into the systematic literature review.
### Annotated Bibliography

<table>
<thead>
<tr>
<th>Article</th>
<th>Purpose</th>
<th>Methodology</th>
<th>Primary Results</th>
<th>Conclusion</th>
<th>Public Health Implications</th>
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<tbody>
<tr>
<td><strong>1.</strong> <em>Original ACE Study</em> Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults*  (<em>The Adverse Childhood Experiences (ACE) Study</em> (Felitti et al., 1998))</td>
<td>To describe the connection between childhood psychological physical, sexual, abuse/neglect and household dysfunction to adult health risk behaviors, e.g., smoking, obesity, depression, suicide, alcohol drug use</td>
<td>13,494 surveys given at SD Kaiser Permanente clinic given in 2 waves. The 7 categories of childhood exposures were added giving each respondent a score of 0-7. Risk factors were assessed through the survey questions – looking at 10 risk factors that are the leading cause of mortality.</td>
<td>52% reported at least 1 ACE. Women more likely to have multiple ACES. Study found a dose-response relationship between # of ACES and many risk factors. Those with 4+ ACES have (OR:7.4) significantly greater chance of alcoholism.</td>
<td>Found a strong link between childhood adversity and adult health. Authors suggest that the exposures to adversities during childhood could create anxiety, depression and anger – Child and young adult then uses smoking and substances as a coping device.</td>
<td>Children (who experience 1 ACE) typically experience several – important for public health professionals to understand complex interactions of ACEs and how they impact health problems long term. If health risk behaviors (overeating, alcohol, drugs) are used as coping mechanism prevention efforts should focus on early childhood trauma.</td>
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<td><strong>2.</strong> Associations between adverse childhood experiences, psychological distress, and adult alcohol problems  (<em>Strine et al., 2012</em>)</td>
<td>To examine the association between male &amp; female ACEs and self-perceived alcohol problems. To determine the possible mediating role of psychological distress between the variables – to help clarify the link between the variables</td>
<td>Three surveys used, completed by 7297 respondents. Regression analysis used to check relationship between variables. Conducted mediation analysis to check the impact of psychological distress on variables.</td>
<td>Physical abuse: Female 24%, Male 28% Emotional abuse: Female 11%, Male 8% Females who reported physical and emotional abuse sig more likely to (self-report) alcohol problems. Males who reported physical abuse sig more likely to (self-report) alcohol problems.</td>
<td>Few studies look at the pathway or mechanism that links or explains ACEs and alcohol use. Psychological distress mediated emotional abuse for women and physical abuse for men.</td>
<td>Helps to understand how early (traumatic) childhood factors influence alcohol use/health outcomes. Helps explain why alcohol is used as a mechanism to cope with mental distress.</td>
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<td><strong>3.</strong> Adverse Childhood</td>
<td>To examine the differences in gender</td>
<td>BRFSS survey, 8,492 respondents in South</td>
<td>For both males and females only emotional abuse</td>
<td>Study uses more recent (2015) survey data to</td>
<td>Study allows interventionists and</td>
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<td>Experiences (ACEs) and Alcohol Abuse among South Carolina Adults (Crouch et al., 2018)</td>
<td>b/t ACEs and binge drinking/heavy drinking among adults.</td>
<td>Carolina. Used logistic regression to determine relationship between variables</td>
<td>increased likelihood of binge drinking (greater for females) The likelihood of heavy drinking increased for males who experienced physical abuse and for females who experienced emotional abuse.</td>
<td>confirm (some) literature regarding problem alcohol use and physical/emotional abuse. Current study also revealed inconsistent findings, (physical abuse) was found to be protective rather than predictive</td>
<td>policy-makers to better understand the relationship between Abuse &amp; alcohol. Study strengthens data on childhood risk factors that may lead to increased alcohol use so allowing more specific strategies to be developed.</td>
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<td>4. Is there a relationship between adverse childhood experiences and problem drinking behaviors? Findings from a population-based sample (Fang &amp; McNeil, 2017)</td>
<td>To examine the gender-specific differences b/t ACEs and binge drinking.</td>
<td>Cross-sectional BRFSS study, 39,434 respondents using heavy drinking, binge drinking, physical and emotional abuse variables – analyzed using logistic regression.</td>
<td>Prevalence rates of physical and emotional abuse similar b/t genders. Binge drinking and heavy drinking significantly higher for males. For both men and women emotional abuse increased the likelihood of binge drinking – greater for men.</td>
<td>Study confirms existing literature concerning ACEs and binge drinking but does not agree/demonstrate similar findings regarding ACEs and heavy drinking. Suggests factors other than ACEs may be affecting alcohol use (ex. income)</td>
<td>Although the link b/t childhood trauma and adult alcohol problems is well documented, public health officials should consider additional socio-economic determinates.</td>
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<td>5. Association of adverse childhood experiences with lifetime mental and substance use disorders among men and women aged 50+ years</td>
<td>To examine the relationship b/t ACEs and lifetime alcohol use disorder among older adults (50+)</td>
<td>U.S. epidemiologic survey, 14,738 respondents the study investigates the prevalence of ACEs by gender and the association b/t each type and alcohol, etc. Uses physical &amp; emotional abuse variables</td>
<td>Physical abuse: Female 17%, Male 19% Emotional abuse: Female 10%, Male 8%. Physical abuse increases likelihood of alcohol use disorder only in males (OR: 1.62)</td>
<td>Study documents long lasting negative impacts of ACEs although many of the odds ratios tended to be small. Gender differences b/t ACEs were found but only one comparing the association b/t physical abuse and alcohol.</td>
<td>Study questions the strength b/t ACEs and mental disorders. Sociodemographic variables had stronger correlation to alcohol than ACEs. Helps to broaden understanding of child adversity and health/well-being in later life.</td>
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<td>(Choi et al., 2017)</td>
<td>To examine the impact of ACEs on risky health behaviors (drug, alcohol &amp; tobacco use) among pregnant females. Study was conducted primarily on low-income individuals.</td>
<td>1,476 individuals responded to a series of 3 surveys and questionnaires were given during prenatal visits and following the birth (postpartum) at home.</td>
<td>52% of respondents reported physical abuse, 27% emotional abuse. Women reporting physical and emotional abuse were significantly more likely to drink alcohol during pregnancy than those not exposed to those ACEs.</td>
<td>For low-income women experiencing ACEs prior to the age of 16 significantly increases the likelihood of alcohol, tobacco and drug use during pregnancy. Additionally, there is a dose response relationship, whereas each additional ACE reported increases the likelihood of the taking part in the risky behavior.</td>
<td>Due to the length of time it may take to terminate alcohol, drug and tobacco use, resources should be available to women prior to pregnancy. Females should be educated at a young age to understand how the harmful effects of physical and emotional abuse can be transmitted from one generation to the next.</td>
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<td>(Chung et al., 2010)</td>
<td>To document the relationship b/t ACEs and pre-pregnancy alcohol use and alcohol use during pregnancy using the BRFSS survey in the state of Nevada.</td>
<td>1,987 mothers-to-be reported on ACEs prior to the age of 18 and alcohol use while pregnant. Study examines ACEs cumulatively and by type and controls for drinking before pregnancy.</td>
<td>21% of women reported physical abuse and 32% reported emotional abuse. Women who experienced physical abuse (p=.048), and emotional abuse (p=.011) were significantly more likely to report alcohol use during pregnancy than those who reported no abuse.</td>
<td>Childhood adversity increases the likelihood of risky behaviors during pregnancy. A strength of the study is that it controlled for pre-pregnancy drinking patterns demonstrating the independent relationship b/t the two variables.</td>
<td>Considering the prevalence of ACEs and the potential complications of drinking while pregnant further screening my be helpful to identify women who may be at greatest risk. May be valuable to highlight barriers to screening encountered by pregnant women and establish programs or interventions to overcome obstacles.</td>
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<td>(Frankenberger et al., 2015)</td>
<td>To examine the relationship b/t ACEs and health risk behaviors among the female Hawaiian population. Over 65% of respondents are</td>
<td>Using the BRFSS questionnaire, 3,354 females responded to questions regarding smoking, obesity and binge drinking. ACEs were recorded</td>
<td>15% of respondents reported physical abuse and 25% reported emotional abuse. Females experiencing emotional abuse during</td>
<td>Prior to adjusting for age, race, education etc., only emotional abuse was associated with binge drinking (OR: 1.57)</td>
<td>Majority of sample was Asian &amp; Pacific Islander – public health officials may look at cultural differences that impact results and how screening / prevention strategies</td>
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<td>obesity and binge drinking among women in Hawaii. (Remigio-Baker et al., 2016)</td>
<td>Asian &amp; Pacific Islander.</td>
<td>cumulatively and by type.</td>
<td>childhood were 57% (OR:1.57) more likely to binge drink as adults. Although after adjusting for covariates the results became insignificant.</td>
<td>Findings of current study differ from many national studies. Ethnicity of respondents may explain reasons. Many national studies Asian and Pacific Islanders are under-represented.</td>
<td>may incorporate cultural beliefs.</td>
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