HHS Public Access

Author manuscript

Child Abuse Negl. Author manuscript; available in PMC 2025 April 01.

Published in final edited form as:

Child Abuse Negl. 2024 April ; 150: . doi:10.1016/j.chiabu.2023.106524.

Adverse Childhood Experiences and Associations with Mental Health, Substance Use, and Violence Perpetration among Young Adults in sub-Saharan Africa

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Abstract

Background: Adverse childhood experiences (ACEs) can have debilitating effects on child well-being, with consequences persisting into adulthood. Most ACE studies have been conducted in high-income countries and show a graded relationship between multiple ACE exposures and

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Declarations of Interest: None

CDC Disclaimer: The findings and conclusions in this paper are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

adverse health outcomes. Less is known about the types and burden of ACEs in sub-Saharan Africa (SSA).

Objective: To estimate the pooled prevalence of six individual and cumulative ACE exposures (physical, sexual, and emotional violence; orphanhood; witnessing interparental and community violence) and assess their association with mental health outcomes, substance use, and violence perpetration among young adults in SSA.

Participants and setting: Aggregate data from the Violence Against Children and Youth Survey (VACS) in Cote d'Ivoire 2018, Kenya 2019, Lesotho 2018, Mozambique 2019, and Namibia 2019 included a sample of 11,498 young adults aged 18–24 years.

Methods: Cumulative ACEs were defined by an integer count of the total number of individual ACEs (0 to 6). Weighted prevalence and adjusted odds ratios were estimated.

Result: ACEs prevalence ranged from 7.8% (emotional violence) to 55.0% (witnessing community violence). Strong graded relationships between cumulative ACE exposure and all study outcomes for both males and females were observed. Among females, witnessing interparental violence was the only individual ACE risk factor significantly associated with increased odds of substance use; among males, emotional violence was significantly associated with all outcomes.

Conclusion: ACEs are associated with adverse mental health, substance use, and violence perpetration in SSA. Gender-specific and culturally sensitive intervention strategies are needed to effectively mitigate ACEs in this population.

Keywords

Adverse childhood experiences; mental health; substance use; sub-Saharan Africa; violence perpetration; suicide attempt

1.0. Introduction

Adverse Childhood Experiences (ACEs) are exposures to potentially traumatic events during childhood, which may interfere with the fundamental physical, emotional, and social development of a child and place them at risk for numerous health problems (Asmundson & Afifi, 2019; Chang et al., 2019; Cheong et al., 2017; Cleare et al., 2018; Cortina et al., 2012; Felitti et al., 1998; Kappel et al., 2021). ACEs encompass multiple facets of abuse, neglect, and household dysfunction in childhood, which often include physical, sexual, and emotional violence (Dong et al., 2004; Dube et al., 2003; Dube et al., 2006; Felitti et al., 1998). These experiences are common, and the negative impacts are evident across multiple domains of life (Bhushan et al., 2020; Larkin et al., 2012; Metzler et al., 2017). For example, globally, each year an estimated one billion children between the ages of 2 and 17 experience some form of violence (Hillis et al., 2016). A systematic review of the causes and risk factors for adverse health outcomes attributable to ACEs calculated that 23.4% of adults in North America experience at least one ACE, and 35.0% experienced two or more ACEs (Bellis et al., 2019). Researchers have also suggested that the frequency and intensity of ACEs may be higher in low-income settings (Anda et al., 2010). Results from a study of the largest birth cohort in Africa showed that 88% of young adults in South

Africa experienced at least one ACE, and 35% experienced four or more ACEs (Manyema & Richter, 2019). Despite efforts to implement interventions that mitigate ACEs and their adverse health outcomes, the prevalence of ACEs remains high.

Not only are ACEs common, but they often co-occur (Dong et al., 2004; Hughes et al., 2017), and the more severe the exposure, the greater the risk for psychological distress and poor mental health outcomes (Giano et al., 2020; Kappel et al., 2021; Manyema & Richter, 2019; Merrick et al., 2018; Mersky et al., 2013; Trivedi et al., 2021). Given how commonly ACEs occur and their frequent co-occurrence, it is important to understand their cumulative impact on child health. In 2012, the American Academy of Pediatrics released a report outlining the influence of early childhood experiences on a child's biology and developmental outcomes. It highlighted early childhood adversity as a form of toxic stress that results in impaired stress response and subsequent adverse mental health outcomes and health risk behaviors (Shonkoff et al., 2012). Evidence from a systematic review and meta-analysis highlighting the harms of ACEs also shows a robust association between ACE exposure and increased risk of suicide ideation and self-harm behaviors later in life (Hughes et al., 2017; Jörns-Presentatiet al., 2021). A longitudinal study in South Africa found that ACEs predict suicidality, and more than three percent of children and youth reported a past 30-day suicide attempt (Cluver et al., 2015). The prevalence was notably higher than the 2.4% lifetime prevalence reported in the seminal CDC/Kaiser ACE study for those who experienced one ACE (Felitti et al., 1998). Global suicide rates among children and youth continue to increase (Wasserman et al., 2005), and the relationship between ACEs and mental health remains of great interest to public health. However, current and reliable data from sub-Saharan Africa (SSA) are scarce (Cluver et al., 2015; McLoughlin et al., 2015).

The increased vulnerability of children and youth to developing poor mental health outcomes after ACE exposure may increase the burden of risk-taking behaviors such as substance use (Jörns-Presentati et al., 2021). An estimated 2% to 11% of the global health burden is attributable to substance use, mainly alcohol and illicit drug use, among young adults (Degenhardt et al., 2016). Researchers have theorized that self-medicating with alcohol and other drugs is a common practice among victims of childhood trauma, potentially as a strategy to suppress emotions and memories of traumatic events (Anda et al., 1999; Brady & Back, 2012; Dube et al., 2003; Dube et al., 2006; Walsh et al., 2019; Zhang et al., 2020). A study among Chinese adults found that ACEs lead directly to a mood disorder in the form of depression, and the affective dysregulation subsequently results in substance use indulgence (He et al., 2022). Delinquent peer relationships have also been shown to influence the development of behaviors and attitudes in youth that are linked to negative health and behavioral outcomes such as alcohol/illicit drug use later in life (Ivaniushina & Titkova, 2021; Ragan, 2020; Trinidad, 2021). The consequent maladaptive behaviors may potentially present an opportunity for violence victimization and perpetration (Johnson et al., 2023). Further, there is increasing awareness of the differential relationships between ACE exposure and various types of substance use. A study among U.S. adults found that individuals who experienced verbal abuse in childhood had significantly increased odds of binge drinking. In contrast, those who experienced sexual abuse in childhood were more likely to engage in tobacco use (Campbell et al., 2016). A Canadian population-based study found that increased odds for drug dependence

among adults were associated with childhood sexual abuse and witnessing parental domestic violence, while increased odds for alcohol dependence were associated with childhood physical violence and witnessing parental domestic violence (Fuller-Thomson et al., 2016).

While extensive literature has explored the link between ACEs and risky sexual behaviors in high HIV burden settings in SSA, few studies from the region have focused on non-communicable diseases and other psychological and behavioral problems attributed to ACEs. Therefore, more research is needed to understand the contribution of ACEs to the health burden of substance use and mental health, specifically in low- and middle-income countries such as those in sub-Saharan Africa, where mental health is deemed taboo (Kane et al., 2019; Pescosolido et al., 2013).

Not only are there associations with ACEs and mental health challenges and substance use, but there is also substantial evidence that ACEs impact future violence victimization and perpetration (Bellis et al., 2023; Blum & Naranjo-Rivera, 2019; Voith et al., 2019; WHO, 2020). Results from a multi-country study examining the pathway between childhood trauma, intimate partner volence, and harsh parenting show that adult males who experienced physical and sexual abuse in childhood were 14 times more likely to perpetrate physical and sexual violence against an intimate partner. In comparison, their female counterparts were 16 times more likely to be victims of physical and sexual violence by an intimate partner (Fulu et al., 2017). Findings from a national survey of English adults show a significant association between ACE exposure and past year perpetration of physical violence against anyone (Bellis et al., 2014). Similarly, longitudinal studies conducted in the US, UK, and New Zealand show that children exposed to various forms of violence are more likely to become violent later in life (Costa et al., 2015). Although violence perpetration may manifest later in adulthood, evidence suggests that exposure to ACEs is antecedent to violence perpetration in childhood, and regardless of sex, children exposed to ACEs have significantly higher odds of bullying, threatening, or physically harming their peers (Blum et al., 2019).

The burgeoning body of research shows that some of the highest rates of physical and sexual violence globally are found in sub-Saharan Africa (Garcia-Moreno et al., 2006; Mootz et al., 2022). The interconnection between violence victimization and subsequent perpetration has been extensively documented in the literature (Bellis et al., 2023; Johnson et al., 2023; Kimber et al., 2018; Voith et al., 2020). However, despite increasing evidence from the Western world that violence victimization poses a significant risk for violence perpetuation, geographical and cultural differences limit the extent to which those findings from higher-income countries are generalizable in different settings. Although few studies from SSA have examined ACEs and violence perpetration, many of those studies focused on the perpetration of intimate partner violence specifically, thus potentially overlooking other forms of perpetration that may have implications on substance use, psychological distress, and suicidal or self-harm behaviors (Johnson et al., 2023; Mootz et al., 2022). There is a need for more robust research on the relationship between ACEs and the subsequent perpetration of physical or sexual violence in a broader context in SSA.

Although the ACEs literature provides essential insights into the relationship and pathway between early childhood adversity and many adverse health outcomes, those findings are based primarily on studies from high-income countries, mainly in Europe and North America (Bellis et al., 2019; Cavanaugh et al., 2015; Danese et al., 2009; Felitti et al., 1998; Lee & Chen, 2017; Meadows et al., 2019; Mersky et al., 2013; Schilling et al., 2007; Walsh et al., 2019; Whitaker et al., 2021). Furthermore, in the majority of those studies, ACEs were assessed among middle-aged or older adults, requiring them to report on events that occurred in childhood, a potential risk for recall bias. Limited studies have investigated whether these same risk factors are relevant in low-and middle-income countries and used collected data from youth closer to their childhood experiences. While some global estimates on the association between ACEs and violence perpetration exist, less is known about these associations in SSA. Many studies on ACEs from SSA have utilized convenience samples, which may not be generalizable at the population level and can be subject to bias (Amone-P'Olak K., 2022; Basto-Pereira et al., 2022; Kiburi et al., 2018).

Hence, we aim to estimate the pooled prevalence of ACEs and the associations with suicidal or self-harm behaviors, psychological distress, substance use, and perpetration of physical or sexual violence. Our study addresses a gap in the literature by using nationally representative data from five low-and middle-income countries in SSA. We hypothesize that youth with higher ACE exposure are more likely to perpetrate physical or sexual violence and experience substance use and mental health problems.

Our study used data from the Violence Against Children and Youth Surveys (VACS) collected from young adults aged 13–24 years in Cote d'Ivoire 2018, Kenya 2019, Lesotho 2018, Mozambique 2019, and Namibia 2019. A greater understanding of the contribution of ACEs to the burden of poor mental health, substance use, and violence perpetration among young adults across the SSA region may guide interventions aimed at mitigating the negative health outcomes of ACEs in SSA and globally.

2.0. Methodology

2.1. Study design

VACS are cross-sectional, nationally representative household surveys of adolescents and youth ages 13–24 years. The surveys use a 3-stage cluster sampling design. In the first stage of sampling, primary sampling units (PSUs) were randomly selected using probability proportional to size. In the second sampling stage, systematic random selection was used to select households in each PSU. Random sampling was used to select one eligible participant per household in the third stage. The VACS also use a split sampling approach such that males and females are sampled from different PSUs. This approach reduces the likelihood that both a victim and perpetrator of violence will be interviewed from the same community and increases privacy and protects the confidentiality of participants.

The overarching purpose of the VACS is to assess the national burden of violence (physical, sexual, and emotional violence) against children and youth and its contexts among 13–24-year-olds, primarily in low- and middle-income countries, where data is often lacking and seldom nationally representative. Additionally, the surveys provide essential data on the risk

and protective factors for violence, the health and social consequences of violence, as well as knowledge and access to post-violence services for survivors. Notably, the data are used to guide violence prevention programs and policies.

Nguyen and colleagues (2019) provide a detailed description of the VACS study design. VACS includes two core questionnaires adapted for each country-specific survey; one for the head of household and the other for the participant, for which there is a male and a female version. Additional information on the VACS sampling approach and methodology is detailed by Chiang et al. (2016). VACS data collection in Cote d'Ivoire and Lesotho occurred in 2018, while data collection in Mozambique, Namibia, and Kenya occurred in 2019. The final country reports contain detailed information on the country-specific procedures and methodology (Instituto Nacional de Saúde et al., 2022; Ministry of Social Development of Lesotho et al., 2020; Ministry of Women, Family and Children of Côte d'Ivoire et al., 2018; Ministry of Gender Equality, Poverty Eradication, and Social Welfare et al., 2020; Ministry of Labour and Social Protection of Kenya et al., 2020).

2.2. Study population

A combined total of 21,306 13–24-year-olds completed the surveys in the five countries. For this study, analyses were restricted to participants ages 18–24 to allow for temporal separation of ACEs in childhood and outcomes. The final analytic sample comprised 11,498 young adults, of which 8,766 were females and 2,732 were males.

2.3. Ethical considerations

VACS protocols adapted WHO recommendations on ethics and safety in studies of violence against women (WHO, 2001). To promote privacy and confidentiality and protect the safety of participants, the survey's full nature and scope were only disclosed to the randomly selected participants. VACS was presented to all other household members and community members as a survey on the health, education, and life experiences of children and youth (Centers for Disease Control and Prevention, 2017). All youth participants were given a list of local services, including violence services. Participants who reported being in immediate danger, feeling unsafe in their current living situation, experienced violence in the past 12 months, or asked for help—regardless of what was reported on the survey — were provided with immediate referral to a social worker. The survey protocols were independently reviewed and approved by local Institutional Review Boards (IRBs) in the respective countries and the U.S. Centers for Disease Control and Prevention (CDC) IRB to ensure appropriate protections for the rights and welfare of human research participants (García-Moreno, Jansen, Ellsberg, Heise, & Watts, 2005).

2.4. Data Collection

Data were collected face-to-face by interviewers who received training on the survey protocol, research ethics, and the response plan (Centers for Disease Control and Prevention, 2017). All participants met the eligibility criteria for the study, which included being a male or female household member in the sex-assigned PSU between the ages of 13 and 24, who spoke at least one of the survey languages, and was mentally and physically capable of completing the interviewer-administered survey privately. Standard VACS protocol included

obtaining verbal informed consent from the parent or guardian of minors (except for emancipated minors), consent from all young adult participants, and assent from all minor participants (Centers for Disease Control and Prevention, 2017; Nguyen et al., 2019). The data were collected electronically on Android tablets using the Open Data Kit software in Cote d'Ivoire 2018, Kenya 2019, Mozambique 2019, and Namibia 2019. Data collection was done electronically on netbook computers using the Census and Survey Processing System in Lesotho 2018. Adolescent girls and young women were over-sampled in Lesotho, Mozambique, and Namibia; hence, the study sample comprised a larger proportion of females. Given the link between HIV and violence, adolescent girls and young women (AGYW) in high HIV-burden countries in SSA were oversampled to obtain sub-national prevalence estimates of violence, which allows for examining the associations between violence and HIV at selected geographic locations in the country. The oversampling of females in those areas also supports the agenda of the Determined Resilient Empowered Aids-free Mentored and Safe (DREAMS) programs aimed at reducing the rates of HIV in those high HIV burden countries.

2.5. Measures

2.5.1. Adverse Childhood Experiences—The ACEs measures used in VACS were adapted from the ISPCAN Child Abuse Screening Tool-Retrospective (ICAST-R; Dunne et al., 2009) and the Juvenile Victimization Questionnaire (JVQ; Finkelhor et al., 2005). Several publications have shown both instruments to be valid and reliable and demonstrate psychometric properties (Chandraratne et al., 2018; Dunne et al., 2009; Finkelhor et al., 2005; Zolotor et al., 2009). Additional details on the use of ICAST-R and JVQ for VACS, including the specific types of questions obtained from these tools, are described by Kappel and colleagues (2021). ACEs included experiencing the following before age 18: 1) Physical violence (PV), which was defined slightly differently across the five countries but included ever experiencing any of the following from an intimate partner, parent, caregiver, other adult relative, peer, or adult in the community: being slapped, pushed, shoved, shaken, or had something intentionally thrown at to cause hurt, punched, kicked, whipped, or beaten with an object, choked, suffocated, tried to drown, or burned intentionally, used or threatened with a knife, gun or other weapon. 2) Sexual violence (SV), which was defined as unwanted sexual touching, attempted forced sex, pressured sex, or physically forced sex by anyone. 3) Emotional violence (EV), which was defined slightly differently across countries but included ever being told by a parent, adult caregiver, or other adult relative that you were not loved, or did not deserve to be loved, that they wished you had never been born or were dead or ridiculed you or put you down. 4) Orphanhood; participants were classified as orphaned if one or both parents died before the participants turned 18. 5) Witnessing interparental violence was measured by asking participants how many times they have seen or heard their mother or stepmother being hit, punched, kicked, or beaten by their father or stepfather. Participants in Kenya were also asked how many times they have seen or heard their father or stepfather being hit, punched, kicked, or beaten by their mother or stepmother. Those who said once or more than one time were coded as "yes," and those who said never were coded as "no." 6) Witnessing community violence which was defined as ever witnessing someone being attacked outside the home or family environment. Cumulative ACE exposure was calculated by summing the individual ACEs and categorizing them

into three groups, 0 (no ACE exposure), 1–2 ACEs, and three or more ACEs. These ACE categories were determined based on the existing ACEs literature (Dube et al., 2006; Kappel et al., 2021; VanderEnde et al., 2018).

2.5.2. Mental Health Outcomes—Mental health outcomes included suicidal or self-harm behaviors and psychological distress. Suicidal or self-harm behaviors was defined as ever thought of killing oneself, ever attempted suicide, or ever intentionally tried to hurt oneself in any way. Psychological distress was assessed using the Kessler 6 scale (K6). The K6 scale is a widely used screening tool comprising a 6-item questionnaire for non-specific psychological distress (Kessler, 2002). Participants were asked: During the past 30 days, how often did you feel the following ways: Nervous? Hopeless? Restless? Worthless? So sad that nothing could cheer you up? That everything was an effort? Participants rated themselves on a 5-point scale (*all of the time, most of the time, some of the time, a little of the time, and none of the time*) and were coded from 4—all of the time to 0—none of the time. Moderate to severe psychological distress was defined as scoring five or higher on the K6 scale (Prochaska et al., 2012). From this point forward, the term psychological distress is used for participants who scored moderate to severe on the K6 scale. The internal consistency of the K6 scale in this study was tested and found to be high, with a Cronbach's alpha of 0.80.

2.5.3. Substance Use and Violence Perpetration—Substance use was defined as using tobacco/other drugs or binge drinking (drinking four or more alcoholic beverages in a row on one or more days) within the past 30 days. Violence perpetration was not limited to intimate partner violence but included ever having perpetrated physical or sexual violence (as defined above in section 2.5.1) against anyone in one's lifetime. The mental health and substance use items in VACS were obtained from well-validated survey instruments, including the Youth Risk Behavior Surveillance System (YRBSS), the Global School-Based Student Health Survey (GSHS), and the Demographic and Health Surveys (DHS; Kappel, Livingston, Patel, Villaveces, & Massetti, 2021).

2.5.4. Demographic Characteristics and Covariates—Demographic characteristics included in this analysis were 1) age, categorized into 18–21 years and 22–24 years; 2) educational attainment (measured by asking about the highest level of schooling participants completed and categorized as primary or less or secondary or higher); 3) marital status (ever married or lived with someone as if married); and 4) food insecurity, as a proxy for socioeconomic status. In Cote d'Ivoire, Lesotho, Mozambique, and Namibia, food insecurity was assessed by asking whether the household had enough money for food. In Kenya, participants were asked, "In the past month, was there a day that you went without food because there wasn't enough food in the household?" All covariates were assessed as dichotomous variables and adjusted for in the multivariable models.

2.6. Data analysis

All analyses were performed using SAS 9.4. Survey weights were used to produce estimates that represent the population. Frequencies, weighted percentages, and 95% confidence intervals (CI) were estimated for all variables in the study. The chi-square

test of significance was used to assess whether the sex differences observed were statistically significant. Logistic regression stratified by sex was used to examine the relationship between both individual and cumulative ACEs and all study outcomes. Statistical significance was determined by a *p*-value of <0.05.

3.0. Results

3.1. Population Characteristics

The sex-disaggregated characteristics of the population are presented in Table 1. Sixty-two percent (62.1%) of females and 64.5% of males were aged 18–21 years. A significantly higher proportion of females (49.6%) compared to males (18.5%) had ever been married or lived with someone as if they were married ($p < 0.0001$). Slightly less than two-thirds of females (61.7%) and over half of males (58.9%) did not have sufficient food in the household. A significantly lower proportion of females (54.9%) compared to males (65.5%) had a secondary or higher level of education ($p < 0.0001$).

3.2. Prevalence of ACE Exposures, Mental Health, Substance Use, and Violence Perpetration

For both females and males, the least prevalent ACE was emotional violence (9.2% and 7.8%, respectively) and the most prevalent ACE was witnessing violence in the community (37.2% and 55.0%, respectively). A significantly higher proportion of females experienced SV (16.0%) compared to males (8.0%), $p < 0.0001$; however, a higher proportion of males experienced PV (49.7% vs. 36.5%; $p < 0.0001$) and witnessing community violence (55.0% vs. 37.2%; $p < 0.0001$) compared to females. Significantly more females than males had no ACE exposure (females, 27.9%; males, 18.2%; $p < 0.0006$), yet the majority of youth, 72.1% of females and 81.9% of males, reported at least one ACE. (Table 1).

Notably, 18.2% of females and 13.5% of males experienced suicidal or self-harm behaviors, and 42.1% of females and 37.3% of males experienced psychological distress. There were no significant differences in mental health outcomes between females and males. However, the prevalence of substance use was significantly lower among females (8.7%) compared to males (25.1%; $p < 0.0001$), and the prevalence of physical or sexual violence perpetration was significantly higher among males (24.5%) compared to females (13.6%; $p < 0.0001$).

3.3. Associations Between Individual ACEs and Mental Health, Substance Use, and Violence Perpetration

Tables 2.1 and 2.2 present the adjusted associations between individual ACEs and the study outcomes for females and males, respectively. Females exposed to PV had significantly increased odds of suicidal or self-harm behaviors (aOR=1.98; 95% CI: 1.44–2.71), psychological distress (aOR=2.63; 95% CI: 2.04–3.40), and violence perpetration (aOR=3.49; 95% CI: 2.44–5.00). Males exposed to PV had significantly increased odds of psychological distress (aOR=1.54; 95% CI:1.07–2.23), substance use (aOR=1.53; 95% CI:1.02–2.31), and violence perpetration (aOR =3.51; 95% CI: 2.47–4.97). For both females (f) and males (m), a significant association was observed between SV in childhood and suicidal or self-harm behaviors (f: aOR=2.59; 95% CI 1.88–3.58; m: aOR=4.63; 95% CI:

2.11–10.18) and psychological distress (f: aOR=2.29; 95% CI:1.71–3.05; m: aOR=2.02; 95% CI:1.05–3.89). Additionally, SV was significantly associated with violence perpetration among females (aOR=2.28; 95% CI:1.56–3.33) and substance use among males (aOR=2.58; 95% CI:1.28–5.19). In females, exposure to EV was significantly associated with suicidal or self-harm behaviors (aOR=4.14; 95% CI: 2.79–6.17), psychological distress (aOR=4.44; 95% C:3.00–6.57), and violence perpetration (aOR=4.78; 95% CL:3.21–7.13), but there was no statistically significant association between EV and substance use for females. However, among males, EV was significantly associated with higher odds of all study outcomes: suicidal or self-harm behaviors (aOR=3.84; 95% CI:1.82–8.08), psychological distress (aOR=2.58; 95% CI:1.48–4.47), substance use (aOR=2.71; 95% CI:1.54–4.75) and violence perpetration (aOR=4.40; 95% CI:2.45–7.92). Females who were orphaned had significantly higher odds of psychological distress (aOR=1.53; 95% CL:1.15–2.04) compared to those who were not orphaned. However, orphan status was not significantly associated with any of the study outcomes among males.

Witnessing interparental violence was the only independent ACE significantly associated with higher odds of substance use among females (aOR=1.59; 95% CL:1.01–2.51), as well as all other outcomes in the adjusted analyses. Females who witnessed violence in the community during childhood had about two times increased odds of psychological distress (aOR=1.96; 95% CL:1.53–2.51) and violence perpetration (aOR=1.73; 95% CL:1.24–2.41) compared to those who did not witness community violence in childhood. Similarly, witnessing violence in the community during childhood was associated with all study outcomes among males: suicidal or self-harm behaviors (aOR=1.88; 95% CL:1.06–3.34), psychological distress (aOR=1.62; 95% CL:1.23–2.14), substance use (aOR=1.59; 95% CL:1.12–2.24), and violence perpetration (aOR=1.88; 95% CL:1.20–2.93).

3.4. Cumulative ACE Exposure, Mental Health, Substance Use, and Violence Perpetration

The sex-disaggregated results for the relationship between cumulative ACE exposure and the study outcomes are presented in Table 3. Among females, a graded relationship was seen in crude and adjusted models for psychological distress and violence perpetration. Females exposed to 1–2 ACEs, compared to those with no ACE exposure, had significantly increased odds of psychological distress (aOR=2.21, 95% CL: 1.65–2.96) and violence perpetration (aOR=5.27, 95% CL:3.02–9.21). Exposure to three or more ACEs was significantly associated with higher odds of suicidal or self-harm behaviors (aOR=3.58; 95% CL: 2.29–5.60), psychological distress (aOR=5.55; 95% CL: 3.89–7.91), substance use (aOR= 1.84; 95% CL: 1.11–3.06), and violence perpetration (aOR=7.62; 95% CL: 4.45–13.05), compared to those not exposed to ACEs. Notably, there were no significant associations between 1–2 ACEs and suicidal or self-harm behavior and substance use among females; however, a significant association was observed for these outcomes at higher ACE exposure (three or more ACEs).

A similar statistically significant and graded association was found among males, between 1–2 and three or more ACE exposures compared to no ACE and all study outcomes. The adjusted odds for suicidal or self-harm behaviors increased from 2.29 (95% CL:1.12–4.65) among males who experienced 1–2 ACEs to 6.59 (95% CL: 3.41–12.73) among males who

experienced three or more ACEs. The adjusted odds for psychological distress rose from 1.90 (95% CL: 1.18–3.06) among males who experienced 1–2 ACEs to 3.09 (95% CL: 1.70–5.61) for those with three or more ACE exposures. Similarly, the adjusted odds of substance use among males increased from 1.97 (95% CI: 1.29–3.01) to 2.68 (95% CI: 1.69–4.25), and violence perpetration increased from 5.22 (95% CI:2.88–9.48) to 8.29 (95% CI: 4.34–15.83) for 1–2 ACEs versus three or more ACE exposures, among males.

4.0. Discussion

This study of young adults ages 18–24 years in Cote d'Ivoire, Kenya, Lesotho, Mozambique, and Namibia found a high prevalence of ACEs and a graded relationship between cumulative ACE exposure and all study outcomes. More than two-thirds of the females (72.1%) and four-fifths of the males (81.9%) experienced at least one ACE. Individual ACEs were independently associated with suicidal or self-harm behaviors, psychological distress, substance use, and violence perpetration. These findings add to the growing body of ACEs literature in low- and middle-income nations. In addition, they align with findings from the seminal CDC/Kaiser ACE Study and study replications conducted in other regions of the world that show a positive association between ACEs and negative mental health outcomes and risk-taking behaviors such as alcohol/substance use (Dube et al., 2003; Dube et al., 2006; Felitti et al., 1998; Giano et al., 2020; Grigsby et al., 2020; Kappel et al., 2021; Lee & Chen, 2017; Meadows et al., 2019; Merrick et al., 2018; Mersky et al., 2013; Ramaiya et al., 2021; Trivedi et al., 2021; VanderEnde et al., 2016; VanderEnde et al., 2018; Voith et al., 2017).

Notably, there were significant sex differences in the prevalence of specific ACEs; SV was significantly higher among females, whereas PV was significantly higher among males. This finding is consistent with other VACS and ACEs studies (Chiang et al., 2018; Felitti et al., 1998; Kappel et al., 2021). EV emerged as the least prevalent ACE among both males and females. This finding aligns with other studies that show EV to be the lowest reported ACE, irrespective of sex (Annor et al., 2020; Kappel et al., 2021; Zhang et al., 2020). Witnessing violence in the community was the most common ACE in both sexes. Evidence shows that inequality, lack of opportunities, and access to livelihood resources influence youth involvement in violence and increase the risk of community violence throughout the SSA region (Ismail & Olonisakin, 2021; Straus, 2012). The high prevalence of witnessing violence in the community during childhood suggests the need for strategies to identify and address the risk factors for community violence and promote safe communities where children can thrive and achieve their full potential.

Interestingly, when ACEs were assessed individually, witnessing interparental violence was the only independent ACE significantly associated with substance use among females. This underscores the importance of not only considering the number of ACE exposures, but also the contribution of specific individual ACEs, independently, to young adult health. Witnessing violence in the home may have a similar impact on a child as experiencing violence directly (Madruga et al., 2017). Hence, there is a need to devise intervention strategies that promote positive experiences and a strong family structure to improve resiliency and buffer the harmful effects of ACEs (Bhushan et al., 2020).

This study showed an overall graded association between cumulative ACE exposure and the study outcomes. As ACE exposure increases, so do the odds of experiencing suicidal or self-harm behaviors, psychological distress, substance use, and violence perpetration. These findings are consistent with studies from different geographic contexts that report a dose-response relationship between cumulative ACE exposure and psychological distress (Grigsby et al., 2020; Kappel et al., 2021; Merrick et al., 2017; VanderEnde et al., 2016), mental health outcomes (VanderEnde et al., 2018; Felitti et al.,1998), and health-risk behaviors such as substance use (Grigsby et al., 2020; Meadows et al., 2019; Mersky et al., 2013; Ofuchi et al., 2020; Ramiro et al., 2010; Shin et al., 2018; Tsehay et al., 2020).

Females exposed to 1–2 ACEs had significantly higher odds of psychological distress and violence perpetration, but not suicidal or self-harm behaviors or substance use. However, at higher ACE exposure, we found a significant relationship with suicidal or self-harm behaviors and substance use. Among males, 1–2 and three or more cumulative ACE exposure was significantly associated with higher odds of all outcomes examined in this study. Although the findings of this study support existing literature on the gendered nature of ACEs (Cavanaugh et al., 2015; Kappel et al., 2021; VanderEnde et al., 2018;), we did not observe the same association between ACEs and substance use as a study in the U.S., which found ACEs to be associated with higher odds of substance use among females and no association among males (Cunradi et al., 2020). The null effect of substance use among females exposed to 1–2 ACEs in this study may be attributed to the low prevalence of substance use in the female population. Another reason may be the cultural and gender norms and attitudes in sub-Saharan Africa. Traditional African culture promotes masculinity, male dominance, and gender inequality in relation to acceptable risky behaviors such as alcohol and substance use (Wechsberg et al., 2013). According to Reddy and colleagues (2007), the influence of traditional African culture may suppress substance use among females, as this behavior is highly stigmatized and deemed unacceptable for women. An exploratory study of Ethiopian women's knowledge, attitudes, and beliefs about tobacco/substance use showed that 96% regard this behavior as socially unacceptable (Petersen et al., 2018).

Males and females exposed to three or more ACEs had approximately eight times higher odds of perpetrating physical or sexual violence than those with no ACE exposure. Similar associations were found in a latent class analysis of ACEs among adolescents in 15 countries, including the U.S., China, Belgium, and Scotland, which found that regardless of sex, cumulative ACE was positively associated with violence perpetration (Blum & Naranjo-Rivera, 2019). Hence, the results of our study corroborate evidence in the literature from other settings regarding the role of ACEs in violence perpetration. Given the strong social and cultural norms that influence and shape health behaviors in many African countries (BeLue et al., 2009; Patel et., al 1995), future studies may explore whether the perception of those norms mediates the association between ACEs, violence perpetration, and mental health. Additionally, studies may investigate the latent classes of intergenerational violence transmission among perpetrators of intimate partner violence in the sub-Saharan Africa region.

Our results also show that males who experienced three or more ACEs had approximately seven times higher odds of experiencing suicidal or self-harm behaviors compared to males without ACE exposure. These results are consistent with findings from studies conducted in high-income countries (Grigsby et al., 2020; McLafferty et al., 2019). The experiential avoidance model of deliberate self-harm purports that deliberate self-harm, suicide ideation, and suicidal behaviors act as an escape mechanism for unwanted memories and emotional experiences (Angelakis & Gooding, 2021; Chapman et al., 2006). One plausible reason for the observed high odds of suicidal or self-harm behaviors among males with multiple ACE exposures could be the gender norms in SSA, which promote a culture of male dominance and masculinity (Wechsberg et al., 2013). Such norms may discourage men from expressing their emotions and feelings, which can lead to accumulated stress, resulting in suicide attempts and other suicidal behaviors (Ezeugwu & Ojedokun, 2020).

Our findings suggest the need for tailored gender-specific and culturally sensitive interventions. For example, strategies for mitigating substance use— a known risk factor for violence—specifically targeting males may be beneficial. Whereas strategies to promote healthy coping mechanisms for stress, depression, or adverse experiences may benefit both females and males. Future studies may explore whether specific coping mechanisms mediate the association between ACE exposure and negative mental health outcomes and health risk behavior, such as substance use, in youth and adulthood.

The topic of mental health is perceived as ‘taboo’ and highly stigmatized in low-middle-income countries (Kane et al., 2019; Pescosolido et al., 2013), which may indicate that individuals who experience mental health issues are not seeking help, and consequently, not receiving aid. According to Kutcher et al. (2019), low mental health literacy exists in SSA. Given the high prevalence of ACEs in the region and the strong association with mental health outcomes, it is paramount to implement culturally sensitive intervention strategies to effectively address this often overlooked and neglected public health problem. One approach from the INSPIRE technical package is strengthening norms and values that support non-violent, respectful, nurturing, positive, and gender-equitable relationships for all children and adolescents (WHO, 2019). INSPIRE is an evidence-based technical package that consists of seven strategies to aid countries in their mission to end violence against children. Changing societal norms and attitudes can play a pivotal role in preventing violence against children.

The paucity of literature on ACEs and mental health from SSA might be indicative of the limited availability of mental health services, the lack of quality representative data, and the competing priorities of other health and development issues (Bell & Hansen, 2021; Sankoh et al., 2018). Consequently, a multi-level approach to addressing mental health, such as identifying individuals who could benefit from mental health services and improving their access to them, may prove effective. At the national/regional level, campaigns may be necessary to raise awareness, prioritize resource allocation, and destigmatize mental health problems. Strategies from the INSPIRE technical package to reduce harsh parenting practices and create positive parent-child relationships could be adopted to effectively prevent ACEs. Research shows that healthy parenting reduces the risk of violence against children and ACEs (Agathis et al., 2023). A strategic approach to effectively address this

issue is to adopt an evidence-based intervention such as the South Africa Parenting for Lifelong Health (PLH) program (Alampay et al., 2018). PLH has been rigorously evaluated and has shown strong evidence in improving positive parenting by 17% and reducing child maltreatment, such as emotional and physical abuse by a caregiver, by 61% and 48%, respectively (Ward et al., 2020; WHO, 2019). Additionally, evidence from randomized controlled trials of PLH shows a significant intervention effect of reduced substance use among caregivers and reduced past month substance use among adolescents (Cluver et al., 2018; Massarwi et al., 2021). Another potential approach from the INSPIRE technical package is adapting the Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) model, which has been extensively evaluated and proven effective at improving outcomes of children and caregivers who have experienced violence and other traumatic life events (Kliethermes et al., 2017).

Given the limited access to mental health services, intervention strategies aimed at extending the accessibility of mental health services to adolescents and youth who have had an adverse childhood experience, regardless of economic status, may help buffer against adverse mental health outcomes and substance abuse/use later in life. At the school level, implementing mental health education or mental health literacy sessions in the school curriculum may start the necessary change to desensitize the topic of mental health. It may provide a platform for children and youth to feel comfortable seeking help after experiencing trauma. Finally, gender-based intervention strategies to address the risk factors of ACEs can effectively reduce the prevalence of ACEs and mitigate the long-term consequences.

5.0. Strengths and Limitations

This is the first multi-country study to examine the relationship between ACEs, mental health outcomes, substance use, and violence perpetration using VACS data from five SSA countries. The main strength of this study is the use of VACS data, which provides a unique opportunity to fill gaps in the ACEs literature as the data are representative and are collected directly from children and youth in low- and middle-income countries. Another strength of this study is that the oldest participants are 24 years old; therefore, recall bias is possibly minimized as participants are temporally closer to events being recalled. Previous studies relied on data collected from adults older than 24 years in high-income countries. Additionally, VACS data collectors received in-depth training on privacy and confidentiality, rapport building to increase comfort with disclosing, and interviewing techniques to minimize bias (Chiang et al., 2016). There are some limitations that must be considered. The cross-sectional nature of our data does not permit causal inferences, and retrospective reporting of experiences in childhood may be impacted by recall bias. We did not analyze the age at first ACE exposure, which could have provided more insight into the observed relationships, nor did we collect data on other ACEs that could be present within the population. These limitations may result in a lower estimated prevalence of ACEs in SSA. Additionally, due to sample size and power limitations, alcohol and drug use were not assessed independently, and neither was suicide attempt, suicidal ideation, and self-harm, which may have shown a different relationship that could inform more targeted prevention strategies and programs.

Future studies may consider a qualitative approach to better understand the influence of other contextual factors we did not explore in this study. For example, cultural, social, and gender norms on the relationship between ACEs, mental health, violence perpetration, and substance use among youth in SSA. There was no temporal separation between the exposures in childhood and suicidal or self-harm behaviors and violence perpetration. Future longitudinal studies may explore the risk of longer-term health outcomes associated with the expanded ACEs. Since the prevalence of ACEs was high and the odds of violence perpetration were significantly high for both males and females, future studies may also examine the moderating effect of positive childhood experiences in mitigating the impact of ACEs on violence perpetration.

6.0. Conclusion

A significant relationship exists between ACEs and mental health outcomes, substance use, and violence perpetration among young adults in five African countries (Lesotho, Mozambique, Namibia, Cote d'Ivoire, and Kenya). Given the differences in ACEs prevalence observed between males and females, prevention and response efforts could benefit from understanding the gendered nature of ACEs and their outcomes in this context. Our study findings might be crucial to policy change and continued awareness of the adverse outcomes of ACEs. Future research could consider including participants' age at ACEs exposure and consider the buffering effect of positive childhood experiences on ACEs. A prospectively designed study could be explored to understand causality.

Acknowledgment

The authors would like to thank all government agencies involved in the implementation of the surveys and Sarah Matthews for her contribution to preparing the dataset.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors

This project was supported in part by an appointment to the Research Participation Program at the Centers for Disease Control and Prevention administered by the Oak Ridge Institute for Science and Education through an interagency agreement between the U.S. Department of Energy and the Centers for Disease Control and Prevention.

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Table 1:

Demographic characteristics, adverse childhood experiences (ACEs), mental health, substance use, and violence perpetration among females and males aged 18–24 years in Cote d'Ivoire 2018, Kenya 2019, Lesotho 2018, Mozambique 2019, and Namibia 2019.

Variables	Females (n=8,766)		Males (n=2,732)		p-value
	Unweighted Frequency	% (95% CI)	Unweighted frequency	% (95% CI)	
Demographic Characteristics					
Age					<0.4065
18–21	5372	62.1 (59.4–64.9)	1711	64.5 (60.1–68.8)	
22–24	3394	37.9 (35.1–40.6)	1021	35.5 (31.2–39.9)	
Marital status					<0.0001
Ever married or lived with a partner	3438	49.6 (46.5–52.7)	490	18.5 (16.0.–21.0)	
Never married or lived with a partner	5271	50.4 (47.3–53.5)	2224	81.6 (79.1–84.1)	
Food insecurity					0.3389
Enough food in household	5041	38.3 (35.1–41.4)	1500	41.1 (37.5–44.8)	
Not enough food in household	3585	61.7 (58.6–64.9)	1204	58.9 (55.2–62.5)	
Educational attainment					<0.0001
Primary or less than primary	2362	45.1 (41.6–48.6)	899	34.5 (31.7–37.2)	
Secondary or higher than secondary	6375	54.9 (51.4–58.4)	1832	65.5 (62.8–68.3)	
Individual ACE exposure					
Physical violence	2622	36.5 (33.8–39.2)	1310	49.7 (45.5–53.9)	<.0001
Sexual violence	1089	16.0 (13.8–18.1)	197	8.0 (6.0–10.0)	<.0001
Emotional violence	833	9.2 (7.5–10.8)	233	7.8 (5.7–9.8)	0.3400
Orphaned	2981	25.2 (22.5–27.9)	832	24.1 (21.4–26.8)	0.6322
Witnessed interparental violence	2106	23.6 (21.1–26.1)	553	21.5 (18.3–24.8)	0.3981
Witnessed violence in the community	2836	37.2 (34.3–40.1)	1366	55.0 (51.1–58.8)	<.0001
Cumulative ACE exposure					0.0006
0 ACEs	2288	27.9 (24.9–30.8)	499	18.2 (14.4–21.9)	
1–2 ACEs	4847	52.7 (49.7–55.7)	1610	57.6 (54.0–61.3)	
≥3 ACEs	1622	19.5 (17.3–21.6)	622	24.2 (20.3–28.1)	
Mental Health Outcomes					

Variables	Females (n=8,766)		Males (n=2,732)		p-value
	Unweighted Frequency	% (95% CI)	Unweighted frequency	% (95% CI)	
Suicidal ideation/suicide attempt/self-harm					0.0629
Yes	1255	18.2 (15.8–20.6)	269	13.5 (10.4–16.6)	
No	7499	81.8 (79.5–84.2)	2461	86.5 (83.4–90.0)	
Moderate or severe psychological distress					0.1167
Yes	3318	42.1 (39.2–45.0)	984	37.3 (33.3–41.4)	
No	5424	57.9 (55.0–60.8)	1743	62.7 (58.6–66.8)	
Substance use in the past 30 days					<.0001
Yes	1009	8.7 (7.01–10.35)	1005	25.1 (21.9–28.4)	
No	7723	91.3 (89.7–93.0)	1723	74.9 (71.7–78.1)	
Perpetration of physical or sexual violence					<.0001
Yes	1087	13.6 (11.6–15.5)	763	24.5 (22.1–26.8)	
No	7669	86.5 (84.5–88.4)	1968	75.5 (73.2–77.9)	

Acronyms: n = unweighted frequency; CI = confidence interval

Table 2.1:

Relationship between individual adverse childhood experiences (ACEs) and mental health outcomes, substance use, and violence perpetration among females aged 18 –24 in Cote d'Ivoire 2018, Kenya 2019, Lesotho 2018, Mozambique 2019, and Namibia 2019.

	Suicidal or self-harm behaviors	**Moderate to severe psychological distress**	**Substance use**	**Perpetration of physical or sexual violence**
	aOR (95% CI)	**aOR (95% CI)**	**aOR (95% CI)**	**aOR (95% CI)**
Individual ACEs				
Ever experienced PV before 18 years old				
Yes	1.98 (1.44–2.71)***	2.63 (2.04–3.40)***	1.34 (0.98–1.83)	3.49 (2.44–5.00)***
No	ref	ref	ref	ref
Ever experienced SV before 18 years old				
Yes	2.59 (1.88–3.58)***	2.29 (1.71–3.05)***	1.10 (0.69–1.75)	2.28 (1.56–3.33)***
No	ref	ref	ref	ref
Ever experienced EV before 18 years old				
Yes	4.14(2.79–6.17)***	4.44 (3.00–6.57)***	1.53 (0.88–2.66)	4.78 (3.21–7.13)***
No	ref	ref	ref	ref
Orphaned				
Yes	1.27 (0.94–1.72)	1.53 (1.15–2.04)**	1.54 (0.93–2.53)	1.09 (0.73–1.63)
No	ref	ref	ref	ref
Witnessed interparental violence in the home				
Yes	2.08 (1.51–2.86)***	1.56 (1.21–2.02)***	1.59 (1.01–2.51)*	1.54 (1.06–2.23)*
No	ref	ref	ref	ref
Witnessed violence in the community				
Yes	1.30 (0.99–1.71)	1.96 (1.53–2.51)***	1.17 (0.82–1.67)	1.73 (1.24–2.41)***
No	ref	ref	ref	ref

Pooled data reported. Acronyms: CI = confidence interval; aOR= adjusted odds ratio; PV = physical violence; SV= sexual violence; EV = emotional violence

Age, marital status, food insecurity, and educational attainment were adjusted for in the multivariable models

*p-value<0.05

**p-value<0.01

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*** p-value<0.001

Table 2.2

Relationship between individual adverse childhood experiences (ACEs), mental health outcomes, substance use, and violence perpetration among males aged 18–24 in Cote d'Ivoire 2018, Kenya 2019, Lesotho 2018, Mozambique 2019, and Namibia 2019.

	Suicidal or self-harm behaviors	**Moderate to severe psychological distress**	**Substance use**	**Perpetration of physical or sexual violence**
	aOR (95% CI)	**aOR (95% CI)**	**aOR (95% CI)**	**aOR (95% CI)**
Individual ACEs				
Ever experienced PV before 18 years old				
Yes	1.88 (0.96–3.70)	1.54 (1.07–2.23)*	1.53 (1.02–2.31)*	3.51 (2.47–4.97)***
No	ref	ref	ref	ref
Ever experienced SV before 18 years old				
Yes	4.63 (2.11–10.18)***	2.02 (1.05–3.89)*	2.58 (1.28–5.19)**	1.42 (0.83–2.41)
No	ref	ref	ref	ref
Ever experienced EV before 18 years old				
Yes	3.84(1.82–8.08)***	2.58(1.48–4.47)***	2.71(1.54–4.75)***	4.40 (2.45–7.92)***
No	ref	ref	ref	ref
Orphaned				
Yes	0.68 (0.36–1.27)	1.09 (0.78–1.53)	0.86 (0.62–1.19)	1.05 (0.67–1.64)
No	ref	ref	ref	ref
Witnessed interparental violence in the home				
Yes	2.78 (1.76–4.38)***	1.51 (1.02–2.24)***	1.27 (0.84–1.92)	1.59 (1.08–2.35)*
No	ref	ref	ref	ref
Witnessed violence in the community				
Yes	1.88 (1.06–3.34)*	1.62 (1.23–2.14)***	1.59 (1.12–2.24)**	1.88 (1.20–2.93)**
No	ref	ref	ref	ref

Pooled data reported. Acronyms: CI = confidence interval; aOR= adjusted odds ratio; PV = physical violence; SV= sexual violence; EV = emotional violence

Age, marital status, food insecurity, and educational attainment were adjusted for in the multivariable models

*p-value<0.05

**p-value<0.01

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*** p-value<0.001

Table 3:

Relationship between cumulative adverse childhood experience (ACE) exposure and mental health outcomes, substance use, and violence perpetration among females and males in Cote d'Ivoire 2018, Kenya 2019, Lesotho 2018, Mozambique 2019, and Namibia 2019.

	ACE exposures	Females			Males		
		N	Crude OR (95% CI)	aOR (95% CI)	N	Crude OR (95% CI)	aOR (95% CI)
Suicidal or self-harm behaviors	0	167	ref	ref	32	ref	ref
	1–2	636	1.18 (0.76–1.84)	1.20 (0.76–1.89)	132	2.38 (1.18–4.82) *	2.29 (1.12–4.65) *
	≥3	452	3.31 (2.13–5.15) **	3.58 (2.29–5.60) ***	105	6.94 (3.59–13.43) ***	6.59 (3.41–12.73) ***
Moderate to severe psychological distress	0	616	ref	ref	107	ref	ref
	1–2	1828	2.25 (1.70–2.98) ***	2.21 (1.65–2.96) ***	585	1.89 (1.15–3.10) *	1.90 (1.18–3.06) *
	≥3	874	5.59 (3.95–7.91) ***	5.55 (3.89–7.91) ***	292	3.16 (1.73–5.77) **	3.09 (1.70–5.61) **
Substance use in the past 30 days	0	188	Ref	ref	139	ref	ref
	1–2	560	1.53 (0.94–2.49)	1.50 (0.91–2.48)	582	1.87 (1.24–2.83) **	1.97 (1.29–3.01) **
	≥3	261	1.90 (1.17–3.08) *	1.84 (1.11–3.06) *	284	2.49 (1.56–3.99) ***	2.68 (1.69–4.25) ***
Perpetration of physical or sexual violence	0	80	Ref	ref	44	ref	ref
	1–2	586	5.24 (3.03–9.06) ***	5.27 (3.02–9.21) ***	449	4.92 (2.67–9.06) ***	5.22 (2.88–9.48) ***
	>3	421	7.60 (4.46–12.95) ***	7.62 (4.45–13.05) ***	270	7.52 (3.98–14.23) ***	8.29 (4.34–15.83) ***

Pooled data reported. Acronyms: N = unweighted frequency; CI= confidence interval; aOR= adjusted odds ratio.

Age, marital status, food insecurity, and educational attainment were adjusted for in the multivariable models

* p-value<0.05

** p-value<0.01

*** p-value<0.001