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# Adverse Childhood Experiences and Associated Mental Distress and Suicide Risk: Results From the Zambia Violence Against Children Survey

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## Abstract

**Purpose:** Adverse childhood experiences (ACEs) are a global public health concern. Little research exists on the prevalence and health consequences of ACEs in Zambia. The current study examined associations between individual and cumulative ACEs, mental distress, and suicide risk among Zambian youth.

**Methods:** Data from Zambia Violence Against Children and Youth Survey were used (18–24 years old, n=1034). Bivariate and adjusted logistic models were performed with independent variables (i.e., experienced physical violence (PV), sexual violence (SV), and emotional violence (EV); witnessed intimate partner violence (IPV) and community violence (CV); orphan status; cumulative ACE exposure) and dependent variables (i.e., mental distress and suicide risk). Adjusted models controlled for demographic and social characteristics.

**Results:** 76.8% of Zambian youth experienced one or more ACEs, and more than 30% witnessed CV (38.4%) or IPV (30.2%), or experienced PV (35.1%), prior to age 18. 27.5% were orphans, and less than 20% experienced EV (17.3%) or SV (15.4%) in childhood. 42.4% experienced mental distress in the past 30 days, and 12.5% reported lifetime suicidal thoughts or suicide attempts. PV, EV, cumulative ACE exposure, older age, being single, and stronger friendships were significantly related to experiencing mental distress. Cumulative ACEs exposure was associated with significantly higher suicide risk.

**Conclusions:** Preventing ACEs can reduce mental distress and suicide risk among Zambian youth. Youth with cumulative ACE exposure can be prioritized for mental health intervention.



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More research is warranted to investigate the broad-based prevention of ACEs, especially PV and EV, and protective factors that can promote resilience among youth who have experienced ACEs.

**Keywords**

Zambia; youth; adverse childhood experiences; mental health; mental distress; suicide risk

## Introduction

Adverse childhood experiences (ACEs) are a global public health concern. ACEs include physical, emotional, and sexual abuse, child neglect, peer bullying, witnessing intimate partner violence (IPV) or an attack in the community, and having an adverse family environment prior to the age of 18, such as parental separation, being orphaned, living with a household member who is a problem drinker, a drug misuser, mentally ill, or incarcerated (Bellis et al., 2014; Chigiji et al., 2018; Hillis et al., 2017; Soares et al., 2016; VanderEnde et al., 2018; WHO, 2018). ACEs can cause substantial stress (Soares et al., 2016) and negatively influence the health and well-being of children throughout the lifespan (Chigiji et al., 2018). ACEs are associated with poor health outcomes not only at the time of exposure but also later in life (Bellis et al., 2014; Chang et al., 2019; Herzog & Schmahl, 2018; Le et al., 2018; Soares et al., 2016; VanderEnde et al., 2018). Globally, more than 1 billion children, over half of all children in the world, experience some form of violence each year (Hillis et al., 2016), and among them many children experience more than one form of ACEs (Finkelhor et al., 2007; VanderEnde et al., 2018). The prevalence of ACEs varies noticeably depending on the definition, the measurements, the sample characteristics, and the methodology used (Soares et al., 2016). However, a meta-analysis of 224 publications —this study provided 551 prevalence rates through self-report measures or informants (e.g., medical professionals, child protection workers, or teachers) for different types of maltreatment that occurred before the age of 18 years in non-clinical samples from North America, Europe, Africa, South America, Asia, Australia, and NewZealand—estimated the proportion of child abuse and neglect as follows: emotional abuse (36.3%), physical abuse (22.6%), emotional neglect (18.4%), physical neglect (16.3%), and sexual abuse (12.7%; Stoltenborgh et al., 2015). Although these estimates are alarming, these numbers underrepresent the true prevalence of childhood adversities as many cases are unreported (Herzog & Schmahl, 2018; Hillis et al., 2017; Stoltenborgh et al., 2011; 2013).

Although majority of the research on ACEs and health outcomes has been conducted in the United States and Europe (Petruccelli et al., 2019), there is a dearth of research explicating the impact of ACEs in other parts of the world. Understanding ACEs globally is an important step in preventing childhood adversity and improving health globally (Anda et al., 2010). Thus, in order to effectively design and implement culturally relevant and evidence-based interventions to prevent ACEs and their negative health consequences, country-specific investigation is necessary (Ameli et al., 2017) and especially outside of the United States and Europe. Although ACEs are prevalent in Zambia (Nguyen, Padilla, et al., 2019), research regarding the nature, consequences, and implications of ACEs in Zambia has been limited (Beyene et al., 2019; Escueta et al., 2014; Nguyen, Padilla, et al., 2019; Uzoezie, 2018; Zhang et al., 2020). Given the median age of the country is 16.9 years and a

majority of the population are children (CIA, 2020) and there are one million orphans in the country (more than 5% of the country population; Martosko, 2019), investigating prevalence of ACEs and their associated health outcomes can help inform efforts to prevent ACEs and build resilience among affected populations in Zambia.

## ACEs and Health Outcomes

ACEs can leave long-lasting effects on children's brain, mental, and physical health (Bellis et al., 2014; Chang et al., 2019; Herzog & Schmahl, 2018; Le et al., 2018; Soares et al., 2016; VanderEnde et al., 2018). The affected health outcomes are wide-ranging from health-harming, risk behaviors (e.g., smoking, alcohol/drug abuse, sexual risk behaviors, suicidal thoughts/attempts, and delinquent behaviors; Ameli et al., 2017; Begle et al., 2011; Bellis et al., 2014; Chang et al., 2019; Ige et al., 2012, 2012; Nguyen, Padilla, et al., 2019) to delayed cognitive development (Oh et al., 2018). ACEs also increase the risk for negative mental health outcomes (e.g., post-traumatic stress disorder, depression, anxiety, and low self-esteem; Ameli et al., 2017; Bellis et al., 2014; Chang et al., 2019; Ismayilova et al., 2016; Kidman et al., 2020; Le et al., 2018; Oh et al., 2018; Soares et al., 2016; Uzoezie, 2018; VanderEnde et al., 2018), conduct problems (Ameli et al., 2017; Soares et al., 2016), and violence perpetration (Soares et al., 2016; VanderEnde et al., 2016). Children impacted by ACEs are at greater risk of sleep disruption, dysregulation of the innate immune system (Herzog & Schmahl, 2018), somatic disorders, chronic diseases, and infectious diseases (Ameli et al., 2017; Racine et al., 2018; VanderEnde et al., 2018). Individuals who have experienced ACEs have worse self-rated health (Kidman et al., 2020) and are at higher risk for premature death compared to those who did not experience ACEs (Chang et al., 2019; Herzog & Schmahl, 2018; Oh et al., 2018; Soares et al., 2016; 2016; VanderEnde et al., 2018). In addition, maternal ACEs are robust predictors for poor child mental health outcomes among offspring (Kumar et al., 2018). Additionally, ACEs can hinder economic productivity and social outcomes such as educational achievement and employment (Fang et al., 2012; Soares et al., 2016).

The associations between ACEs and negative health outcomes often have a dose–response relationship. That is, the higher number of ACEs experienced, the higher the risk for negative health outcomes (Bellis et al., 2014; Chang et al., 2019; Finkelhor et al., 2007; Sonu et al., 2019; VanderEnde et al., 2018). Further, some forms of ACEs are more closely related to particular health outcomes (Bellis et al., 2014; Chigiji et al., 2018; Herzog & Schmahl, 2018; Nguyen et al., 2010). For example, Chang et al. (2019) found that physical and emotional abuse were significantly correlated with chronic diseases, but other forms of ACEs (e.g., sexual abuse, physical/emotional neglect, witnessing IPV, or witnessing community violence [CV]) did not show such associations (Chang et al., 2019). Further, Nguyen et al. (2010) indicated that emotional abuse was significantly associated with depression, anxiety, and lower self-esteem, but physical and sexual abuse did not show such associations (Nguyen et al., 2010). As such, in order to design and implement effective prevention and intervention efforts, it is imperative to investigate how individual and cumulative ACE types are related to health outcomes (Merrick et al., 2017). In addition, as creating and sustaining safe, stable, nurturing relationships and environments can prevent ACEs (CDC, 2019a), the study also included sociodemographic aspects to better inform

about prevention and mitigation efforts with data-driven evidences. Thus, the purpose of this study is to examine six distinct ACE types—sexual violence (SV), physical violence (PV), emotional violence (EV), witnessing IPV, witnessing CV, and being orphaned—and their independent and cumulative associations with health outcomes in Zambia.

### Current Study

The current study aims to examine the associations between individual/cumulative ACE types and health outcomes (i.e., mental distress and suicide risk), adjusting for demographic and social characteristics. We hypothesized that ACEs, both individual and cumulative, would be significantly associated with the negative health outcomes but the effect sizes may be weaker for indirect violence exposure compared to direct violence exposure.

## Methods

### Survey Design, Sampling Frame, and Participants

This study used data from the Zambia Violence Against Children and Youth Survey (VACS) 2014, a nationally representative cross-sectional household survey of youth 13–24 years old. The survey used a three-stage stratified sample survey design: in the first stage, a total of 248 enumeration areas (EAs) were selected with probability proportional to size and this yielded 113 EAs for females and 135 EAs for males. In the second stage, 25 households were selected in each EA with equal probability systematic sampling, and this resulted in 2770 households for females and 3324 households for males. In the third stage, a representative sample of 1008 eligible females and 1008 eligible males were selected. Out of the representative sample, a total of 1819 respondents (50.8% female) participated. Individual response rates were 86.8% for females and 85.6% for males. The study used a sub-sample of 1034 youth ages 18–24 (50.6% female) to examine ACEs prior to 18 years old. All adult participants provided informed consent to participate in the study. More information about the sampling methodology and ethical protections for VACS are provided in other publications (Chiang et al., 2016; Ministry ofYouth, Sport and Child DevelopmentMinistry of CommunityDevelopment and Social ServicesUniversity of ZambiaUnited Nations Children's Fund, Save the Children International, United StatesCenters for Disease Control and Prevention, 2018; Nguyen et al., 2019). The Centers for Disease Control and Prevention (CDC)'s Institutional Review Board and Zambia's Biomedical Research and Ethics Committee independently reviewed and approved the study (Ministry of Youth, Sport and Child DevelopmentMinistry of Community Development and Social ServicesUniversity of ZambiaUnited Nations Children's Fund, Save the Children International, United StatesCenters for Disease Control and Prevention, 2018).

### Measures

#### Dependent Variables

**Mental Distress.:** Mental distress was measured with the Kessler-6 Psychological Distress Scale (Prochaska et al., 2012). Six questions were asked about how often the respondents felt: *1) nervous, 2) hopeless, 3) restless, 4) so sad that nothing could cheer him/her up, 5) that everything was an effort, and 6) worthless in the past 30 days*. Each question response

had a possible score range of *0 = none of the time* to *4 = all the time* with a total possible range of 0–24. Based on the valid and reliable scale and clinically proven cut-off points of Kessler-6 in measuring psychological distress in various contexts including developing countries (Juan et al., 2019; Prochaska et al., 2012), respondents with scores of 5–24 were categorized as having moderate or severe mental distress (*0 = no mental distress, 1 = moderate/severe mental distress*) (Nguyen, Padilla, et al., 2019; Prochaska et al., 2012).

**Suicide Risk.:** Respondents were asked whether they have ever thought about suicide ("Have you ever thought about killing yourself?") and whether they have ever attempted suicide ("Have you ever tried to kill yourself?"). The response categories were *yes, no, and don't know/declined*. Suicide risk was categorized *as 0 = no suicide risk* or *1 = suicide risk (suicidal thoughts and/or suicide attempts)* based on the data distribution.

## Independent Variables

**ACEs.:** ACEs before age 18 (i.e., experiencing SV, PV, EV; witnessing IPV and CV; and being an orphan) were selected for the current study based on previous literature exploring ACEs using VACS (Kappel et al., 2021). These items included in the VACS were selected from validated scales (ISPCAN Child Abuse Screening Tool-Retrospective (i.e., parent PV and EV; Dunne et al., 2009) and the Juvenile Victimization Questionnaire (i.e., peer and intimate partner; adult PV, SV; witnessing violence in the home, and witnessing PV in the community; Finkelhor et al., 2005).SV

The respondent was asked whether they experienced: *1) receiving food, favors, or any gifts in exchange for sex, 2) participating in a sex photo or video, or shown his/her sexual body parts in front of a webcam, 3) unwanted touching in a sexual way, including fondling, pinching, grabbing, or touching on or around his/her sexual body parts, 4) unwanted attempted sex in which the perpetrator tried to make the respondent have sex against his/her will but did not succeed, 5) physically forced sex in which the respondent was physically forced to have sex, 6) and pressured sex in which the respondent was pressured to have sex through harassment, threats, or tricks*. SV experiences prior to age 18 were included. The response categories were *yes, no, and don't know/declined*, and the responses were dichotomized as *0 = none* (no exposure to SV) and *1 = yes* (any exposure to any type of SV).PV

The respondent was asked whether (a perpetrator type) had ever *1) punched, kicked, whipped, beat him/her with an object, 2) choked, smothered, tried to drown, burned him/her intentionally, and 3) used or threatened him/her with a knife or other weapon*. The responses experienced prior to age 18 were included. The response categories were *yes, no, and don't know/declined*. The respondent was asked these three questions for each perpetrator type: *1) intimate partner, 2) peers, 3) parents, adult caregivers, or other adult relatives, 4) and adults in the neighborhood*. PV was categorized as *0 = no* (not experienced any PVs) or *1 = yes* (experienced any PV).EV

The respondent was asked whether he or she was told as a child by a parent or caregiver that *1) the respondent was not loved or did not deserve to be loved, 2) they wished the respondent had never been born or were dead, or 3) the respondent was ridiculed or put*

*down (e.g., say that he/she was stupid or useless)* prior to age 18. The response categories were *yes, no, and don't know/declined*. EV was coded as *0 = no* (no exposure to EV) or *1 = yes* (any exposure to EV).Witnessed IPV

The respondent was asked *whether they had seen or heard a parent punched, kicked, or beaten up by the other parent, or their boyfriend or girlfriend* before 18 years old. The response categories were *never, once, a few times, many times, and don't know/declined*, and the variable was dichotomized as *0 = never* and *1 = once, a few times, or many times*.Witnessed CV

The respondent was asked *whether they had seen someone get attacked outside of his/her home or family environment* before 18 years old. The response categories were *never, once, a few times, many times, and don't know/declined*, and the variable was dichotomized as *0 = never* and *1 = once, a few times, or many times*.Orphan Status

The respondent was asked *whether one or both of the respondent's parents died* before the respondent was age 18 (*0 = non-orphan, 1 = orphan*).Cumulative ACE Types

A summative scale of cumulative ACE types was coded as a continuous variable (Edwards et al., 2014; Horn et al., 2018; Nguyen, Kegler, et al., 2019) with a range of *0 (no to all six ACEs)* to *6 (yes to all six ACEs: experienced SV, experienced PV, experienced EV, witnessed IPV, witnessed CV, and being orphaned)*.

**Demographic and Social Characteristics.:** Demographic and social characteristics were also assessed. These characteristics included sex, highest level of education completed, marital status, talk to friends about important things, and close to biological mother/father.

## Data Analysis

The prevalence of study variables was examined. Bivariate logistic regressions were performed between each independent variable (i.e., each individual ACE type, the number of ACE types experienced, and demographic and social characteristics) and each dependent variable (i.e., mental distress and suicide risk), respectively. Four adjusted logistic regression models were performed: individual ACE types and sociodemographic factors as independent variables with mental distress (Model 1) and suicide risk (Model 3) as outcome, and cumulative ACE exposure and sociodemographic factors as independent variables for mental distress (Model 2) and suicide risk (Model 4) as outcome. For adjusted models, sociodemographic factors that fell under a *p*-value of .2 for each dependent variable were included. Multicollinearity was also checked (Chang & Do, 2015; Gale et al., 2016) to ensure parsimonious models; $\alpha = .05$ was used to determine statistical significance and 95% confidence intervals were reported. Analyses were performed in SAS 9.4 (SAS Institute Inc., Cary, North Carolina, USA) using SAS SURVEYFREQ and SURVEYLOGISTIC procedures and the STRATA, CLUSTER, and WEIGHT commands (Ministry of Youth, Sport and Child DevelopmentMinistry of Community Development and Social ServicesUniversity of ZambiaUnited Nations Children's Fund, Save the Children International, United StatesCenters for Disease Control and Prevention, 2018).

## Results

### Prevalence of Demographic and Social Characteristics, ACEs, and Health Outcomes

Prevalence of demographic and social characteristics, ACEs, and health outcomes are reported in Table 1. About half the sample was female (50.6% [95% CI, 43.1–58.1]). Less than 30% (29.6% [95% CI, 25.7–33.4]) of respondents completed primary or less than primary education, and 35.6% (95% CI, 31.8–39.4) of respondents completed secondary or more than secondary education. About 30% (31.4% [95% CI, 27.3–35.5]) of respondents were currently married, while 68.5% (95% CI, 64.4–72.6) were never married, divorced, separated, or widowed. Sixty percent (95% CI, 56.1–63.9) of respondents did not talk to friends about important things a lot, and a majority of respondents were close or very close to their biological mother (89.8% [95% CI, 87.5–92.1]) and father (75.4% [95% CI, 71.9–78.8]). More than three in four (76.8% [95% CI, 73.5–80.2]) experienced at least one type of ACE. The range of cumulative ACE exposure was 0–6 with a median of 1.0 and an interquartile range of 2.0. Among individual ACE types, witnessing CV was most prevalent (38.4% [95% CI, 34.7–42.1]), followed by experiencing PV (35.1% [95% CI, 31.6–38.5]) and witnessing IPV (30.2% [95% CI, 27.0–33.4]). In addition, more than one in four respondents were orphaned (27.5% [95% CI, 24.5–30.6]), and less than 20% of respondents experienced EV (17.3% [95% CI, 14.4–20.2]) and SV (15.4% [95% CI, 12.8–18.0]). Less than a half of respondents (42.4% [95% CI, 38.7–46.2]) had mental distress in the past 30 days, and 12.5% (95% CI, 10.3–14.7) presented suicide risk in their lifetime.

### Associations between ACEs and Health Outcomes

The unadjusted and adjusted associations are presented in Table 2. Bivariate associations suggest that all individual ACE types—except for orphan status—and cumulative ACE exposure were significantly related to mental distress: SV (OR = 1.6 [95% CI, 1.1–2.4]), PV (OR = 1.7 [95% CI, 1.2–2.3]), EV (OR = 2.0 [95% CI, 1.3–3.0]), witnessed IPV (OR = 1.5 [95% CI, 1.1–2.0]), witnessed CV (OR = 1.5 [95% CI, 1.1–2.1]), and cumulative ACE exposure (OR = 1.3 [95% CI, 1.2–1.5]). Additionally, being 1 year older in age (OR = 1.1 [95% CI, 1.0–1.2]) was statistically significantly associated with mental distress. Youth who were currently married had .7 lower odds (95% CI, .5–.9) of having mental distress compared to youth who were never married, divorced, separated, or widowed. Experiencing childhood SV (OR = 2.0 [95% CI, 1.2–3.4]), PV (OR = 1.6 [95% CI, 1.1–2.3]), and EV (OR = 2.8 [95% CI, 1.7–4.7]) were each statistically significantly associated with suicide risk. Further, being male (OR = .6 [95% CI, .4–.8]) and having close relationship with biological mother (OR = .3 [95% CI, .1–.6]) and father (OR = .6 [95% CI, .4–.9]) had significantly less suicide risk. Multicollinearity was not found among variables and the correlation levels were low to moderate.

Age, marital status, and friendship were included as covariates in the adjusted models for mental distress, whereas age, sex, education level, and relationship with mother and father were included as covariates in the adjusted models for suicide risk. Adjusted logistic regression results suggest that experiencing PV (AOR = 1.5 [95% CI, 1.0–2.1]) and experiencing EV (AOR = 1.5 [95% CI, 1.0–2.3]), experiencing one additional ACE type (AOR = 1.3 [95% CI, 1.2–1.5]), being 1 year older (AOR = 1.1 [95% CI, 1.0–1.2]), and

talking to friends about important things a lot (AOR = 1.4 [95%, 1.0–1.9]) were significantly associated with higher mental distress. Youth who were currently married had .7 lower odds (95% CI, .5–1.0) of having mental distress compared to youth who were never married, divorced, separated, or widowed in the adjusted model. More types of ACE experienced were associated with higher suicide risk (AOR = 1.4 [95% CI, 1.1–1.7]).

## Discussion

The preponderance of the ACEs literature relies on data and findings from the United States and Europe (Petruccelli et al., 2019). Studies in diverse cultural contexts are needed to understand the patterns of risk associated with ACEs. In order to prevent violence and negative health outcomes associated with ACEs in Zambia, representative data from Zambia are needed (Ameli et al., 2017; Soares et al., 2016). In order to effectively design and implement culturally relevant and evidence-based interventions, country-specific investigation is necessary (Ameli et al., 2017). This study examined the associations of individual types of ACE, cumulative ACE exposure, mental distress, and suicide risk among Zambian youth, adjusting for demographic and social characteristics. This allowed for a more granular exploration of how individual ACEs versus cumulative ACE exposures impact the health of Zambian youth. It was hypothesized that ACEs, both individually and cumulatively, would be significantly associated with negative health outcomes but the effect sizes may be weaker for indirect violence exposure compared to direct violence exposure. Hypotheses were partially supported.

The prevalence of ACEs was high in Zambia. The results showed that 76.8% of 18–24-year-old youth experienced at least one type of ACE. All individual ACE types, except for orphan status, were significantly associated with higher risk for mental distress in bivariate analyses, while only PV and EV remained significant in the adjusted model. Thus, direct and indirect violence exposures were indeed significantly associated with mental distress, but exposure to other types of ACEs and individual differences in demographic and social characteristics may have confounded the relationships. The significant associations of mental distress with experiencing PV and EV are commensurate with the literature (Ameli et al., 2017; Annor et al., 2020; Berzenski & Yates, 2011; Breiding et al., 2013; Chang et al., 2019; Goodman et al., 2017; Meinck et al., 2017) and our hypotheses. Three types of direct violence exposure were statistically associated with suicide risk in bivariate analyses; however, no ACE types significantly correlated with suicide risk in the adjusted model.

Cumulative ACE exposure was significantly associated with both mental distress and suicide risk at the bivariate level as well as in the adjusted models. The significant connections of cumulative ACE exposure with mental distress (Boxer & Terranova, 2008; Chang et al., 2019; Hughes et al., 2017) and with suicide risk (Cluver et al., 2015; Hughes et al., 2017) are similar to previous research findings and confirmed in the study.

Importantly, orphan status did not emerge as significantly associated with mental distress or suicide risk in either bivariate or adjusted models. Research supports that orphan status is connected to poorer mental health outcomes (Atwine et al., 2005; Doku, 2009; Lata & Verma, 2013; Makame et al., 2002; Musisi et al., 2007; Nyamukapa et al., 2008;

Ruiz-Casares et al., 2009), but the significance is not always found with poorer mental health outcomes such as depression (Carbonaro, 2019). High prevalence of orphan status (>27%) among Zambian youth suggests that the emotional impacts of parental death may be buffered when many peers experience the same loss. It is also possible that youth who were orphaned had other family or community supports in the Zambian context that built resilience following parental death. It is noteworthy that the significant associations found in the literature also had similar context as to orphanhood using samples from China, Ethiopia, Ghana, Mozambique, Namibia, Rwanda, South Africa, Tanzania, Uganda, and Zimbabwe (Atwine et al., 2005; Doku, 2009; Lata & Verma, 2013; Makame et al., 2002; Musisi et al., 2007; Nyamukapa et al., 2008; Ruiz-Casares et al., 2009). More research is warranted to understand protective factors for orphans in Zambia in preventing poor mental health outcomes.

Being single and being able to talk to friends about important things a lot was associated with greater risk for mental distress. Interestingly, stronger friendship was shown as a risk factor for experiencing mental distress, contrary to the literature (Heinze et al., 2018; Turner et al., 2017). In this case, friendships could have included negative social interactions, impacting psychological well-being negatively (Rook, 1984), or correlating with depressive symptoms (Flett et al., 1997; Schuster et al., 1990). On the other hand, since the logistic regression analyses do not allow causal inferences, it is also possible to interpret that mentally distressed youth relied on talking to friends as a coping mechanism. This finding was unexpected and suggests the need for additional friendship-related research in the context of ACEs and mental distress among Zambian youth. Further, being male and having a close relationship with one or both parents were identified as significant protective factors for suicide risk in bivariate analyses, but the relationships were not significant in the adjusted model. This is consistent with previous studies that females have higher suicide risk (Itani et al., 2018; Vijayakumar et al., 2005) and social support from family lowers suicide risk (Holt & Espelage, 2005; Turner et al., 2013). Given the significant result of being male, future studies may investigate the associations between ACEs and suicide risk, stratified by sex, to better understand suicide risk by sex and possibly narrow down its intervention efforts to more specific population among Zambian youth. Further, more studies regarding protective factors that mitigate suicide risk for ACE-exposed youth in Zambia are warranted.

## Study Strengths and Limitations

The current study has several strengths and limitations. Important strengths come from the nationally representative nature of the VACS and large sample size. In addition, this study examined associations among different types of ACEs and mental distress and suicide risks, with demographic and social characteristics adjusted, which has been lacking in violence literature. The limitations include that the VACS data are cross-sectional, therefore, causal inference was not possible. The data were retrospectively self-reported and may have been impacted by recall bias. In addition, memory irregularities may have occurred in the reminiscence of traumatic events for the youth. Further, the prevalence of ACE or negative mental health outcomes may have been underestimated due to barriers to disclosure including fear, embarrassment, or other factors. As the VACS is a household survey, experiences of youth who live outside of family care were not represented. Further, time

constraints (past 30 days) of the mental distress measure limited our understanding of how acute distress may have been experienced immediately or in the months after a particular victimization experience. Lastly, the lifetime measure of suicide risks did not establish a clear temporal order between ACE and suicidal risks; therefore, the findings need to be interpreted with caution.

## Conclusions

ACEs are prevalent in Zambia, and careful ACE research and effective prevention efforts can reduce its detrimental consequences on youth mental health (CDC, 2019b). First, these results clearly indicate the importance in engaging in primary prevention efforts for ACEs to improve the mental health trajectories of Zambian youth. Second, screening efforts to identify youth who have been exposed to ACEs may increase access to mental health services through a targeted approach, given the significant relationship to both mental distress and suicide risk. Mental health interventions, such as strengthening coping skills and resilience, can be prioritized for youth with cumulative ACE exposure. Third, prioritizing PV and EV in ACEs prevention could effectively mitigate the harmful effects on youth mental health. Lastly, more research on protective factors is warranted in connection to childhood adversities and mitigating negative health outcomes that are applicable to Zambian context. Particularly, the findings on friendship were unexpected and more investigation can elucidate and guide the tailoring of interventions for Zambian youths. This research can be used to inform positive life trajectories for Zambian youths and strengthen intervention efforts for practice, program, research, and policy.

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## Author Biographies

**NaeHyung Lee, PhD**, conducts research on adverse childhood experiences both in the U.S. and international contexts. Her research interests include health impacts of violence and other life adversities experienced particularly among children and youth as well as effective strategies to prevent adverse childhood experiences and mitigate their effects.

**Greta Massetti, PhD** is a Senior Scientist in the Centers for Disease Control and Prevention's Division of Violence Prevention, where she leads global efforts to improve the availability of data on violence against children and youth and to use data to inform evidence-based strategies to prevent violence. Her research addresses the prevalence, contexts, and health consequences of violence against children and youth globally.

**Elizabeth Perry, M.P.H.** is a Second Century Initiative University Doctoral Fellow and second-year doctoral student in the School of Public Health at Georgia State University. Her research interests center around child maltreatment prevention, adolescent trauma, and implementation science to research ways to effectively increase the reach of evidence-based programs in low-resourced areas in low- and middle-income countries.

**Shannon Self-Brown, PhD**, is a Professor in the School of Public Health at Georgia State University. Her publications have focused on the impact of youth violence, trauma, and disaster exposure on youth mental health, as well as the implementation of evidence-based behavioral parenting programs and mental health practices for traumatized youth.

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**Table 1.**

Characteristics of 18–24-Year-Olds and Prevalence of Adverse Childhood Experiences (ACEs), Zambia 2014 ($n$ = 1034).

| Demographic and Social Characteristics | *n* | Weighted % | 95% CI |
|---|---|---|---|
| Sex | | | |
| Female | 507 | 50.6 | 43.1, 58.1 |
| Male | 527 | 49.4 | 41.9, 56.9 |
| Highest level of education completed | | | |
| Primary or less than primary | 333 | 29.6 | 25.7, 33.4 |
| Secondary or more than secondary | 360 | 35.6 | 31.8, 39.4 |
| Marital status | | | |
| Currently married | 372 | 31.4 | 27.3, 35.5 |
| Never married/divorced/separated/widowed | 661 | 68.5 | 64.4, 72.6 |
| Talk to friends about important things | | | |
| Not at all, a little, or not very much | 620 | 60.0 | 56.1, 63.9 |
| A lot | 411 | 39.8 | 35.9, 43.6 |
| Close to biological mother | | | |
| Not close or no relationship | 67 | 7.5 | 5.5, 9.5 |
| Close or very close | 939 | 89.8 | 87.5, 92.1 |
| Close to biological father | | | |
| Not close or no relationship | 207 | 20.4 | 17.2, 23.6 |
| Close or very close | 782 | 75.4 | 71.9, 78.8 |
| ACE Experienced, Lifetime | | | |
| Any ACEs experienced | 803 | 76.8 | 73.5, 80.2 |
| Childhood sexual violence | 169 | 15.4 | 12.8, 18.0 |
| Childhood physical violence | 368 | 35.1 | 31.6, 38.5 |
| Childhood emotional violence | 172 | 17.3 | 14.4, 20.2 |
| Witnessed intimate partner violence in childhood | 312 | 30.2 | 27.0, 33.4 |
| Witnessed community violence in childhood | 384 | 38.4 | 34.7, 42.1 |
| Orphaned | 292 | 27.5 | 24.5, 30.6 |
| Health Outcomes | | | |
| Mental distress, past 30 days | | | |
| No mental distress | 595 | 57.6 | 53.8, 61.3 |
| Moderate/Severe mental distress | 435 | 42.4 | 38.7, 46.2 |
| Suicide risk, lifetime | | | |
| No suicide risk | 901 | 87.5 | 85.3, 89.7 |
| Suicidal thoughts or suicide attempts | 128 | 12.5 | 10.3, 14.7 |

*Note*. CI = Confidence Interval; CV = community violence; EV = emotional violence; IPV = intimate partner violence; PV = physical violence; SV = sexual violence. Some categories do not add to the total number of 1034 due to missing data. 32.98% of participants had missing data for highest level of education completed.

**Table 2.**

Associations between Adverse Childhood Experiences (ACEs) and Mental Distress and Suicide Risk Among 18–24-Year-Olds, Zambia 2014 ($n$ = 1034).

| | Mental Distress | | Suicide Risk | |
|---|---|---|---|---|
| | **OR (95% CI)** | **AOR (95% CI)** | **OR (95% CI)** | **AOR (95% CI)** |
| Individual ACE Types | Model 1 ($n$ = 993) | | Model 3 ($n$ = 634) | |
| SV experienced | 1.6 (1.1, 2.4)* | 1.5 (.9, 2.3) | 2.0 (1.2, 3.4)* | 1.7 (.9, 3.2) |
| PV experienced | 1.7 (1.2, 2.3)* | 1.5 (1.0, 2.1)* | 1.6 (1.1, 2.3)* | 1.4 (1.0, 2.4) |
| EV experienced | 2.0 (1.3, 3.0)* | 1.5 (1.0, 2.3)* | 2.8 (1.7, 4.7)* | 1.9 (1.0, 3.7) |
| Witnessed IPV | 1.5 (1.1, 2.0)* | 1.2 (.9, 1.7) | 1.4 (.9, 2.1) | 1.6 (.9, 3.0) |
| Witnessed CV | 1.5 (1.1, 2.1)* | 1.3 (.9, 1.8) | 1.1 (.7, 1.7) | 1.0 (.9, 1.9) |
| Orphaned | 1.1 (.8, 1.5) | 1.0 (.8, 1.5) | 1.5 (1.0, 2.4) | 1.1 (.8, 2.2) |
| Age (in years) | 1.1 (1.0, 1.2)* | 1.1 (1.0, 1.2)* | 1.1 (1.0, 1.2) | 1.0 (1.0, 1.1) |
| Male | 1.0 (.7, 1.3) | N/A | .6 (.4, .8)* | .9 (.5, 1.6) |
| Secondary or more education completed | 1.0 (.7, 1.4) | N/A | 1.4 (.9, 2.3) | 1.1 (.7, 2.0) |
| Currently married | .7 (.5, 9)* | .7 (.5, 1.0)* | .9 (.6, 1.3) | N/A |
| Talk to friends about important things a lot | 1.3 (1.0, 1.8) | 1.4 (1.0, 1.9)* | .9 (.6, 1.4) | N/A |
| Close or very close to biological mother | .7 (.4, 1.2) | N/A | .3 (.1, .6)* | .5 (.2, 1.5) |
| Close or very close to biological father | 1.1 (.8, 1.6) | N/A | .6 (.4, .9)* | .7 (.4, 1.5) |
| Cumulative Types of ACE | Model 2 ($n$=1026) | | Model 4 ($n$=649) | |
| Number of ACE types experienced | 1.3 (1.2, 1.5)* | 1.3 (1.2, 1.5)* | 1.3 (1.1, 1.6)* | 1.4 (1.1, 1.7)* |
| Age (in years) | 1.1 (1.0, 1.2)* | 1.1 (1.0, 1.2)* | 1.1 (1.0, 1.2) | 1.0 (.9, 1.1) |
| Male | 1.0 (.7, 1.3) | N/A | .6 (.4, .8)* | .8 (.5, 1.4) |
| Secondary or more education completed | 1.0 (.7, 1.4) | N/A | 1.4 (.9, 2.3) | 1.2 (.7, 2.0) |
| Currently married | .7 (.5, .9)* | .6 (.5, .9)* | .9 (.6, 1.3) | N/A |
| Talk to friends about important things a lot | 1.3 (1.0, 1.8) | 1.3 (1.0, 1.8) | .9 (.6, 1.4) | N/A |
| Close or very close to biological mother | .7 (.4, 1.2) | N/A | .3 (.1, .6)* | .6 (.2, 1.7) |
| Close or very close to biological father | 1.1 (.8, 1.6) | N/A | .6 (.4, .9)* | .7 (.4, 1.3) |

*Note.* AOR = Adjusted Odds Ratio; CI = Confidence Interval; CV = community violence; EV = emotional violence; IPV = intimate partner violence; OR = Odds Ratio; PV = physical violence; SV = sexual violence. The sample size for each model differed due to missing values. For adjusted models, only the sociodemographic factors that fell under a $p$-value of .2 for each dependent variable were included; the sociodemographic factors that did not fall under a $p$-value of .2 for each dependent variable were not included and marked as N/A.