HHS Public Access

Author manuscript

Child Abuse Negl. Author manuscript; available in PMC 2024 July 11.

Published in final edited form as:

Child Abuse Negl. 2024 April ; 150: 106701. doi:10.1016/j.chiabu.2024.106701.

Adverse childhood experiences, mental distress, self-harm and suicidality, and cumulative HIV risk by sex in Lesotho☆

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Abstract

Background: Adverse childhood experiences (ACEs) have been understudied in low- and middle-income countries, especially in sub-Saharan Africa.

Objectives, participants, setting: We explored associations between mental distress, self-harm or suicidality, and HIV risk and individual and cumulative ACEs (sexual, emotional, and physical violence; witnessing community and interparental violence; orphanhood) among youth aged 13–24 in Lesotho.

Methods: Multivariable logistic regressions stratified by sex using nationally representative 2018 Lesotho Violence Against Children and Youth Survey (n_{female} = 7101; n_{male} = 1467) data.

Results: Over 75 % of males and females experienced at least 1 ACE. Among males, physical and community violence were significantly associated with mental distress; orphan status and emotional violence was associated with self-harm/suicidality. Males who witnessed interparental violence had higher odds of disclosing 2 types and 3 or more types of HIV risk versus none. Among females, being a double orphan and having experienced sexual, emotional, physical,

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☆We have no known conflict of interest to disclose.CDC Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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community, and interparental violence were significantly associated with mental distress and any self-harm/suicidality in both models. Females who experienced physical violence had higher odds of disclosing 3 or more risk types versus no risk. Statistically significant associations emerged between cumulative ACEs and mental distress, self-harm/suicidality, and higher levels of HIV risk for both males and females.

Conclusions: Differential patterns of associations between ACEs and mental health problems and HIV risk emerged by sex. Scalable, integrated individual and community efforts to prevent ACEs, provide mental health supports, and encourage safer sexual behaviors among those exposed are needed and could benefit youth in Lesotho.

Keywords

Adverse childhood experiences; ACEs; Violence against children and youth survey; VACS; ACE score; Sub-Saharan Africa; Global health

1. Introduction

Adverse childhood experiences (ACEs) pose a significant public health problem (Bellis et al., 2019; Merrick et al., 2019). Nearly two-thirds of youth globally experience ACEs (Carlson et al., 2019), and at least half have been exposed to sexual, physical, or emotional violence in the past year (Hillis et al., 2016). ACEs are potentially traumatic events that occur throughout childhood and can lead to negative long-term outcomes on health and well-being (Ports et al., 2020). Although ACEs are relatively well-studied in some high-income countries, ACEs and their impacts are understudied in low- and middle-income countries (LMICs), and even fewer studies have explored ACEs in LMICs using nationally representative samples (Carlson et al., 2019; Massetti et al., 2019). Yet, the few studies that have been conducted suggest that childhood adversity is common in LMICs (Gilbert et al., 2018; Kabiru et al., 2014; Lee et al., 2022; Palermo et al., 2019).

The relationship between ACEs and a host of short and long-term health outcomes at the individual, relational, and societal levels are well documented. People who experience ACEs are at significantly higher risk of developing chronic diseases, such as cancer, heart disease, and obesity (Bellis et al., 2016, 2019; Dierkhising et al., 2019; Felitti et al., 1998; Kalmakis & Chandler, 2015; Merrick et al., 2019). Research has also found consistent associations between exposure to ACEs and mental health outcomes, including depression, anxiety, posttraumatic stress disorder, suicidal ideation, suicide, mental distress, and substance use at the individual-level (Gardner et al., 2019; Hughes et al., 2017; Merrick et al., 2019). People who experience ACEs are more likely to engage in high-risk behaviors (e. g., multiple sex partners, lack of condom use) and are at greater risk of experiencing future violence victimization compared to those who do not experience ACEs (Dube et al., 2003; Finkelhor et al., 2009; Hillis et al., 2000; Hillis et al., 2001; Kidman et al., 2022; Lalor & McElvaney, 2010). Prior research has also documented intergenerational transmission of ACEs, such that a paren's own experiences of ACEs could be carried forward into their own parenting, adversely impacting their children (Narayan et al., 2021).

At the societal level, the economic burden of ACEs is very high due to costs related to the treatment of mental and physical health conditions, criminal justice, social welfare, and reduced earnings among others (Pereznieto et al., 2014). In South Africa, the economic burden of violence against children was 4.3 % of the country's GDP ($13.5 billion; Fang et al., 2017), which was twice as high as that of countries in other regions (i.e., 1.36 % to 2.52 % across the East Asia and Pacific region; Fang et al., 2015). Thus, preventing ACEs could substantially reduce the global public health impact of these adverse events on population health, as well as the range of social, and economic outcomes, particularly in sub-Saharan Africa – a region comprised of LMICs (Fang et al., 2017). Nonetheless, to date, most ACEs research has been conducted in high-income countries (e.g., Dube et al., 2003; Hillis et al., 2000; Hillis et al., 2001), particularly the US and UK (Massetti et al., 2019). This lack of diversity in LMIC representation in research on ACEs limits the ability to determine common patterns and outcomes of ACEs across cultures and settings. In particular, the absence of data from specific countries categorized as LMICs hampers efforts to assess the prevalence and burden of ACEs, assess its impacts, and drive prevention and response efforts in those countries. As such, research on ACEs from LMICs is essential and should be prioritized in order to address current knowledge gaps. The consequences of understudying and not addressing ACEs in LMICs could contribute to existing economic and health inequalities between high-income countries and LMICs.

1.1. ACEs and mental health in sub-Saharan Africa

Estimates suggest that mental health problems account for a third of global disability (Vigo et al., 2016) and LMICs carry over 80 % of the non-fatal disease burden of depressive disorders (World Health Organization, 2017). In 2015, it was estimated that over 75 % of deaths by suicide occur in LMICs (Knipe et al., 2019; World Health Organization, 2017). Mental health challenges in sub-Saharan Africa, in particular, are common and expected to worsen in the coming decades (Charlson et al., 2014; Jörns-Presentati et al., 2021; World Health Organization, 2017). More specifically, Charlson et al. (2014) estimated that the burden of mental health and substance use disorders will increase by 130 % in the African region by 2050 (Charlson et al., 2014). Studies exploring the pooled prevalence of suicidal behaviors in LMICs found the highest prevalence of suicidal ideation, planning, and attempts among adolescents aged 12 to 15 in African countries (Li et al., 2021). Estimates from Kenya, for example, suggest mental disorders were the leading cause of disability among Kenyan adolescents and young people aged 10 to 24 years (Kumar et al., 2022). Numerous social determinants of health and structural and social challenges have been found to negatively impact mental health, including gender inequality, income, and food insecurity, structural characteristics of neighborhoods, environmental events, and social and cultural structures (Lund et al., 2018; Swahn et al., 2022), many of which are particularly salient in LMICs (Lund et al., 2010, 2018; Patel & Kleinman, 2003).

Research has documented associations between exposure to singular ACE types and mental health challenges, including mental distress and self-harm behaviors and suicidality in sub-Saharan African countries (Bauta & Huang, 2022; Cluver et al., 2015; Jörns-Presentati et al., 2021; Manyema et al., 2018; Masiano et al., 2022; Meinck et al., 2017; Nguyen et al., 2019; Oladeji et al., 2010; Quarshie et al., 2020; Satinsky et al., 2021). However, much of this

research focuses on direct exposure to singular types of violence, specific populations based on demographics (e.g., HIV status or urbanicity), or has used convenience samples. There is limited research examining associations with ACEs using population-based, representative data from LMICs in sub-Saharan Africa (Amene et al., 2023; Massetti et al., 2019). Two studies using convenience sampling of youth aged 12 to 18 years living in the slums and on the streets in Kampala, Uganda, found that death of one or both parents and violence exposure were associated with self-reported depression, anxiety, hopelessness, and worry (Perry et al., 2020, 2022). Lee and colleagues used nationally representative data from Zambia and found that experiencing ACEs was associated with mental health problems and suicide risk among young people aged 13 to 24 years (Lee et al., 2022). Other findings from the Malawi Longitudinal Study of Families and Health found that ACEs were associated with depression and post-traumatic stress disorder (Kidman et al., 2020). However, none of these studies explored the associations between ACEs and mental health outcomes by sex.

Exploring the effects of cumulative ACEs in LMICs using nationally representative samples is also warranted, given previous research. Dose-response relationships between the number and severity of ACEs and health outcomes, including poor mental health outcomes, chronic illness, HIV, sexual risk and reproductive health have been well documented, mainly in high income countries (Bellis et al., 2014, 2019; Charak et al., 2017; Cluver et al., 2015; Hughes et al., 2017; Lee et al., 2022; VanderEnde et al., 2018). ACEs, especially the various violence types, tend to co-occur and are prevalent in LMICs (Charak et al., 2017; Lee et al., 2022; Palermo et al., 2019). Another study exploring ACEs among rural Ugandans found that cumulative exposure to ACEs was associated with greater depression symptom severity and increased risk for suicidal ideation (Satinsky et al., 2021). In a convenience sample of urban youth living in the slums or on the streets of Kampala, Uganda, associations emerged between cumulative experiences of ACEs and suicidal ideation (Culbreth et al., 2021) and self-reported anxiety and depression (Perry et al., 2022). Finally, in a longitudinal study in South Africa, findings suggest a strong graded relationship between cumulative ACEs at baseline and suicidal behavior 1 year later, including suicide planning, ideation, and attempts such that as the number of ACEs experienced increases, suicidal behavior increases (Cluver et al., 2015).

1.2. ACEs and HIV risk in sub-Saharan Africa

HIV remains a global public health challenge despite progress in the past decade (GBD 2017 HIV collaborators, 2019; Zhang et al., 2022). The Eastern and southern regions of sub-Saharan Africa experience the greatest burden of HIV globally (UNAIDS, 2023a). The two countries with the highest adult prevalence of HIV are in southern Africa, one of which is Lesotho (World Population Review, 2023). HIV/AIDS is the leading cause of death in the sub-Saharan African region (Dwyer-Lindgren et al., 2019; GBD 2017 HIV collaborators, 2019; James et al., 2018) and Lesotho (IMHE, 2020). Further, adolescent girls and young women experience a disproportionate burden of HIV compared to their male peers in sub-Saharan Africa as well as Lesotho (Frederix et al., 2023; Schwitters et al., 2022; UNAIDS, 2019; UNAIDS, 2023a; UNAIDS, 2023b) and this has remained unchanged in the past decade (GBD 2017 HIV collaborators, 2019).

Research has documented associations between childhood violence exposure and ACEs and increased risk for engaging in sexual risk behaviors during adolescence (Kidman et al., 2022; Lalor & Mcelvaney, 2010; Senn & Carey, 2010; Thibodeau et al., 2017). One study among US youth found that exposure to community violence was associated with more engagement in sexual risk (Udell et al., 2017). Another longitudinal nationally representative study that followed US youth into adulthood found that individual ACEs and cumulative ACE exposure were associated with the number of sex partners in the past 12 months at two follow-up time points, one where the mean participant age was 21 and a second when the participant mean age was 38 (Assini-Meytin et al., 2022). A population-based study among adolescent females from Tanzania found that exposure to sexual violence was associated with having multiple sex partners and low condom use in the past 12 months (Chiang et al., 2015).

One gap in the literature related to exploring the associations between ACEs and HIV risk is that many studies only include individual HIV risk types and do not explore associations between cumulative HIV risk. There are several challenges when considering the measurement of adolescent sexual behavior, such as relatively low correlations among risk behaviors for youth who are sexually active (Barker et al., 2019), the fluidity and relatively low frequency of adolescent sexual relationships and risky sexual behaviors during a given time period (Manning et al., 2014), and recall and numeracy skills (Napper et al., 2010) which make it difficult to summarize risk across types. Further, looking at individual risk types alone may not provide an accurate picture of HIV risk, especially during times when youth are engaging in a number of risk types. As such, cumulative HIV risk may be one way to model additive risk that could lead to HIV transmission. The only study to date, to our knowledge, that has explored additive HIV risk in sub-Saharan Africa is a study by Kidman et al. (2022). In their longitudinal study among youth in Malawi, they found that exposure to ACEs at baseline (age 10–16) was associated with higher engagement in HIV risk 4 years later for females but not males. When Kidman et al. (2022) explored associations cross-sectionally, separately at baseline and again at follow-up, they found associations between ACEs and higher engagement in HIV risk for males and females when youth were 10–16 years at baseline and 13–20 years at follow-up. Lastly, other findings among young people from Nigeria have found associations between cumulative ACEs and greater engagement in sexual risk behaviors (Ige et al., 2012).

1.3. Current study

The Kingdom of Lesotho is a low-income country, land-locked and located within South Africa (The World Bank, 2023). As of 2017, 44.9 % of the population lived below the poverty line and over half (50.6 %) was under the age of 24 (Central Intelligence Agency, 2023). Lesotho has the second highest HIV prevalence in the world (UNAIDS, 2022), and adolescent women and girls ages 14 to 24 are nearly twice as likely as their male counterparts to be living with HIV (UNAIDS, 2022). Further, orphanhood is high in Lesotho (Ministry of Social Development of Lesotho et al., 2020). Despite having a young population, no research has explored the associations between ACEs and mental distress, self-harm behaviors and suicidality, and cumulative HIV risk among youth in Lesotho.

In most research, measurement of ACEs has included emotional, physical, or sexual violence; emotional or physical neglect; or household challenges including witnessing intimate partner violence, substance abuse or mental illness in the home, parental separation or divorce, or having an incarcerated household member (Felitti et al., 1998; Ports et al., 2020). Researchers have also advocated for considering other factors in the measurement of ACEs that also have negative impacts on long-term health and well-being (Finkelhor et al., 2013; Karatekin & Hill, 2018) and taking context into account in defining ACEs (Massetti et al., 2019). The current study focuses on six ACE items, consistent with prior research on ACEs in LMICs (Amene et al., 2023; Kappel et al., 2021; Lee et al., 2022; VanderEnde et al., 2018): experiencing physical, sexual, and emotional violence, witnessing interparental violence or community violence, and experiencing the death of one or both parents.
One study to date has explored associations between sexual violence and mental health outcomes, including mental distress, suicidal thoughts, and self-harm using a nationally representative sample in Lesotho, but no other ACE types were included (Picchetti et al., 2022). Given the dearth of nationally representative data on ACEs and mental health in Lesotho, understanding individual and cumulative ACEs at the national level is warranted and could inform primary prevention efforts to prevent ACEs, and response efforts to address the mental health challenges of ACE-exposed youth. Thus, the purpose of this study is to 1) assess the proportion of individual and cumulative ACEs, mental distress, self-harm or suicidality, and cumulative HIV risk among males and females ages 13 to 24 in Lesotho; 2) explore associations between individual ACEs and mental distress, self-harm or suicidality, and cumulative HIV risk separately and by sex; and 3) understand associations between cumulative ACEs and mental distress, self-harm or suicidality, and cumulative HIV risk by sex.

2. Methods

2.1. Data source

This study utilizes data from the 2018 Lesotho Violence Against Children and Youth Survey (VACS; Ministry of Social Development of Lesotho et al., 2020), a nationally representative survey of males and females aged 13–24. The purpose of the Lesotho VACS was to produce national estimates of physical, emotional, and sexual violence in childhood and young adulthood, identify risk and protective factors for violence against children and youth, and use these findings to inform policy and prevention efforts. The Lesotho VACS was led by the Lesotho Ministry of Social Development, with support from ICAP at Columbia University, the U.S. Centers for Disease Control and Prevention (CDC), members of the National Orphans and Vulnerable Children Coordinating Committee, representatives from relevant Government Ministries of Lesotho, and national and international organizations (e.g., UNICEF). More information about the methodology, sampling and survey design, and ethical considerations for VACS are reported elsewhere (Chiang et al., 2016; Ministry of Social Development of Lesotho et al., 2020; Nguyen et al., 2019).

2.2. Ethical considerations

The Lesotho VACS was conducted according to WHO recommendations for research with populations who have experienced violence (World Health Organization & Global

Programme on Evidence for Health Policy, 2001) and CDC guidelines for engaging children and adolescents in violence research (Centers for Disease Control and Prevention, 2017). For participants under the age of 18, the parent or guardian provided permission for the child to participate, and the child assented to participate in the survey. Youth participants who were under 18 years of age and were emancipated or married, and those who were over the age of 18, provided their own consent to participate. Interviews took place in a private location and participants provided verbal consent to participate. Due to the sensitive nature of the survey items, direct referral protocols were put in place for youth who needed social services such as counseling. Ethical approval to conduct the Lesotho VACS was obtained independently from the Research and Ethics Committee at the Lesotho Ministry of Health, and the Institutional Review Boards at both the Colombia University Medical Center and the CDC.

2.3. Survey procedure, sampling, and sampling weights

Males and females ages 13 to 24 years were selected to participate in VACS. Samples for males and females were drawn separately and based on required sample size and response rates. Males and females were selected from separate enumeration areas (EAs) using a three-stage cluster sampling design. The sampling frame for VACS Lesotho was the 2016 census. In stage one, probability proportional to size was used to select 240 EAs (197 females, 43 males) from the 2600 EAs in the sampling frame. In stage two, 40 households were randomly selected, using equal probability systematic sampling, in each EA from all eligible households in the EA. A household was eligible if there was at least one household member who was between the ages of 13 and 24 years. In stage three, one eligible participant was randomly selected from each household and invited to participate in the survey. Survey weights were then applied to the dataset to represent the total population. Survey weights were created and applied to each individual participant to adjust for the probability for selection, differential non-response, and calibration to the census population. The final sample included 7101 females and 1467 males; the individual response rates were 98.3 % for females and 98.0 % for males.

2.4. Measures

The Lesotho VACS questionnaire is made up of items selected from well-established and commonly used survey tools with demonstrated validity and reliability.

2.4.1. Outcome variables

2.4.1.1. Mental distress.: The Kessler Psychological Distress Scale (K6) is a validated 6-item scale to measure general mental distress (Kessler et al., 2010), including feelings in the past 30 days of being “nervous,” “hopeless,” “restless,” “so sad that nothing could cheer you up,” “that everything was an effort,” and “worthless.” Each item was measured on a scale of *none of the time* (0) *to all of the time* (4) with higher scores indicating more severe distress (possible range 0 to 24). We calculated a total summary score by summing the 6 variables in the K6 scale. The summary score was then used to create a binary variable to indicate whether a participant was experiencing moderate to severe mental distress (versus those who did not). Cutoff points used in the current study are based on prior

literature (Kessler et al., 2010; Prochaska et al., 2012). Participants with summary scores of 5 or higher were considered to be experiencing moderate to severe distress. The Cronbach coefficient alpha for the K6 variables was $\alpha = 0.828$.

2.4.1.2. Self-harm or suicidality.: Self-harm and suicidality items were adapted from the WHO multi-country study (Ellsberg et al., 2008; World Health Organization, 2005). Three items assessed self-harm or suicidality: self-harm, suicidal ideation, and suicide attempt. Self-harm was assessed with the item, "Have you ever hurt yourself on purpose in any way?" Suicidal ideation was assessed with the item, "Have you ever thought about killing yourself?" And suicide attempt was assessed with the item, "Have you ever tried to kill yourself?" Youth could respond *yes*, *no*, *don't know*, or *declined* to each item. We created a binary (*yes, no*) variable, *any self-harm/suicidality,* that was operationalized as yes if a participant experienced one or more of the three items.

2.4.1.3. Cumulative HIV risk.: The fluidity and relative low frequency of adolescent sexual relationships (Manning et al., 2014), and developmental considerations such as recall and numeracy skills (Napper et al., 2010) make it challenging to summarize risk across types. As such, we created an additive HIV risk index to quantify the constellation of 6 sexual risk factors that could place a youth at risk of acquiring HIV. The 6 risk types for HIV are clinically meaningful and have been consistently associated with HIV infection (Chen et al., 2007; Stöckl et al., 2013; Wamoyi et al., 2016). This approach builds off previous literature that used additive composite HIV risk scores that include biological and behavioral items (Kidman et al., 2022) as well as research modeling additive HIV risk as an ordered outcome variable (Epstein et al., 2014). Levels of the HIV risk index were 0 risk types, 1 risk type, 2 risk types, and 3 or more risk types; we collapsed the "3 risk types" level with the higher levels (i.e., 4 risk types, 5 risk types, and 6 risk types) due to small cell counts in the higher levels, especially among males. Risk types included in the HIV risk index included multiple sex partners (≥ 2 sex partners in the past 12 months; Gilbert et al., 2022), age-disparate sexual relationship (5 year age difference of a sex partner) with the most recent sex partner in the past 12 months (Leclerc-Madlala, 2008), no or infrequent condom use with the most recent sexual partner in the past 12 months, lifetime presence of a sexually transmitted infection (self-reported symptoms or diagnosis), lifetime transactional sex (exchange of sex for money, gifts, or other things that were important; Chiang et al., 2021), and early sexual debut (having sex before age 15; Seff et al., 2021).

2.4.2. Correlates of interest

2.4.2.1. Adverse childhood experiences.: ACE types for the current study were selected from previous ACE research in LMICs and available measures in the Lesotho VACS (Amene et al., 2023; Dube et al., 2009; Finkelhor et al., 2013; Kappel et al., 2021; Karatekin & Hill, 2018; Lee et al., 2021; VanderEnde et al., 2018). ACEs assessed in the current study include experiencing the following prior to age 18, even if the participant had not yet reached 18 years of age: 1) sexual violence, 2) emotional violence, 3) physical violence, 4) witnessed community violence, 5) witnessed interparental violence, and 6) loss of one or both parents (orphan status). Orphan status may be a particularly relevant ACE in this context, given the high prevalence of orphanhood (Ministry of Social Development of

Lesotho et al., 2020), potentially due to HIV being endemic in the country (Coburn et al., 2013). ACE items measured in VACS were selected from the ISPCAN Child Abuse Screening Tool-Retrospective (ICAST-R; parent physical violence, emotional violence; Dunne et al., 2009; Zolotor et al., 2009) and the Juvenile Victimization Questionnaire (JVQ; peer, intimate partner, and adult physical violence, sexual violence, witnessing interparental violence, and witnessing violence in the community; Finkelhor et al., 2005; Pereda et al., 2018).

Types of sexual violence included unwanted sexual touching, attempted sex, physically forced sex, or pressured sex by any perpetrator. Physical violence included having been slapped, pushed, shoved, shook, intentionally thrown something at, punched, kicked, whipped, beaten with an object, choked, smothered, intentionally burned, attempted drowning, attacked or threatened with a knife, and attacked or threatened with a gun. Physical violence questions were asked about intimate partners, peers, parents, or other adults in the community as perpetrators. Emotional violence was measured by asking participants if a parent, adult caregiver, or other adult relative ever told them that they were not loved, wished they had never been born, or ever ridiculed or put them down. Response options for sexual, physical, and emotional violence were *yes* or *no*. Witnessing community violence was measured by asking participants how many times they had seen anyone get attacked outside of their home and family environment, which we then recoded into a binary (*any, none*) variable. Similarly, witnessing interparental violence was measured by asking participants how many times they saw or heard their mother or stepmother being hit, punched, kicked, or beaten by their father or stepfather, which we then recoded into a binary (*any, none*) variable. Orphan status was assessed using two different questions related to the responden's biological mother and father, from which we created a 3-level variable (*both parents alive, one parent alive, no parents alive*). The 3-level orphan status variable was based on previous literature (Puffer et al., 2012) that found differences in mental health outcomes of single and double orphans.

We created cumulative ACE score categories from total ACE counts based on previous literature (Amene et al., 2023; Dube et al., 2009; Kappel et al., 2021; VanderEnde et al., 2018). Youth could have experienced up to 6 total cumulative ACEs. The three cumulative ACE categories we used were 0 ACEs, 1–2 ACEs, and ≥ 3 ACEs, which were used in the cumulative ACEs models.

2.4.3. Control variables—We controlled for age (*continuous*), food insecurity (participant response to the item, “Do you think your household has enough money for food?” [*yes, no*]), and whether a person was married or cohabitating. The food insecurity question serves as an indicator of economic and material insecurity. Both age and food insecurity are potential confounders in the relationship between ACEs and mental health challenges (Jackson et al., 2019; Pourmotabbed et al., 2020); thus, we chose to treat age and food insecurity as control variables in our models with the two mental health outcomes. We added marital status as a third covariate, in addition to age and food insecurity) to the model with the HIV risk index as the outcome as marital status is a potential confounder in the relationship between ACEs and HIV risk.

2.5. Data analysis

Participants ages 13 to 24 were included in the analytic sample. To assess the proportion of youth ages 13 to 24 who experienced ACEs, mental distress, self-harm and suicidality, and HIV risk types, we calculated frequencies and weighted percentages for categorical variables and means and weighted means for continuous variables as well as the respective 95 % confidence intervals for each variable type. Analyses were stratified by sex when computing population estimates. We started our modeling process by conducting correlations and simple logistic regression models to understand the bivariate relationships between our correlates and outcomes of interest that were selected using theory and previous research. Results of the unadjusted estimates from the simple logistic regression models regressing mental distress and self-harm/suicidality on each ACE item are presented in Tables 2 and 3, respectively. We then conducted a series of multivariable regression models, first by adding all the individual ACEs to the model at once (results not presented); then, we added the covariates to the models that included the individual ACE types (adjusted estimates presented in Tables 2, 3, and 4). We followed the same process for our cumulative ACEs models, except in these models, ACEs were combined and treated as one 3-level ordinal variable. All simple and multivariable regression models were stratified by sex. We used logistic regression for the models with mental distress and self-harm/suicidality as the outcome and multinomial regression for the models with the composite HIV risk index as the outcome. We evaluated the HIV risk composite to see if the proportional odds assumption held and it did not, so we chose to treat it as a multinomial variable in our models. Our final models presented in Tables 2–6 estimate the relationships between ACE types, cumulative ACEs and mental distress, self-harm or suicidality, and HIV risk for males and females. We controlled for age and food insecurity in all models and added marital status as a third covariate in the model with HIV risk as the outcome.

We ran sensitivity analyses, stratified by age group and focusing on 18–24-year-olds, to determine if the results varied by age group (18- to 24-year-olds versus 13- to 17-year-olds). Findings from the sensitivity analyses suggested results were largely in the same direction with a consistent overall pattern of findings. However, the confidence intervals for some of the results, particularly for males in the older age group, were very wide, which made it difficult to interpret the findings. Thus, all our analyses included young people aged 13 to 24. Because we included youth ages 13 to 24 in our analytic sample, we chose to report ACEs as proportions and not as a *prevalence* as ACE prevalence is typically reported for persons older than age 18. As such, we use the term proportion or population estimates to describe all descriptive statistics reported in this study. All analyses accounted for the complex survey design; proportion estimates and logistic regression models were estimated using PROC SURVEY procedures and STRATA, CLUSTER, WEIGHT, and DOMAIN commands in SAS 9.5 (SAS Institute Inc., Cary, NC).

3. Results

3.1. Population characteristics

Weighted population estimates and corresponding 95 % confidence intervals (CI) for all study variables are presented in Table 1. ACEs were common among both males and

females ages 13 to 24 in Lesotho. About 58 % (95 % CI [53.49, 63.01]) of males reported 1–2 ACEs and 24.75 % (95 % CI [19.38, 30.12]) reported 3 or more ACEs. Among females, 55.30 % (95 % CI [53.48, 57.12]) reported 1–2 ACEs and 20.57 % (95 % CI [18.58, 22.56]) reported 3 or more ACEs.

When looking at individual ACE types, population estimates of exposure to ACEs varied by sex and the type of ACE. Among males, 32.53 % (95 % CI [28.75, 36.31]) lost one parent, while 7.57 % (95 % CI [5.88, 9.26]) lost both parents. Among females, about 29 % (95 % CI [27.53, 30.35]) lost one parent and 9.03 % (95 % CI [8.14, 9.92]) lost both parents. Among males, 4.04 % (95 % CI [2.62, 5.45]) experienced sexual violence, 7.64 % (95 % CI [5.20, 10.08]) experienced emotional violence, and 56.27 % (95 % CI [51.04, 61.49]) experienced physical violence. Over a quarter (26.34 %; 95 % CI [22.23, 30.44]) of males reported witnessing interparental violence and 37.99 % (95 % CI [32.21, 43.78]) reported witnessing community violence. Among females, 12.8 % (95 % CI [11.23, 14.43]) experienced sexual violence, 10.99 % (95 % CI [9.85–12.13]) experienced emotional violence, and 35.60 % (95 % CI [33.10, 38.09]) experienced physical violence. About 32 % (32.13 % ([95 % CI [30.05, 34.20]) of females reported witnessing interparental violence and 21.06 % (95 % CI [19.17, 22.94]) reported witnessing community violence.

In terms of mental health problems, mental distress was descriptively more common than self-harm/suicidality. About a quarter of males and females experienced mental distress, and about one in twenty males and one in ten females experienced any self-harm/suicidality. Nearly 30 % of males (28.48 %, 95 % CI [22.88, 34.09]) reported moderate to severe mental distress and 4.81 % (95 % CI [3.27, 6.37]) reported any self-harm/suicidality. Among females, 26.41 % (95 % CI [24.20, 28.63]) reported moderate to severe mental distress and 8.95 % (95 % CI [8.01, 9.89]) reported any self-harm/suicidality.

A high prevalence of youth disclosed high levels of HIV risk; about 70 % of males and females disclosed at least 1 type of HIV risk. Nearly 29 % of males and 36 % of females disclosed 2 or more risk types. The most common HIV risk types among males were no or infrequent condom use (35.38 %, 95 % CI [29.15, 41.62]), multiple sex partners (32.11 %, 95 % CI [26.55, 37.66]), and early sexual debut (28.20 %, 95 % CI [24.12, 32.27]). Among females, the most common HIV risk types were infrequent condom use (60.12 %, 95 % CI [57.60, 62.63]) and having an age-disparate sexual relationship (33.74 %, 95 % CI 931.58, 35.91]).

3.2. Associations between individual ACEs and mental distress

Unadjusted and adjusted associations for the models with mental distress as the outcome are presented in Table 2 and suggest differential patterns of associations between ACEs and mental distress by sex. In the multivariable model for males, males who experienced physical violence (AOR = 1.44, 95 % CI [1.00, 2.05]) and who witnessed community violence (AOR = 2.19, 95 % CI [1.57, 3.06]) had significantly higher odds of mental distress, controlling for the other ACE types, age, and food insecurity. In the adjusted model for females, statistically significant independent associations emerged between mental distress and orphanhood (double orphans only), experiencing sexual, emotional, and physical violence, and witnessing community and interparental violence. Females

who lost both parents had 1.29 higher odds of experiencing mental distress (95 % CI [1.02, 1.64]), controlling for the other individual ACE types, age, and food insecurity. In adjusted analyses, females who experienced sexual violence had 1.75 higher odds (95 % CI [1.46, 2.08]) of experiencing mental distress. Females who experienced emotional violence (Adjusted Odds Ratio [AOR] = 2.28; 95 % CI [1.83, 2.85]) and physical violence (AOR = 1.36; 95 % CI [1.13, 1.64]) had higher odds of mental distress. Females who witnessed community violence (AOR = 1.34; 95 % CI [1.10, 1.62]) and interparental violence (AOR = 1.49; 95 % CI [1.30, 1.71]) had significantly higher odds of experiencing mental distress.

3.3. Associations between individual ACEs and self-harm or suicidality

Unadjusted and adjusted associations for the models with any self-harm/suicidality as the outcome are presented in Table 3. In the final adjusted model for males, orphanhood (single orphan only) and emotional violence were the only individual ACE types independently associated with any self-harm/suicidality. Males who experienced emotional violence had 5.92 (95 % CI [2.45, 14.29]) higher odds and those who lost one parent had 2.31 (95 % CI [1.19, 4.47]) higher odds of any self-harm/suicidality. In the adjusted model for females, statistically significant associations emerged between orphanhood (double orphan only), experiencing sexual, emotional, and physical violence, and witnessing community and interparental violence and any self-harm/suicidality. Females who lost both parents had 1.72 (95 % CI [1.29, 2.31]) higher odds of any self-harm/suicidality, controlling for the other individual ACE types, age, and food insecurity. Females who experienced sexual violence (AOR = 2.32; 95 % CI [1.78, 3.01]), emotional violence (AOR = 2.57; 95 % CI [1.92, 3.44]), physical violence (AOR = 1.86; 95 % CI [1.46, 2.38]), and witnessed community (AOR = 1.29; 95 % CI [1.00, 1.67]) and interparental violence (AOR = 1.53; 95 % CI [1.20, 1.95]) had significantly higher odds of any self-harm/suicidality.

3.4. Associations between individual ACEs and HIV risk

Unadjusted and adjusted associations for the models with HIV risk as the outcome are presented in Table 4. In the final adjusted model for males, witnessing interparental violence was the only individual ACE type that was independently associated with the HIV risk index. Males who witnessed interparental violence had higher odds of disclosing 2 risk types (versus none; AOR = 2.51, 95 % CI [1.48, 4.25]) and higher odds of disclosing 3 or more risk types (versus none; AOR = 2.79, 95 % CI [1.24, 6.26]). In the adjusted model for females, statistically significant associations emerged between physical violence and witnessing interparental violence and the HIV risk index. Females who experienced physical violence had higher odds of disclosing 3 or more risk types (versus none; AOR = 1.45, 95 % CI [1.03, 2.04]) and females who witnessed interparental violence had reduced odds of disclosing 1 risk type (versus none) AOR = 0.71, 95 % CI [0.54, 0.93]).

3.5. Associations between cumulative ACEs, mental distress, self-harm or suicidality, and HIV risk

Models reporting adjusted associations between cumulative ACEs and mental health outcomes are presented in Table 5. In the models for both males and females, compared to 0 ACEs, experiencing 1–2 ACEs and 3 or more ACEs were both associated with higher adjusted odds of mental distress. Controlling for age and food insecurity, males

who experienced 1–2 ACEs had 2.42 times (95 % CI [1.64, 3.59]) higher odds of mental distress, and those who experienced 3 or more ACEs had 4.37 times (95 % CI [2.89, 6.60]) higher odds of mental distress compared to males with 0 ACEs, controlling for age and food insecurity. Controlling for the other variables in the model, females who experienced 1–2 ACEs had 1.66 times (95 % CI [1.32, 2.09]) higher odds of mental distress, and those who experienced 3 or more ACEs had 3.68 times (95 % CI [2.79, 4.85]) higher odds of mental distress, compared to females with 0 ACEs.

With regard to self-harm/suicidality, males who experienced 3 or more ACEs had 6.01 times (95 % CI [1.95, 18.49]) higher odds of any self-harm/suicidality compared to males with 0 ACEs. Females who experienced 1–2 ACEs had 2.80 times (95 % CI [1.95, 4.03]) higher odds of any self-harm/suicidality; females who experienced 3 or more ACEs had 7.99 times (95 % CI [5.51, 11.58]) higher odds of any self-harm/suicidality compared to females with 0 ACEs.

Models presenting the adjusted associations between cumulative ACEs and HIV risk are presented in Table 6.

With regard to the HIV risk index, males who experienced 1–2 ACEs had higher odds of disclosing 2 risk types (versus none; AOR = 2.61, 95 % CI [1.08, 6.32]). Males who experienced 3 or more ACEs had higher odds of disclosing 2 or more risk types (versus none; AOR = 3.71, 95 % CI [1.39, 9.91]) and 3 or more risk types (versus none; AOR = 2.83, 95 % CI [1.09, 7.37]). Among females, those who experienced 1–2 ACEs had higher odds of disclosing 3 or more risk types (versus none; AOR = 1.65, 95 % CI [1.11, 2.45]). Lastly, females who experienced 3 or more ACEs were at higher odds of disclosing 3 or more risk types (versus none; AOR = 2.53, 95 % CI [1.54, 4.16]).

4. Discussion

Exposure to individual and cumulative adverse events in childhood has lasting consequences on individual and population health (Bellis et al., 2019; Lopez et al., 2021; Merrick et al., 2019; O'Neill et al., 2021). However, little is known about the proportion of youth who experience ACEs and the effects of ACEs on mental health, self-harm or suicidality, and HIV risk among youth in Lesotho. Further, the distribution of ACEs and their association with mental health and HIV-related outcomes may differ by sex (Easterlin et al., 2019; Salmon et al., 2022; Wade et al., 2021), which has important implications for prevention and intervention strategies. Currently, no research has been conducted exploring multiple types of childhood adversity and mental health among youth in Lesotho, especially using a nationally representative sample. Understanding these associations is essential for developing policies and programs to prevent and address these exposures. The current study assessed the proportion of ACEs, mental distress, any self-harm or suicidality, and HIV risk among males and females ages 13 to 24 in Lesotho and explored associations between individual and cumulative ACEs and mental distress, self-harm or suicidality, and HIV risk. Understanding the proportion, distribution, and effects of both individual and cumulative ACEs on mental health and HIV risk among under-researched populations, like

young people living in Lesotho, can inform targeted prevention efforts, which could have far-reaching benefits for Lesotho and other LMICs.

A very high proportion of young people expereince ACEs in Lesotho. About 83 % of males and 75 % of females reported experiencing at least 1 ACE. These findings are descriptively similar to other research on ACEs in sub-Saharan Africa. For example, a nationally representative sample of Malawian young people found that 90 % of males and 77 % of females reported at least 1 ACE (VanderEnde et al., 2018). In terms of individual ACE types, experiencing the death of one or both parents was the most prevalent ACE type in the current study; nearly 40 % of females and males experienced the death of one or both parents. Orphanhood in southern Africa has been found to increase social and economic vulnerabilities, including increased risk for HIV and other serious health outcomes (Skinner et al., 2013).

About one in four males and females experienced mental distress, and about one in twenty males and one in ten females experienced any self-harm or suicidality. The current findings are corroborated by a recently published review exploring mental health outcomes among adolescents living in sub-Saharan Africa (Jörns-Presentati et al., 2021), and suggest a substantive portion of the population in Lesotho experience mental health challenges. Further, many studies in this review found higher mental health problems for adolescents who were orphaned by AIDS or who had a parent who was living with HIV/AIDS (Jörns-Presentati et al., 2021), which is especially relevant given the prevalence of orphanhood found in the current study and the challenging legacy of HIV/AIDS in Lesotho (Central Intelligence Agency, n.d.). The high proportion of youth who experienced mental distress and any self-harm or suicidality in this study points to the need for accessible and effective mental health services in LMICs. However, despite the need for accessible mental health treatment for children and adolescents, a treatment gap exists (Patel et al., 2008; Yatham et al., 2018) due, in part, to limited options for treatment and limited human resource capacity (Leocata et al., 2021; World Health Organization, 2011).

The majority of sexually active male and female youth in Lesotho disclosed HIV risk types. About 70 % of males and females disclosed at least 1 risk type, which was similar to findings among a high-risk youth population living in the US (Epstein et al., 2014). About 30 % of males and over 1/3 of females disclosed 2 or more risk types. The most common risk types among males were no or infrequent condom use, multiple sex partners, and early sexual debut, while the most common risk types among females were no or infrequent condom use and having an age disparate sexual relationship. Previous research indicates high rates of HIV among young people living in Lesotho (Frederix et al., 2023; Low et al., 2019), and the high prevalence of individual and additive sexual risk among youth in Lesotho may play a role in HIV transmission among this population.

When exploring the associations between ACEs and mental distress, we found associations for both males and females. Among males, significant associations emerged for experiencing physical violence and witnessing community violence. Among females, orphanhood, sexual, emotional, and physical violence, and witnessing community and interparental violence all emerged as significantly associated with mental distress. Our findings are commensurate

with prior work exploring the associations between individual ACE types and mental health, including a global systematic review and meta-analysis (Fergusson & Woodward, 2002; Gardner et al., 2019; Mathers & Loncar, 2006; Silins et al., 2018).

We also found different patterns of associations between self-harm or suicidality and individual ACE types for males and females. Among males, exposure to emotional violence and losing one parent prior to age 18 was associated with self-harm or suicidality. Among females, experiencing the loss of both parents, experiencing sexual, emotional, and physical violence, and witnessing community and interparental violence all emerged as significantly associated with self-harm or suicidality. Interestingly, our finding of the association between exposure to emotional violence and self-harm or suicidality for both males and females is similar to findings from other research in Kenya, Tanzania, and Uganda (Ashaba et al., 2021; Seff & Stark, 2019). For example, Seff and Stark (2019) explored sex-disaggregated associations between violence types and suicide ideation in 13- to 24-year-olds in Kenya and Tanzania and found consistent associations between ever experiencing emotional violence from a caregiver and suicide ideation among both males and females in both countries. Findings from this same study also found different patterns of other violence types (i.e., physical violence from a caregiver, physical violence from a community member, sexual violence, and physical intimate partner violence) and suicide ideation by sex (Seff & Stark, 2019), which support the findings of the current study. Thus, these findings suggest that efforts to provide mental health supports to violence-exposed youth are needed to prevent self-harm or suicidality.

Interestingly, statistically significant associations between levels of orphanhood and mental health outcomes varied by type of mental health outcome and sex. Only females who were double orphans had statistically significant greater odds of moderate to severe mental distress when compared to females whose both parents were alive. No significant associations between being a female single orphan (versus having both parents alive) or any levels of the orphan status variable for males emerged. Similarly, in the models with self-harm and suicidality as the outcome, the only significant associations between orphan status levels and self-harm/suicidality that emerged were among female double orphans and male single orphans. One explanation for these findings for females could be that among female single orphans, the parent-child relationships with the surviving parent may have buffered some of the negative mental health effects of losing a parent in childhood. For males, community factors may buffer the mental health effects of losing both parents, such as peer friendships or being able to find a job. Further, there may be other culturally specific buffering factors in these relationships that we did not explore in this study. Future research is needed to better understand orphan status and related outcomes, the immediate and extended family context, and potential community- and caregiver-based protective factors for youth mental health for both males and females in Lesotho.

When exploring the associations between ACEs and cumulative HIV risk, we found different associations between ACE types and HIV risk levels for males and females. Among males, witnessing interparental violence was statistically significantly associated with disclosing 2 risk types and 3 or more risk types compared to 0 risk types and was the only individual ACE associated with HIV risk. One study among college students in

the US found associations between male exposure to interparental violence and the number of sex partners (Smith Schafer, 2023). Interparental violence arises from gender and power inequalities as well as structural environmental influence (Anderson, 2017). While we did not assess individual HIV risk types, it is possible that for males, growing up in a home where interparental violence was present could have influenced the endorsement of norms that could lead to a person to engage in risky sexual behaviors as a means to exert power and control. Future research is needed to understand the drivers and mechanisms of this strong finding among males in Lesotho. Among females, experiencing physical violence was associated with higher odds of disclosing 3 or more HIV risk types. Findings from the seminal ACEs study found associations between ACE types and sexual risk behaviors (e.g., early sexual debut, self-perceived AIDS risk, and ≥ 30 sex partners) among women in the US (Hillis et al., 2001). In Malawi, associations between witnessing interparental violence and HIV risk among males and experiencing physical abuse and HIV risk among females did not emerge in the longitudinal analyses in Kidman et al. (2022). However, the authors also did not report the associations between individual ACEs and cumulative HIV risk in their cross-sectional analyses. We also found that witnessing interparental violence was associated with lower odds of disclosing 1 HIV risk type among females, which was unexpected. One explanation for this could be that witnessing interparental violence discouraged youth from engaging in sex or risky sex. This could also have been a spurious finding; thus, more research is needed to understand what factors could be driving this association.

The associations between mental distress and self-harm or suicidality and cumulative ACEs were striking for both males and females, especially among youth who experienced 3 or more ACEs. Our findings corroborate existing research (Ames et al., 2019; Masiano et al., 2022; Oscós-Sánchez, 2017; Voith et al., 2014), including a study among women in rural Kenya that found associations between cumulative ACEs and generalized anxiety (Goodman et al., 2022). Similarly, our findings align with results from a prospective study among South African adolescents that found associations between cumulative ACE scores and suicide behaviors 1 year later (Cluver et al., 2015). Further, another study among rural Ugandan adults found associations between cumulative ACEs and depression symptom severity, major depressive disorder diagnosis, and suicidal ideation (Satinsky et al., 2021).

We also found consistent associations between cumulative ACEs and higher levels of HIV risk for both males and females, with higher ACE exposure associated with higher levels of HIV risk. This finding aligns with similar research from the seminal ACEs study from the US that found cumulative ACEs were associated with HIV risk, including early sexual debut, AIDS risk, multiple sex partners among women (Hillis et al., 2001) and likelihood of having an STI among males and females (Hillis et al., 2000). These findings also align with research from the UK (Wood et al., 2022), Hispanic youth in the US (Rahman et al., 2023), as well as a nationally representative sample of youth in Namibia (Agathis et al., 2023) that found associations between cumulative ACEs and individual HIV risk types. Kidman et al. (2022) also found that higher levels of ACE exposure were positively associated with higher HIV risk scores among youth in Malawi, with predicted HIV risk scores increasing as ACE count increased. Childhood adversity could influence HIV risk via stress-response activation, that could inhibit impulse control and a youth's ability to recognize

risky situations (Anda et al., 2006; Felitti, 2009; Shonkoff et al., 2009). Depression and mental health challenges could arise from stress response activation and have been found to mediate the relationship between ACEs and HIV risk behavior among South African youth aged 12 to 17 (Meinck et al., 2019). Mental health conditions have also been found to be associated with poorer HIV prevention outcomes beyond risky sexual behavior, including poor engagement in HIV prevention behaviors (Collins et al., 2021). While the current study did not explore indirect paths from ACEs to HIV risk, future research should explore if mental health challenges mediate the relationship between ACEs, HIV risk, and HIV among youth in Lesotho. Better understanding these relationships, specifically in Lesotho, could have implications on prevention and response efforts in LMICs countries with high rates of HIV, and among populations at high risk of HIV.

4.1. Limitations

The main strength of this study is that it used rigorous, complex epidemiological methods to produce national estimates of ACEs and mental health challenges for youth in Lesotho. VACS Lesotho is the only comprehensive, nationally representative source of violence data on children and youth in Lesotho. Yet, there were several limitations to this study that should also be considered when interpreting the findings. First, we were limited in terms of the types of ACEs measured in the Lesotho VACS, so we were unable to assess other traditional or expanded ACEs related to neglect (Centers for Disease Control and Prevention, 2021; Finkelhor et al., 2013; Karatekin & Hill, 2018). We were also unable to explore or consider any ACEs that may be specific to the Lesotho or broader LMIC context, such as having a caregiver who is living with HIV or other chronic illness or disability. Additionally, we included youth ages 13 to 24 years in our analyses due to sample size limitations. Given many youth in this sample have not yet reached 18 years of age, it could be possible that the youth in the younger age group may still experience 1 or more ACEs between VACS data collection and prior to turning 18, which could result in a different proportion of ACEs or associations observed between the variables reported in this study. As a result, ACEs might have been underrepresented in this study. VACS is a cross-sectional survey; thus, causal relationships cannot be inferred. Third, we used the Kessler-6 scale to assess non-specific mental distress. While the K6 is a validated brief screening tool for serious mental illness (Prochaska et al., 2012), it is not designed to diagnose mental health disorders. Nonetheless, the purpose of this study was not to diagnose mental health disorders, but rather, give a broad indication of associations between ACEs and general youth mental health problems. Next, the smaller sample size among males resulted in much wider confidence intervals for males than females, which in turn likely influenced statistical significance. It is not possible to determine whether individual results for males would have been significant with a larger sample size. Fourth, ACEs, mental distress, self-harm or suicidality, and HIV risk are associated with stigma, which could also have influenced reporting rates, and may have yielded underestimates of these measures. Lastly, we computed a composite score for cumulative HIV risk. While this approach has been used in the literature (Barker et al., 2019; Epstein et al., 2014; Kidman et al., 2022), the single-dimensional composite score could dilute the effect of each risk type, as different risk types may have a differential effect on HIV infection. Despite this, our goal was to model additive HIV risk, as disclosing higher levels of risk could contribute to a greater risk of the transmission of HIV. Further, we

followed recommendations outlined in Barker et al. (2019) in our use of this polynomial HIV risk composite. More research is needed to develop a unified definition of and a measurement model for aggregate HIV risk in Lesotho and sub-Saharan Africa, broadly. Despite these limitations, this is the first study to examine ACEs, mental distress, and self-harm or suicidality among a nationally representative sample of youth in Lesotho, and as such, provides important findings that are relevant for prevention and intervention programs in Lesotho, as well as future research.

4.2. Conclusion and implications

In the current study, we found a high proportion of ACE exposure, and many youth experienced the loss of one or both parents, which has social and economic implications. We also found significant associations between both individual and cumulative ACEs and mental distress, self-harm or suicidality, and composite HIV risk. The findings of this study provide further support for increased funding efforts (Vigo et al., 2016) and scaled up prevention programming to prevent ACEs and subsequent mental health challenges and HIV risk across Lesotho. Moreover, there is a clear need to provide support services and evidence-based treatments for youth who have experienced ACEs, especially multiple types of ACEs. Preventing ACEs and addressing mental health challenges could have far-reaching implications on individual health, social, and economic outcomes for Lesotho (Fang et al., 2015, 2017; Fergusson & Woodward, 2002; Mathers & Loncar, 2006; Murray et al., 2012; Patel et al., 2008; Pereznieto et al., 2014; Shonkoff et al., 2009; World Health Organization, 2022; Yatham et al., 2018).

INSPIRE is a technical package recommended by the US CDC and the WHO and serves as a framework that provides evidence-based interventions and policies to prevent and respond to violence against children and ACEs (World Health Organization, 2016). INSPIRE consists of seven strategies and approaches to ending violence, ACEs, and associated outcomes for children that can be implemented across settings and countries: 1) implementation and enforcement of laws; 2) norms and values; 3) safe environments; 4) parent and caregiver support; 5) income and economic strengthening; 6) response and support services; and 7) education and life skills. Further, implementing strategies, policies, and interventions in an integrated, cross-cutting manner may bolster program outcomes and strengthen child protection systems. Research suggests that some interventions may also have spillover effects and other indirect benefits for people beyond those directly receiving services (Cluver et al., 2018; Desrosiers et al., 2021, 2023).

Research suggests evidence-based parenting programs may reduce child maltreatment (World Health Organization, 2023a, 2023b), particularly physical, sexual, and emotional violence against children. Given the high proportion of youth who experienced these ACEs found in the present study and based on INSPIRE and WHO parenting guidelines (World Health Organization, 2023a), scalable parenting interventions are needed and have significant potential for impact in Lesotho. One evidence-based parenting program, Parenting for Lifelong Health (PLH) Parents and Teens (World Health Organization, 2023b) is being implemented in Lesotho. PLH Parents and Teens has been found to reduce violence in the home and increase positive parenting, involvement, and monitoring (Cluver et al.,

2017; Ward et al., 2020). PLH also offers prototype versions that include enhanced content for HIV prevention and sexual violence risk reduction (World Health Organization, 2023b). PLH is just one example of current programmatic efforts to support parents and caregivers. To respond to global calls and recommendations to support all caregivers of children ages 0 to 17 in LMICs (World Health Organization, 2023a), additional parenting programs should be explored.

The U.S. Presiden's Emergency Plan for AIDS Relief (PEPFAR) and the Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe (DREAMS) programs also offer integrated programming to address structural drivers of HIV and violence risk among adolescent girls and young women (Saul et al., 2018). DREAMS programs include HIV treatment and prevention, school and community-based violence prevention programs, parenting and caregiver programs, and economic strengthening interventions that are intended to prevent HIV, violence, and other childhood adversities. DREAMS also offers post-violence care for survivors of violence and linkage to care, including social services for victims of violence. Lesotho has implemented DREAMS since 2015 in select areas with a high burden of HIV. The present findings indicating strong associations between ACEs and mental health and HIV risk among females support the need for strengthening DREAMS programming in Lesotho. At the societal level, legislative efforts (Fortson et al., 2016) and health systems strengthening interventions, such as integrating behavioral health care into primary care visits for young people, have shown promising benefits (Asarnow et al., 2015) and could further build resilience among ACE-exposed youth in Lesotho. Collectively, these interventions could reduce ACE exposure and support the mental and physical health of ACE-exposed young people in Lesotho (Charlson et al., 2014).

It is important to consider these findings within the historical and current context of the Lesotho HIV crisis. We found that ACEs were associated with high levels of HIV risk. There is evidence that poor mental health also may increase the risk of HIV infection (Remien et al., 2019) via less health risk literacy and lower adherence to HIV prevention measures, including increased risk behaviors, and lower engagement with HIV prevention services (Collins et al., 2021; Remien et al., 2021). Therefore, the primary prevention of ACEs is imperative to both the mental health of youth in Lesotho and downstream HIV risk and related outcomes. This could not only have implications on the quality of life and well-being related to mental health but also the risks of exposure to and being agents of HIV transmission (Hsiao et al., 2018). These findings are commensurate with the UNAIDS call for addressing the mental health of people living with, at risk of, and affected by HIV through integrated approaches and ensuring universal health coverage to end the AIDS pandemic. This study adds to the calls for a strengthened integration of violence prevention, mental health services, and HIV prevention and response to promote positive public health and quality of life for the next generation of youth in Lesotho.

Data availability

Lesotho VACS data are publicly available and access can be requested through the Together for Girls website: https://www.togetherforgirls.org/request-access-vacs/

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Table 1

Demographic characteristics and proportion of adverse childhood experiences (ACEs), mental distress, and suicide risk by sex among young people aged 13–24, Lesotho 2018 (N = 8568).

Characteristics	Males		Females	
	Unweighted n	Weighted % (95 % CI)	Unweighted n	Weighted % (95 % CI)
Age[a]	18.23	(18.00, 18.46)	18.24	(18.12, 18.36)
Food insecurity				
No	1011	68.68 (63.39, 73.97)	4613	65.87 (63.68, 68.06)
Yes	440	31.32 (26.03, 36.61)	2397	34.13 (31.94, 36.32)
Orphan status[b]				
Both parents alive	882	59.90 (55.42, 64.39)	4403	62.03 (60.36, 63.70)
One parent alive	462	32.53 (28.75, 36.31)	1987	28.94 (27.53, 30.35)
No parents alive	100	7.57 (5.88, 9.26)	637	9.03 (8.14, 9.92)
Sexual violence[b]				
No	1416	95.96 (94.55, 97.38)	6276	87.17 (85.57, 88.77)
Yes	51	4.04 (2.62, 5.45)	820	12.83 (11.23, 14.43)
Emotional violence[b]				
No	1359	92.36 (89.92, 94.80)	6302	89.01 (87.87, 90.15)
Yes	102	7.64 (5.20, 10.08)	756	10.99 (9.85, 12.13)
Physical violence[b]				
No	674	43.73 (38.51, 48.96)	4707	64.40 (61.91, 66.90)
Yes	793	56.27 (51.04, 61.49)	2394	35.60 (33.10, 38.09)
Community violence[b]				
No	935	62.00 (56.22, 67.79)	5651	78.94 (77.06, 80.83)
Yes	530	37.99 (32.21, 43.78)	1441	21.06 (19.17, 22.94)
Interparental violence[b]				
No	1100	73.66 (69.56, 77.77)	4913	67.87 (65.80, 69.95)
Yes	358	26.34 (22.23, 30.44)	2168	32.13 (30.05, 34.20)
Cumulative ACEs[b]				
0 ACEs	265	16.95 (13.65, 20.26)	1846	24.13 (22.28, 25.99)

Characteristics	Males		Females	
	Unweighted n	Weighted % (95 % CI)	Unweighted n	Weighted % (95 % CI)
1–2 ACEs	876	58.30 (53.49, 63.01)	3894	55.30 (53.48, 57.12)
3 or more ACEs[b]	326	24.75 (19.38, 30.12)	1361	20.57 (18.58, 22.56)
Mental distress				
No or low	1070	71.52 (65.91, 77.12)	5196	73.59 (71.37, 75.80)
Moderate to severe	395	28.48 (22.88, 34.09)	1849	26.41 (24.20, 28.63)
Self-harm or suicidality				
No	1399	95.19 (93.63, 96.74)	6525	91.05 (90.11, 91.99)
Yes	68	4.81 (3.27, 6.37)	575	8.95 (8.01, 9.89)
Age disparate sexual relationship				
No	561	90.29 (87.48, 93.09)	1909	66.26 (64.09, 68.42)
Yes	58	9.71 (6.91, 12.52)	1006	33.74 (31.58, 35.91)
No or infrequent condom use				
No	413	64.62 (58.38, 70.85)	1210	39.88 (37.37, 42.40)
Yes	228	35.38 (29.15, 41.62)	1800	60.12 (57.60, 62.63)
Lifetime STI				
No	1371	92.26 (90.15, 94.37)	6472	90.28 (89.26, 91.29)
Yes	96	7.74 (5.63, 9.85)	606	9.72 (8.71, 10.74)
Lifetime transactional sex				
No	769	98.08 (96.92, 99.24)	3210	94.93 (93.95, 95.90)
Yes	14	1.92 (0.76, 3.08)	156	5.07 (4.10, 6.05)
Multiple sex partner				
No	545	67.89 (62.34, 73.45)	3041	90.25 (88.87, 91.64)
Yes	224	32.11 (26.55, 37.66)	306	9.75 (8.36, 11.13)
Early sexual debut				
No	526	71.80 (67.73, 75.88)	3060	92.10 (90.95, 93.25)
Yes	234	28.20 (24.12, 32.27)	280	7.90 (6.75, 9.05)
HIV risk summary				
0 types	233	30.09 (25.67, 34.52)	981	29.37 (27.10, 31.65)
1 type	334	41.22 (37.04, 45.40)	1179	34.63 (32.25, 37.00)
2 types	147	18.75 (14.96, 22.55)	871	26.23 (24.22, 28.24)

Characteristics	Males		Females	
	Unweighted n	Weighted % (95 % CI)	Unweighted n	Weighted % (95 % CI)
≥3 types	68	9.93 (7.26, 12.60)	331	9.77 (8.66, 10.87)

Note. Self-harm or suicidality is defined as reporting at least one of the following: self-harm, ideation, or attempt. HIV risk summary includes the following 6 HIV risk indicators: age disparate sexual relationship with someone ≥5 years older, no or infrequent condom use, transactional sex, early sexual debut (< 15 years), multiple sex partners, and lifetime STI.

[a]Mean (95 % Confidence Limit for the Mean).

[b]All 6 ACE types occurred prior to age 18 regardless of participant age.

Table 2

Associations between adverse childhood experiences (ACEs) and mental distress among young people ages 13–24 in Lesotho, 2018 (n = 8227).

Characteristics	Males				Females			
	Unadjusted[a]		Adjusted[b]		Unadjusted[a]		Adjusted[b]	
	OR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	OR (95 % CI)	*p* value	AOR (95 % CI)	*p* value
Orphan status								
Both alive	Ref.				Ref.			
One alive	1.08 (0.79, 1.48)	0.623	1.00 (0.74, 1.34)	0.971	1.12 (0.98, 1.29)	0.108	1.00 (0.86, 1.17)	0.953
None alive	1.05 (0.765, 1.68)	0.854	0.85 (0.50, 1.44)	0.538	1.45 (1.16, 1.82)	0.001	1.29 (1.02, 1.64)	0.034
Sexual violence								
No	Ref.				Ref.			
Yes	1.39 (0.62, 3.09)	0.424	0.94 (0.33, 2.69)	0.906	2.36 (1.97, 2.82)	<0.001	1.75 (1.46, 2.08)	<0.001
Emotional violence								
No	Ref.				Ref.			
Yes	1.68 (0.94, 3.00)	0.077	1.25 (0.66, 2.38)	0.49	2.97 (2.40, 3.67)	<0.001	2.28 (1.83, 2.85)	<0.001
Physical violence								
No	Ref.				Ref.			
Yes	1.69 (1.20, 2.39)	0.003	1.44 (1.00, 2.05)	0.043	1.74 (1.45, 2.08)	<0.001	1.36 (1.13, 1.64)	0.001
Community violence								
No	Ref.				Ref.			
Yes	2.53 (1.90, 3.38)	<0.001	2.19 (1.57, 3.06)	<0.001	1.68 (1.40, 2.02)	<0.001	1.34 (1.10, 1.62)	0.004
Interparental violence								
No	Ref.				Ref.			
Yes	1.71 (1.28, 2.29)	<0.001	1.31 (0.92, 1.86)	0.131	1.90 (1.66, 2.17)	<0.001	1.49 (1.30, 1.71)	<0.001

Note. OR = odds ratio, AOR = adjusted odds ratio, Ref = reference group. Bolded text indicates $\alpha < 0.05$. All ACEs occurred prior to age 18, even if the participant had not yet reached age 18. Final model statistics for males: Likelihood ratio F = 1500.45 (7.11, 1635.85), $p < .0001$. Final model statistics for females: Likelihood ratio F = 1455.86 (7.69, 1768.37), $p < .0001$.

[a]Unadjusted models present simple logistic regression results regressing mental distress on the respective ACE item.

[b]Adjusted models controlled for age and food insecurity.

Table 3

Associations between adverse childhood experiences (ACEs) and self-harm or suicidality among young people ages 13–24 in Lesotho, 2018 (n = 8280).

Characteristics	Males				Females			
	Unadjusted[a]		Adjusted[b]		Unadjusted[a]		Adjusted[b]	
	OR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	OR (95 % CI)	*p* value	AOR (95 % CI)	*p* value
Orphan status								
Both alive	Ref.				Ref.			
One alive	2.54 (1.30, 4.97)	0.007	2.31 (1.19, 4.47)	0.014	1.04 (0.82, 1.32)	0.719	0.90 (0.70, 1.16)	0.41
None alive	1.47 (0.36, 5.95)	0.587	1.04 (0.25, 4.038)	0.959	1.88 (1.43, 2.47)	<0.001	1.72 (1.29, 2.31)	<0.001
Sexual violence								
No	Ref.				Ref.			
Yes	5.00 (1.39, 17.96)	0.014	2.50 (0.89, 7.04)	0.082	3.53 (2.81, 4.43)	<0.001	2.32 (1.78, 3.01)	<0.001
Emotional violence								
No	Ref.				Ref.			
Yes	6.98 (3.00, 16.22)	<0.001	5.92 (2.45, 14.29)	<0.001	3.81 (2.99, 4.85)	<0.001	2.57 (1.92, 3.44)	<0.001
Physical violence								
No	Ref.				Ref.			
Yes	2.22 (1.19, 4.13)	0.012	1.34 (0.68, 2.63)	0.393	2.47 (1.96, 3.10)	<0.001	1.86 (1.46, 2.38)	<0.001
Community violence								
No	Ref.				Ref.			
Yes	2.32 (1.30, 4.14)	0.005	1.80 (0.94, 3.44)	0.076	1.81 (1.43, 2.29)	<0.001	1.29 (1.00, 1.67)	0.047
Interparental violence								
No	Ref.				Ref.			
Yes	1.87 (0.91, 3.84)	0.087	0.88 (0.44, 1.76)	0.722	2.14 (1.72, 2.66)	<0.001	1.53 (1.20, 1.95)	<0.001

Note. OR = odds ratio, AOR = adjusted odds ratio, Ref = reference group. Self-harm or suicidality is defined as reporting at least one of the following: self-harm, ideation, or attempt. Bolded text indicates $\alpha < 0.05$. All ACEs occurred prior to age 18, even if the participant had not yet reached age 18. Final model statistics for males: Likelihood ratio F = 1206.70 (7.13, 1638.95), $p < .0001$. Final model statistics for females: Likelihood ratio F = 1547.59 (8.27, 1902.37), $p < .0001$.

[a]Unadjusted models present simple logistic regression results regressing self-harm or suicidality on the respective ACE item.

[b]Adjusted models controlled for age and food insecurity.

Table 4

Associations between adverse childhood experiences (ACEs) and HIV risk levels among young people ages 13–24 in Lesotho, 2018 (n = 8568).

Characteristics	Males[a]						Females[a]					
	1 HIV risk type		2 HIV risk types		≥ 3 HIV risk types		1 HIV risk type		2 HIV risk types		≥ 3 HIV risk types	
	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value
Orphan status												
Both alive	Ref.	0.375	Ref.	0.314	Ref.	0.066	Ref.	0.909	Ref.	0.163	Ref.	0.614
One alive	1.22 (0.79, 1.87)	0.886	1.33 (0.76, 2.30)	0.756	1.93 (0.96, 3.89)	0.971	1.02 (0.79, 1.31)	0.66	1.20 (0.93, 1.55)	0.234	1.10 (0.76, 1.59)	0.573
None alive	1.07 (0.42, 2.71)		0.86 (0.32, 2.31)		1.02 (0.28, 3.80)		1.09 (0.74, 1.62)		1.23 (0.88, 1.72)		1.14 (0.72, 1.82)	
Sexual violence												
No	Ref.	0.904	Ref.	0.816	Ref.	0.47	Ref.	0.918	Ref.	0.61	Ref.	0.078
Yes	1.08 (0.32, 3.63)		1.10 (0.48, 2.52)		1.86 (0.35, 10.01)		1.02 (0.74, 1.39)		1.10 (0.77, 1.57)		1.45 (0.96, 2.16)	
Emotional violence												
No	Ref.	0.828	Ref.	0.343	Ref.	0.104	Ref.	0.863	Ref.	0.357	Ref.	0.507
Yes	0.89 (0.31, 2.57)		1.66 (0.58, 4.56)		3.05 (0.79, 11.69)		1.03 (0.71, 1.52)		1.22 (0.80, 1.88)		1.19 (1.71, 1.98)	
Physical violence												
No	Ref.	0.254	Ref.	0.435	Ref.	0.675	Ref.	0.829	Ref.	0.464	Ref.	0.034
Yes	0.81 (0.57, 1.16)		1.25 (0.71, 2.21)		0.88 (0.48, 1.62)		0.97 (0.76, 1.24)		1.10 (0.85, 1.43)		1.45 (1.03, 2.04)	
Community violence												
No	Ref.	0.596	Ref.	0.861	Ref.	0.843	Ref.	0.376	Ref.	0.929	Ref.	0.091
Yes	1.18 (0.64, 2.19)		1.06 (0.54, 2.10)		1.07 (0.56, 2.06)		1.13 (0.86, 1.47)		0.99 (0.73, 1.34)		1.39 (0.95, 2.04)	
Interparental violence												
No	Ref.	0.945	Ref.	0.0007	Ref.	0.013	Ref.	0.012	Ref.	0.318	Ref.	0.638
Yes		0.98 (0.61, 1.58)		2.51 (1.48, 4.25)		2.79 (1.24, 6.26)		0.71 (0.55, 0.93)		0.88 (0.69, 1.13)		1.07 (0.80, 1.43)

Note. AOR = adjusted odds ratio. Ref = referent category. Referent category for the outcome is 0 HIV risk types. Bolded text indicates $\alpha < 0.05$. All ACEs occurred prior to age 18, even if the participant had not yet reached age 18. HIV risk summary includes the following 6 HIV risk indicators: age disparate sexual relationship with someone ≥5 years older, no or infrequent condom use, transactional

sex, early sexual debut (< 15 years), multiple sex partners, and lifetime STI. Final model statistics for males: Likelihood ratio F = 694.34 (14.93, 3433.37), $p < .0001$. Final model statistics for females: Likelihood ratio F = 784.07 (23.09, 53.09.85), $p < .0001$.

[a] Adjusted models controlled for age, food insecurity, and marital status.

Table 5

Associations between cumulative adverse childhood experiences (ACEs) and mental distress (n = 8405) and self-harm or suicidality (n = 8460) among young people ages 13–24 in Lesotho, 2018.

Characteristics	Males				Females			
	Mental distress		Self-harm or suicidality		Mental distress		Self-harm or suicidality	
	AOR (95 % CI)[a]	*p* value	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value
Cumulative ACEs								
0 ACEs	Ref.	<0.001	1.73 (0.58, 5.17)	0.326	Ref.	<0.001	Ref.	<0.001
1–2 ACEs	2.42 (1.64, 3.59)	<0.001	6.01 (1.95, 18.49)	0.002	1.66 (1.32, 2.09)	<0.001	2.80 (1.95, 4.03)	<0.001
3 or more ACEs	4.37 (2.89, 6.60)				3.68 (2.79, 4.85)		7.99 (5.51, 11.58)	

Note. AOR = adjusted odds ratio, Ref = reference group. Self-harm or suicidality is defined as reporting at least one of the following: self-harm, ideation, or attempt. Bolded text indicates $\alpha < 0.05$. All ACEs occurred prior to age 18. Final model statistics for males: (mental distress) Likelihood ratio F = 3021.28 (3.70, 851.33), $p < .0001$. Final model statistics for females: (mental distress) Likelihood ratio F = 2131.45 (3.82, 786.19), $p < .0001$. Final model statistics for males: (self-harm/suicidality) Likelihood ratio F = 1435.82 (3.56, 819.41), $p < .0001$. Final model statistics for females: (self-harm/suicidality) Likelihood ratio F = 2606.69 (3.73, 856.80), $p < .0001$.

[a]Adjusted models controlled for age and food insecurity.

Table 6

Associations between cumulative adverse childhood experiences (ACEs) and HIV risk levels among young people ages 13–24 in Lesotho, 2018 N = 4109.

Characteristics	Males[a]						Females[a]					
	1 HIV risk type		2 HIV risk types		≥ 3 HIV risk types		1 HIV risk type		2 HIV risk types		≥ 3 HIV risk types	
	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value	AOR (95 % CI)	*p* value
Cumulative ACEs												
0 ACEs	Ref.	0.427	Ref.	0.034	Ref.	0.905	Ref.	0.66	Ref.	0.282	Ref.	0.014
1–2 ACEs	1.21 (0.75, 1.96)	0.884	2.61 (1.08, 6.32)	0.009	0.95 (0.39, 2.30)	0.033	0.94 (0.70, 1.26)	0.215	1.20 (0.86, 1.67)	0.185	1.65 (1.11, 2.45)	0.0003
3 or more	1.05 (0.55, 2.00)		3.71 (1.39, 9.91)		2.83 (1.09, 7.37)		0.81 (0.58, 1.13)		1.27 (0.89, 1.81)		2.53 (1.54, 4.16)	

Note. AOR = adjusted odds ratio. Ref = referent category. Referent category for the outcome is 0 HIV risk types. Bolded text indicates α <0.05. All ACEs occurred prior to age 18, even if the participant had not yet reached age 18. HIV risk summary includes the following 6 HIV risk indicators: age disparate sexual relationship with someone ≥5 years older, no or infrequent condom use, transactional sex, early sexual debut (<15 years), multiple sex partners, and lifetime STI. Final model statistics for males: Likelihood ratio F = 1137.08 (10.12, 2328.04), p < .0001. Final model statistics for females: Likelihood ratio F = 1623.64 (12.93, 2973.76), p < .0001.

[a]Adjusted models controlled for age, food insecurity, and marital status.