

Short Abstract:**Prevalence of Adverse Childhood Experiences and Association with Current Health among Adolescents in Malawi**

Childhood adversity is robustly associated with poor health across the life course. However, very few studies have examined the prevalence and implications of childhood adversity in low- and middle-income countries, where poverty and HIV are often endemic. This study uses a standardized instrument to measure adverse childhood experiences (ACEs) among adolescents in Malawi. Respondents (age 10-16; N=2,089) were interviewed in their local language and health measures taken. Adolescents reported experiencing a high burden of adversity over their lifetime (i.e., reporting 5 ACEs on average). Exposure to each additional adversity was significantly associated with mental health outcomes (OR 1.21 for depression, OR 1.20 for PTSD) and self-reported health ratings. However, ACEs did not demonstrate a graded relationship with obesity, stunting or grip strength. These patterns are quite consistent with evidence from high-income countries, and suggest that primary prevention of ACEs should be a priority to ensure lifelong health in low-resources settings.

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PLEASE DO NOT SHARE. The following represents preliminary analyses from a recently concluded study wave and should not be cited. Final results are forthcoming.

Extended Abstract:

Prevalence of Adverse Childhood Experiences and Association with Current Health among Adolescents in Malawi

Childhood adversity captures a broad array of individual, family, peer and community events that are stressful or traumatic for children. For example, it may include abuse; bullying by peers; witnessing domestic violence; parental death; and experiencing poverty or collective violence. Critically, a substantial proportion of the population experiences childhood adversity: in a seminal US study, two-thirds experienced at least one of the above adversities, and one in six experienced 4+ [1]. Childhood adversity is also robustly associated with poor health in later life, including heart disease, cancer, and depression [2, 3].

To date, much of what we know about adverse childhood experience (ACEs) comes from studies in the U.S. and other high-income contexts. Very few studies have examined the prevalence and implications of childhood adversity in low- and middle-income countries. Fewer still have done so in an HIV endemic context. A recent systematic review concluded that “little is known about how ACEs predict health outcomes in low income, high violence settings, where exposure to adversity is widespread across the life course” [3]. In the past few years, however, the geographic scope of inquiry has slowly expanded. Emerging evidence supports the cross-cultural relevance of the ACEs concept and suggests that ACEs may be even more common in low- and middle-income countries (LMIC) [4-12]. In many contexts, extreme poverty, war and/or HIV/AIDS fuel adversity [7]. We know, for example, that children who grow up in families affected by HIV and illness are more likely to experience multiple, overlapping adversities [13, 14]. The most obvious impact is the death of a parent, but this is only the beginning: having a parent who has died, or who is HIV-positive, increases the likelihood that a girl will be sexually abused [15]. At the same time, the epidemic disrupts natural sources of protection, such as community social support, that may buffer children against adversity and its sequelae [16].

Moreover, most of what we know about childhood adversity comes from adult retrospective reports. Only a few studies have attempted to measure cumulative ACEs among adolescents in LMIC [17, 18]. In a study of South African adolescents, over three quarters reported at least one adverse experience and 20% reported three or more [17]. Similar findings were reported among adolescents in Kenyan slums [18]. Neither of the above studies used a standardized instrument to measure ACEs, which hampers comparison between countries. Accurate measurement during this developmental period is also critical to understand the link between adversity and subsequent later life health trajectories, both in adolescence and beyond. From studies in high-income contexts, we know ACEs begin to negatively impact health as early as adolescence, with depression, early pregnancy and sexually transmitted disease among the documented effects [19-21].

The goal of this paper is to describe the prevalence and consequences of ACEs among adolescents in a low-income, HIV-endemic country. We hypothesize that adversity will be common; will cluster; and will be more prevalent among HIV-affected children. We further hypothesize that cumulative adversity will have an adverse impact on adolescent health, and that this association will be strongest for concurrent adversity.

Methods

Setting

This study is an extension of the Malawi Longitudinal Study of Families and Health (MLSFH) [22]. Established in 1998, the MLSFH project provides data on the health and demographic/socioeconomic conditions of adults in three regions of Malawi (North, South, Center). The MLSFH study population lives in rural areas, has low levels of education, and primarily engages subsistence agriculture and small-scale market activities. Moreover, HIV/AIDS is widespread: 5% of male and 9% of female adults (15-49 years old) are HIV-infected [23].

Sample

This study established a new cohort of adolescents by building on the existing MLSFH. In prior rounds (i.e., 2008 and 2010) of MLSFH data collection, all adults completed a household roster that included children. Those children estimated to be 10-16 years old in 2017 were selected for the current adolescent cohort. Using the residential information of the original MLSFH respondent, we traced selected adolescents, verified their age, and invited them to

participate in the MLSFH adolescent study. When adolescents no longer lived at the original location, we attempted to trace them to their new location. We enrolled 2,089 eligible adolescents: 1,787 were located at or near the homes of the original adult MLSFH respondents; 114 were traced to new homes within a nearby cluster of villages; and 262 respondents were located further away in their home district or in one of the four major cities in Malawi. Of the eligible adolescents located, only 13 (<1%) did not give assent or did not have caregiver consent to participate.

Data collection

All participants and their primary caregivers gave their informed written consent/assent to participate in study procedures, including a survey, health measures, and HIV testing. IRB approval was obtained from Stony Brook University and the National Health Science Research Committee (NHSRC) in Malawi. All surveys were conducted privately at the adolescent's home. Respondents were interviewed in their local language (chiChewa, chiYao or chiTumbuka) and any potential distress was monitored by the trained interviewers. In cases of substantial distress, the interviewer called in a MLSFH field work supervisor who arranged any necessary support. Following the survey, HIV Testing & Services (HTS) counsellors collected anthropometric measures and administered an HIV test. All adolescents were left with an emergency phone number card, with local resources as well as a "hot line" number run by the study. During the study and for a period for two months after completion, the MLSFH implementation partner (IKI Malawi) operated the hotline and provided additional information about resources and support.

Measures

Adversity during childhood and adolescence: The WHO notes that ACEs remain understudied in LMIC [24]; to facilitate such research, they designed and piloted the ACE-IQ in conjunction with African researchers [25]. The ACE-IQ covers individual (e.g., neglect), family (e.g., household mortality), peer (e.g. bullying) and community influences (e.g., violence outside the home). The standard ACE-IQ captures adversity in the first 18 years of life, without further attention to timing. Since we interviewed adolescents, we augmented the questions to capture more detailed information on timing. Adolescents were asked whether they experienced each event *ever* and *in the past 12 months*. Previous work shows a strong graded relationship between ACEs and poor health [26, 27]; thus ACEs were operationalized by summing the number of adversities reported using the binary method. These were categorized into quintiles (to account for smaller sample sizes at higher numbers) to facilitate description. The ACE-IQ showed good validity and reliability in this sample; see [28] for a detailed description.

Physical health outcomes: We capture an ordinal measure of self-rated health using the following question "Compared to other people your age, would you say your health is much better, very good, good, fair or poor?" Adolescents were also asked a series of questions to elicit their subjective expectations for the future using an approach that has been used in prior rounds of the MLSFH [29]. After a brief tutorial, adolescents were given ten beans, and told to place the beans on a plate to represent the likelihood that a given event would happen. For this analysis, we focus on adolescents' expectations of dying within the next a 5-year period. We also collected several anthropometric measures of nutritional health. We use height-for-age to capture stunting, and code such using Z-scores in relation to the WHO child/adolescent international reference group for age and gender; stunting is defined as a Z-score <-2 [30]. Similarly, we use body mass index (BMI) to measure obesity in relation to the WHO international reference group, and define such as a Z-score >2. Finally, we measure grip strength, an indicator that helps identify the level of development and degree of disability. Participants were allowed four attempts using the dynamometer, two with each hand. For this study, we analyze the maximum grip strength (kg) achieved.

Mental health outcomes: Depressive symptomology was measured using the Beck Depression Inventory (BDI) [31]. The BDI is a self-report scale of 21 items, each scored from 0 to 3. The scale evaluates cognitive-affective and somatic contents, such as pessimism, feeling of failure, social withdrawal, and sadness. The total score ranks the intensity of depression, ranging from minimal to severe. For this study, we use a dichotomous outcome: those individuals who scored above 17 were considered to have moderate or severe depression. The Posttraumatic Stress Disorder Scale (PTSD-8) is an 8 item scale based on DSM-IV criteria for PTSD and evaluates 3 symptom clusters: intrusion, avoidance and hypervigilance behaviours [32]. Item scores range from 0 to 4; individuals who score at least one item ≥ 2 on each cluster meet the criteria for PTSD.

Covariates: In highly endemic countries, such as Malawi, support and resources are often targeted explicitly to children

who are affected by HIV/AIDS. Adolescents were asked whether parents, siblings or other household members were HIV-positive or had died from AIDS. Given the stigma that surrounds HIV/AIDS, it is likely that many adolescents will not know the cause of death. Thus, we create a second dichotomous variable that additionally includes whether they had been affected by the illness or death of anyone in their family. Finally, we consider age (continuous), gender, SES (a continuous measure of asset ownership, weighted by inverse of the proportion of the population owning each asset), and home district (Rumphi, Mchinji, or Balaka).

Analyses: We describe the prevalence of individual adversities in using frequencies. We hypothesize that traditional ACEs will be common and cluster, both within and across developmental periods. We examine the co-occurrence of adversities within a developmental period using multivariate linear regression (controlling for clustering at the caregiver level, as adolescents raised by the same person would have more similar experiences). Models test the association between a single type of adversity and the overall ACE score. Next we test whether ACEs are more prevalent among HIV-affected children, using the same multivariate linear regression approach. Finally, we examine whether cumulative adversity predicts current health and subjective mortality expectations. We run separate multivariate regressions for each outcome; these are logistic, ordinal or linear models depending on the form of the outcome. Missing data was minimal (e.g., 5 of 2,089 had incomplete ACEs data), and thus were deleted in a case-wise fashion. All models adjust for age, gender, SES, home district and the aforementioned clustering. Analyses are run using Stata v13.

Results

NOTE. The following represents preliminary analyses from a recently concluded study wave. Here, we present results related to two of the key hypotheses: that adversity will be common, and that cumulative adversity will have an adverse impact on adolescent health. Final results exploring the full set of hypotheses are forthcoming.

Exposure to adverse childhood experiences

On average, adolescents ever experienced 5 childhood adversities (out of a possible 13 measured) (see figure 1). The most common individual adversities reported were emotional abuse (53%) or neglect (85.9%), physical abuse (53.2%), and witnessing community violence (88%) (see table 1).

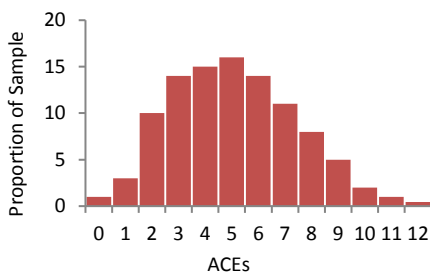


Fig 1. Prevalence of cumulative lifetime ACEs

Table 1. Lifetime prevalence of individual ACE, by gender

	Prevalence of ACE			
	All	Girls	Boys	p-value
Individual Abuse & Neglect				
Emotional neglect	85.9	83.8	88.1	.005
Emotional abuse	53.0	49.5	56.4	.001
Physical neglect	32.5	31.9	33.0	.567
Physical abuse	53.2	49.4	57.0	<.001
Sexual abuse	6.52	8.0	5.1	.008
Family Dysfunction				
Substance abuser in household	22.4	21.4	23.4	.271
Someone with mental health issues	6.6	7.4	5.8	.138
Incarcerated household member	12.9	13.1	12.7	.763
Domestic violence	59.0	60.5	57.6	.168
Parents dead or divorced	50.7	51.0	50.4	.770
Peer				
Bullied	31.4	25.5	37.1	<.001
Community				
Community violence	88.3	86.8	89.9	.028
Collective violence	8.9	8.9	8.9	.975

Association between cumulative adverse childhood experiences and health

Adversity was significantly associated with mental health outcomes and self-reported health ratings. For each additional adversity experienced, the odds of depression rose about 21% and those of PTSD rose about 20%. To put this in perspective, we also present results comparing the top and bottom quintiles of ACEs score. Adolescents who scored in the top ACEs quintile had three times the odds of depression and four times the odds of PTSD compared to peers in the bottom quintile. However, ACEs did not demonstrate a graded relationship with any objectively measured health outcomes, including obesity, stunting and grip strength.

Table 3. Multivariate association between cumulative lifetime ACEs and health outcomes

	Adjusted associations	
	Per single ACE	Top vs bottom ACE quintile
Physical health		
Poor self-rated health	OR 1.11**	OR 1.89**
5-year mortality expectation	RR 0.09**	RR 0.50**
Stunting	OR 1.00	OR 0.99
Obesity	OR 1.04	OR 1.34
Grip strength (kg)	RR 0.17	OR 0.67
Mental health		
PTSD	OR 1.20**	OR 4.16**
Depression	OR 1.21**	OR 3.12**

Note. *p<0.05; **p<0.01

Preliminary Conclusions

Childhood adversity is incredibly common in Malawi, a low-income and HIV-endemic country. We find that childhood adversity has a strong influence on mental health - even in early adolescence. It does not exert the same influence on physical health outcomes during this developmental period. Despite the very different environments, these patterns are quite consistent with evidence from high-income countries. For example, a 2017 meta-analysis found that ACEs were a strong predictor of depression in adults, but had a weaker relationship with indicators of obesity and self-rated health [3].

These results suggest that setting the stage for lifelong health begins early. Primary prevention of ACEs has been a low priority in low-income contexts; but the increased focus on capturing the burden of adversity combined with the global commitments embodied in the SDGs may provide momentum. Parenting programs, trauma-focused care, and resilience interventions have shown promise in high-income contexts. These urgently need to be adapted to low-resource settings and rigorously evaluated in LMIC.

Table 2. Frequency of health outcomes

	N (%)	Mean ACEs (SD)
Physical health		
Self-rated health		
Much better	468 (22.46)	4.82 (2.25)
Better	826 (39.64)	4.95 (2.28)
Same	660 (31.67)	5.31 (2.39)
Worse	120 (5.76)	6.15 (2.47)
Much worse	10 (.48)	7.3 (1.77)
5-year mortality expectation		
0-20%	727 (34.97)	4.89 (2.23)
30-50%	1,090 (52.43)	5.28 (2.38)
60-100%	262 (12.60)	5.09 (2.47)
Stunting		
Yes	605 (30.04)	5.30 (2.89)
No	1,409 (69.96)	5.04 (2.36)
Obesity		
Yes	473 (23.65)	5.19 (2.40)
No	1,527 (76.35)	5.09 (2.32)
Grip strength		
7-18.5kg	169 (21.64)	5.37 (1.89)
19-23.5kg	148 (18.95)	5 (2.04)
24-33kg	154 (19.72)	5.12 (2.34)
34-46kg	174 (22.28)	4.72 (2.25)
47-55kg	136 (17.41)	5.07 (2.22)
Mental health		
PTSD		
Yes	230 (11.06)	6.17 (2.92)
No	1,849 (88.94)	4.99 (2.32)
Depression		
Yes	354 (16.99)	6.06 (2.41)
No	1,730 (83.01)	4.92 (2.85)

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