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## Adverse childhood experiences, sexual debut and HIV testing among adolescents in a low-income high HIV-prevalence context

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### Abstract

**Objectives:** To investigate whether adverse childhood experiences (ACEs) are important determinants of sexual debut and HIV testing.

**Design:** Adolescents (age 10-16; N=2,089) from rural Malawi were interviewed in 2017-2018 for the baseline wave of a longitudinal study of childhood adversity and HIV risk.

**Methods:** Respondents were interviewed in their local language. Surveys captured 13 lifetime childhood adversities (using the ACE – International Questionnaire); sexual debut; and previous HIV testing. We used multivariate regression models to test whether adversity, measured both cumulatively and separately, predicted HIV risk.

**Results:** For each additional adversity, there was a significant rise in the odds of sexual debut (OR 1.13, CI 1.07-1.20) and HIV testing (OR 1.10, CI 1.04-1.16).

**Conclusions:** Preventing HIV among all young people necessitates a paradigm shift that recognizes the importance of early life social determinants in structuring HIV risk.

### Keywords

HIV; adolescents; childhood adversity; HIV testing; sexual debut

### Introduction

Almost two million adolescents (defined by the UN as 10-19 years) were living with HIV in 2015, a quarter million of whom were newly infected [1]. Without new approaches to prevention, the number of adolescents living with HIV is predicted to grow [1]. Greater attention to structural determinants – such as childhood adversity – may be one way to reverse the trend.

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Adverse childhood experiences (ACEs) are potentially important determinants of HIV risk [2]. Evidence now links ACEs to early sexual debut, risky sexual behavior, and sexually transmitted infections (STI) [3-5]. Moreover, their influence can be powerful: globally, adults with four or more ACEs have on average a six-fold increase in the odds of an STI [6].

Few studies have measured ACEs in HIV-endemic countries. The key exceptions suggest ACEs influence subsequent HIV risk [7-11]. For example, a recent study from Malawi suggests that there is a dose-response relationship between cumulative adversity and both infrequent condom use and having multiple sexual partners among youth aged 19-24 [11]. Moreover, a study in South Africa suggests that ACEs begin to negatively impact these sexual behaviors as early as adolescence [10]. Despite these recent studies, research on adversity and HIV risk remains scarce - particularly in low-income countries (LICs) where childhood adversity is likely to be common. Moreover, there have been no studies looking at how adversity impacts HIV testing, an integral part of an HIV prevention package [12, 13]. As the first step on the HIV care cascade, HIV testing is also necessary to link HIV-positive adolescents to lifesaving treatment.

Our study investigates whether individual and cumulative ACEs are associated with sexual debut and HIV testing among adolescents in Malawi. We extend previous work by focusing on a younger developmental period (early adolescence, defined as 10-14 [14]), and by considering the impact of a wide range of ACEs on both a preventive behavior (HIV testing) and an HIV risk factor (early sexual debut).

## Methods

### Sample and data collection:

This study builds on the Malawi Longitudinal Study of Families and Health (MLSFH, est. 1998) [15], a longitudinal cohort from three rural districts (Mchinji, Balaka, and Rumphi). In each MLSFH household, we interviewed adolescent members age 10-16 (N=2,089) and their primary caregiver. Face-to-face interviews took place at their home and in their local language (Chewa, Yao or Tumbuka) during 2017-2018. Further detail on the sample and response rate (99%) are reported elsewhere [16]. IRB approval was obtained from Stony Brook University and the National Health Science Research Committee in Malawi.

### Measures:

Lifetime adversity was measured using a standardized instrument developed by the WHO [17]. The Adverse Childhood Experiences – International Questionnaire (ACE-IQ) captures a broad array of 13 individual, family, peer and community experiences (see Table 1), and has shown good psychometric properties among Malawian adolescents [18]. We used a binary coding measure: any affirmative answer (regardless of frequency) was coded as exposure that type of ACE. ACEs were considered both separately and as part of a cumulative measure; the latter was operationalized by summing the number of adversities reported (ranging from 0-13).

Early sexual debut is a consistent indicator of HIV risk [19]. Debut was defined by the question “Have you ever had sexual intercourse? By sexual intercourse I mean penetrative

vaginal sex.” Given that our sample was 10-16, there was no need to further differentiate by age of debut. HIV testing is a protective behaviour [12, 13]. Adolescents reported their lifetime history of HIV testing; we treated this as a dichotomous outcome.

Finally, we measured age (continuous), gender, quintile of socioeconomic status (SES, reported by the caregiver), and home district.

### Analyses:

Data to test the hypothesized association between adversity and HIV risk were available from 2,085 adolescents. We described the sample characteristics and modelled their association with cumulative adversity using linear regression. We used logistic regression to examine the dose-response relationship between cumulative adversity and both sexual debut and HIV testing (Model 1 in Table 1). In a second set of analyses, we examined whether specific types of adversity predicted HIV risk, running *separate* logistic regressions for each type of adversity (Model 2). However, focusing on one type of adversity fails to account for the clustering of adversity, and may overestimate the impact of that risk factor. To identify specific types of adversity that have a unique influence on health, we need to take these other adversities into account [20]. Thus in the third set of analyses, we continued to examine separate adversities, but additionally adjusted for the cumulative ACE score (Model 3). Finally, to investigate if sexual debut mediated the association between adversity and HIV testing, we re-estimated the specification in Model 3 controlling for sexual debut (Model 4). All models controlled for age, gender, SES, and district; standard errors were adjusted for household clustering. Analyses were run using Stata v13.

## Results

As reported elsewhere [16], adolescents experienced an average of 5 (of 13) ACEs. The sample was 13.25 years old on average, and age had a positive association with cumulative adversity (beta 0.08, 95% CI 0.03-0.14). Females (49%) reported lower cumulative adversity (beta -0.25, CI -0.45, -0.05). SES quintile was not significantly associated with adversity. Emotional neglect was the most commonly reported adversity (86%); sexual abuse was the least (7%, Table 1).

### Prevalence of sexual debut and HIV testing during early adolescence

One fifth of the sample had sexually debuted (27% of boys, 16% of girls). Similarly, one fifth reported a previous HIV test, with no difference by gender.

### Relative odds of sexual debut and HIV testing by cumulative adversity

There was a clear gradient between adversity and risk behavior (see Figure 1). In adjusted analyses, each additional adversity was associated with a significant rise in the odds of sexual debut (adjusted OR (aOR) 1.13, CI 1.07-1.20; Table 1, Model 1). Cumulative adversity similarly demonstrated a significant association with HIV testing (aOR 1.10, CI 1.04-1.16).

### Relative odds of sexual debut and HIV testing by type of adversity

Eight of the 13 types of adversity were significantly associated with sexual debut (Table 1, Model 2). Sexual abuse demonstrated the strongest association (aOR 4.21, CI 2.74-6.48). Sexual debut was reported by over half (51%) of adolescents who experienced sexual abuse, compared to 20% of adolescents who did not experience sexual abuse. We also tested whether separate adversities retained an independent association with sexual debut after controlling for cumulative adversity (Model 3). Sexual abuse was the only type of adversity to retain a strong positive association with sexual debut (aOR 3.44, CI 2.15-5.48).

Five of the 13 adversities were associated with HIV testing. Two (a household member experiencing either substance abuse or incarceration) remained as significant positive associations after controlling for cumulative adversity. Physical abuse had a significant negative association with HIV testing after controlling for cumulative adversity. Finally, adding a control for sexual debut did not noticeably change the odds associated with HIV testing (Model 4).

### Discussion

We find that early sexual debut is more likely among adolescents who have already experienced substantial adversity in their young lives. This is consistent with the literature on adversity and sexual behavior in high-income contexts, and adds weight to the emerging literature in lower-resource contexts [9-11]. Moreover, research has shown that children growing up in difficult circumstance are exposed to multiple, overlapping adversities [20], and that they often influence outcomes through a common causal chain [21, 22]. We too find that cumulative adversity demonstrates a clear risk gradient, as expected.

In the context of HIV epidemic, however, most studies have focused only on a single type of adversity (e.g., orphanhood [23, 24]). This study therefore examined whether single adversities have a unique influence on sexual debut. At first glance, eight of the thirteen types of adversity appear related to sexual debut. When adjusting for cumulative adversity, however, only one type of adversity emerges as a significant independent predictor: sexual abuse. This broadly suggests that focusing on one type of adversity can overestimate its impact; in many cases, the observed association may instead be due to the accumulation of non-specific ACEs.

Our findings suggest that sexual violence may be an exception. In a South African study, sexual abuse was associated with much larger effect sizes across most HIV risk factors (e.g., number of partners) when compared to emotional or physical abuse [9]. Among adults in the Philippines, sexual abuse was the strongest (and one of the only) independent predictors of early sexual debut [25]. However, other studies – such as the previously mentioned study of youth in Malawi [11] – have not observed a distinct association between sexual violence and HIV risk (condom use or multiple partners).

Longitudinal studies are needed to assess whether sexual abuse is indeed a unique, powerful determinant of sexual risk. If so, interventions that tackle sexual abuse should be prioritized. The THRIVE strategies, developed by the WHO, offer a starting point for reducing both

sexual abuse and other forms of child maltreatment [26]. These seven evidence-based strategies range from the national-level (e.g., laws criminalizing sexual abuse), to the household-level (parenting programs), to the individual-level (cash-transfers). The next step is adaptation and evaluation of these approaches in LICs.

We also found that adolescents with a history of adversity were more likely to report HIV testing, which is somewhat surprising. We could find only one other study examining ACEs and HIV testing: in three Africa countries, adults who had experienced child abuse were more likely to have taken an HIV test [27]. One potential explanation is that individuals who experience a large burden of adversity tend to have higher self-perceived HIV risk [4]; this in turn may motivate HIV testing [28, 29]. Clearly, more work needs to be done to understand what is motivating HIV testing, as this may provide important insights on how we can increase HIV testing rates among adolescents.

Strengths of this study include use of a standardized instrument to measure a range of ACEs, a large community sample, and a focus on adolescents. Studies of adversity and sexual debut in adult populations rely on retrospective recall, and there is evidence of substantial bias in the reporting of adversity [30]. Among adolescents, we can more accurately capture ACEs, early sexual initiation, and HIV testing – though this approach does not fully eliminate recall bias or allow for temporal ordering. The cross-sectional nature of the data are a limitation, however we note that similar associations between cumulative ACEs and risky sexual behavior have been reported in prospective trials [e.g., 10, 31]. The cross-sectional nature is particularly limiting in exploring the relationship between sexual abuse and sexual debut. Early sexual debut is not always voluntary: a prior study in Malawi found that 38% of girls (age 12-19) reported that their first sexual experience was coerced or forced [32]. Longitudinal data is needed to better characterize the above relationships (and are forthcoming as part of this project).

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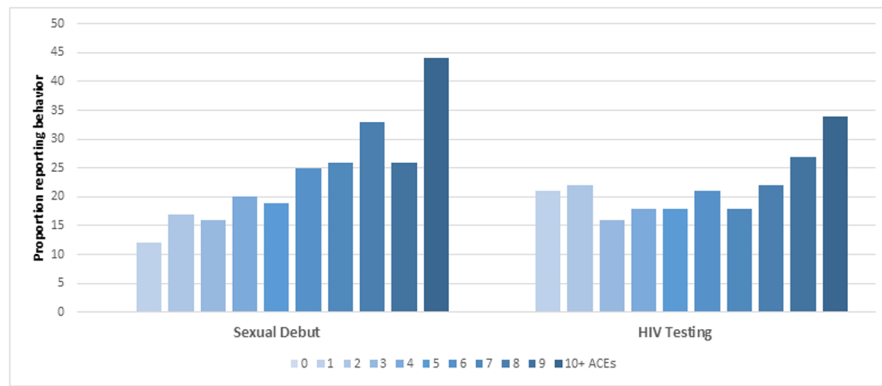
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**Figure 1.** Prevalence of sexual debut and HIV testing by ACE score among adolescents in Malawi aged 10-16 (N=2085)



**Table 1.** Prevalence and adjusted relative odds of HIV-related behaviors by reported adverse childhood experience among adolescents in Malawi aged 10-16 (N=2085)

Adverse Childhood Experiences	Sexual Debut				HIV testing			
	mean	SD	n	%	Model 1 aOR (95% CI)	n	%	Model 1 aOR (95% CI)
<b>Cumulative ACEs</b>								
Continuous score (0-13)	5.12	2.35			<b>1.13 (1.07-1.20)</b>			<b>1.10 (1.04-1.16)</b>
<b>Individual Abuse &amp; Neglect</b>								
Emotional neglect	1792	86	421	24	<b>1.56 (1.02-2.36)</b>	360	20	1.30 (0.92-1.82)
Emotional abuse	1105	53	283	26	1.07 (0.83-1.38)	209	19	1.12 (0.87-1.43)
Physical neglect	677	32	160	24	<b>1.44 (1.11-1.87)</b>	146	22	1.16 (0.91-1.48)
Physical abuse	1110	53	254	23	1.09 (0.86-1.39)	194	17	0.82 (0.65-1.03)
Sexual abuse	136	7	69	51	<b>4.21 (2.74-6.48)</b>	42	31	<b>1.51 (1.02-2.22)</b>
<b>Family Dysfunction</b>								
Substance abuser in household	467	22	122	26	1.28 (0.97-1.68)	115	25	<b>1.62 (1.23-2.11)</b>
Someone in the household with mental health issues	137	7	33	24	1.29 (0.82-2.02)	38	28	1.48 (0.99-2.22)
Incarcerated household member	269	13	71	26	1.08 (0.77-1.52)	75	28	<b>1.79 (1.29-2.48)</b>
Domestic violence	1231	59	291	24	<b>1.28 (1.00-1.63)</b>	248	20	1.15 (0.91-1.46)
Parents dead or divorced	1057	51	266	25	<b>1.30 (1.02-1.65)</b>	237	22	<b>1.43 (1.12-1.81)</b>
<b>Peer</b>								
Bullied	654	31	188	29	<b>1.62 (1.26-2.07)</b>	141	22	1.25 (0.97-1.60)
<b>Community</b>								
Community violence	1842	88	439	24	<b>1.77 (1.04-3.00)</b>	374	20	<b>1.59 (1.06-2.39)</b>
Collective violence	186	9	65	35	<b>1.68 (1.15-2.47)</b>	48	26	<b>1.67 (1.17-2.40)</b>

Note: Models 1-4 control for age, gender, SES and region. Model 2 runs separate multivariate logistic regressions for each type of adversity. Model 3 builds off Model 2 but with an additional control for the continuous ACE score. Model 4 further controls for sexual debut. Bolded values represent those that are statistically significant (<0.05).