COLLEGE OF MEDICINE

ASSESSING THE RELATIONSHIP BETWEEN ADVERSE CHILDHOOD EXPERIENCES (ACE) AND HIGH HIV RISK BEHAVIOURS AMONG MALE AND FEMALE ADOLESCENTS: A CROSS SECTIONAL STUDY IN BALAKA, MALAWI

By

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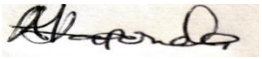
Declaration

I, Alice S. Kaponda, hereby declare that this dissertation is my original work and has not been presented for any other awards at the University of Malawi or any other University.

Signature: 

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Abstract

Human Immunodeficiency Virus (HIV) remains a burden in Malawi with high incidences among adolescents (0.23% per year). Adverse childhood experiences (ACEs) are a range of events (that children can experience early in their life that leads to stress and can result in trauma and unhealthy behaviours eg sexual immorality, indulging in substance abuse. There are a number of behaviours that exposes one to high HIV risks eg multiple sexual partners and infrequent condom use. The study assessed the relationship between reported adverse childhood experiences and sexual risk behaviours among adolescents' in Balaka district. This was a cross-sectional study design. It used secondary data from the Malawi Longitudinal Study of Families and Health (MLSFH) study. This study used data from the 2017/2018 data collection wave which interviewed adolescents aged between 10-19. Logistic regression analysis was performed in STATA v14 to assess the association between ACEs and HIV risk behaviours (multiple sexual partners and infrequent condom use). Adolescents who reported having exposed to physical abuse were 1.5771 times likely to have multiple sexual partners as compared to those who were not exposed to reported physical abuse (OR=1.5771, Cl = 0.7879 – 3.1566 at 95%) and AOR was 1.4245 among the exposed. Adolescents exposed to physical abuse and sexual abuse had 1.3019 and 1.4048 respectively risk of not Infrequently use condoms amongst the exposed than in the non-exposed. No association was found between reported emotional abuse and infrequent condom use (OR=1). The study revealed that there was an association between ACEs and sexual risk behaviours. There is a need to institutionalise comprehensive sexuality education from lower primary age groups, not confined to the limited coverage of life skills as at present.

Keywords: *Adverse childhood experiences, sexual risk behaviours', HIV, adolescents, Balaka, Malawi*

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Abbreviations and Acronyms

ACE:	Adverse Childhood Experiences
AOR:	Adjusted Odds Ratio
CEA:	Childhood Emotional Abuse
COMREC:	College of Medicine Research Ethics Committee
CPA:	Childhood physical abuse
CSA:	Childhood Sexual Abuse
DEC:	District Executive Committee
HIV:	Human Immuno-Deficiency Virus
IPV:	Intimate Partner Violence
IRB:	Institutional Review Board
LMIC:	Low and Middle Income Countries
MDHS:	Malawi Demographic Health Survey
M&E:	Monitoring and Evaluation
MEP:	Masters in Epidemiology
MLSFH:	Malawi Longitudinal Study for Families and Health
MPHIA:	Malawi Population-based HIV Impact Assessment
MSPs:	Multiple Sexual Partners
OR:	Odds Ratio
PGD:	Post Graduate Diploma
P1:	Principal Investigator
US:	United States
WHO:	World Health Organization

Definitions

- Adverse childhood experiences (ACEs) are events which adolescents are exposed to during their childhood age[1,2].
- Childhood physical abuse (CPA) is defined as the intentional use of physical force against a child that results in, or has a high likelihood of resulting in harm for the child's health, survival, development, or dignity. It includes hitting, beating, kicking, shaking, biting, strangling, scalding, burning, poisoning, and suffocating [3].
- Childhood emotional abuse (CEA) falls under the larger umbrella of psychological maltreatment. It refers to a repeated pattern of behaviour that leads children to believe that they are worthless and unloved, and ultimately results in damage to their psychological health and psychosocial development. CEA includes belittling, threatening, frightening, discriminating, ridiculing, and other forms of rejection or hostile treatment.
- Childhood sexual abuse (CSA) is defined as the involvement of a child in sexual activity that he or she does not fully comprehend, is unable to give informed consent to, is not developmentally prepared for, or that violates the laws or social taboos of society [3].

Chapter 1: Introduction and objectives of the study

1.1 Background

Globally 37.9 million people were living with HIV in 2018 out of which 1.7 million were new infections [4]. Adolescents account for 4% (1.6 million) of people living with HIV and about 89% of these adolescents living with HIV live in sub-Saharan Africa [5,6]. Despite the continued decline in the HIV incidences globally between 2010 and 2018 (estimated at 16% decrease), HIV remains a major public health problem in sub-Saharan Africa [4,7]. Adolescents experience the highest rates of HIV infections with female adolescents aged between 10–24 years in sub-Saharan Africa being more vulnerable, they are twice as likely as young men of the same age to be living with HIV[8,9]. Studies have shown that there are certain health related behaviours' which are putting adolescents at higher risk of HIV infection which include multiple sexual partners, low rates of condom use, substance use, etc. [10,11].

Despite the greater strides reached by Malawi in reaching the 90-90-90 goal by 2020, HIV is still a serious public health problem leading to deaths among adults [12,13]. It was estimated that by 2020, **90%** of all people living with HIV will have known their HIV status; **90%** of all people diagnosed with HIV infection will have received sustained antiretroviral therapy; **90%** of all people receiving antiretroviral therapy will have had viral suppression [14]. Malawi accounts for one million (1 million) number of people living with HIV out of which 38,000 of them being new infections [13,15]. Adolescent's is one of the vulnerable groups most affected with HIV in Malawi, about 12,500 out of 36,000 HIV new infections in 2016 occurred among young people [13].

According to 2015-2016 MPHIA study, HIV incidence among adolescents in Malawi is remarkably high (0.23% per year) just like in other sub-Saharan African countries[12,15–17]. HIV prevalence among adolescent girls and young women aged between 15-24 years is between five and ten times higher than the prevalence among males in the same age group [18]. A lot of adolescents adopt risky behaviours' in the search for their identity, as they experience physical and emotional changes as they grow without having adequate information on how to protect themselves from the adverse consequences of these behaviours' [16,19].

According to 2015-2016 MDHS, early sexual activities were reported to be high in Malawi[15], among young people aged 15-24 years. A total of 19% of young men aged between 15-24 years and 14% of young women of the same age had sexual intercourse before the age of 15 years [15]. In addition, 10% of young women (15-24 year) were more likely to have multiple sexual partners compared to 1% among young men of the same age while condom use was at 6% among young women and 2% among men of the same age [15,20].

1.2 Literature review

Adverse childhood experiences (ACEs) refers to a range of events that children can experience early in their life before the age of 18years that leads to stress and can result in trauma and chronic stress responses [2,21,22]. ACEs are potentially traumatic and can have negative, lasting effects on health and well-being of children [2,23,24]. They do come in different forms; abuse (physical, emotional and sexual abuse), neglect (physical and emotional neglect) and household dysfunction (mental illness, incarceration of a parent or guardian, orphan-hood, mother treated violently, substance abuse and parental divorce or separation) [15,25–27]. These ACEs bring

about the psychological torture to the minds of young ones and live them with long term health complications that can come from recurring exposures to ACEs [1,2]. Children exposed to four or more ACEs have up to 12 times higher odds of having negative health outcomes (eg. death, loss of function, lack of well-being) in adulthood than children without such exposures [23,28]. Sexual risk behaviour (SRB) refers to any sexual activity that increases the odds of associated negative consequences, such as sexually transmitted infections (STIs), human immunodeficiency virus (HIV) infection, and unintended pregnancy [29]. SRB includes, but is not limited to: early sexual debut, unprotected sex (i.e. sex without a condom), anal sex, sex with multiple partners, and using drugs or alcohol prior to or while having sex. Sexual risk behaviors' tends to emerge and peak during adolescence, persisting into young adulthood [29,30].

Globally, research have shown that majority of the general public have experienced at least one form of ACE before reaching the age of 18 years [25,26]. Nonetheless, adolescents are more exposed to ACEs which pose them at risk of harm and some can experience multiple ACEs during their childhood [31,32]. Studies conducted in the high income settings indicates that the most prevalent ACEs include emotional neglect (57.9%), physical neglect (53.3%), parental divorce or separation (17.3%) and violence against mothers (11.1%) and these ACEs were reported more in men as compared to women [22,33,34]. A study conducted in Low and Middle Income countries (LMI) on ACEs among adolescents indicated that the most common adversities reported by adolescents were emotionally of being hurt (51.9), violence victimization (45.8%) and household instability (43.1%) [35].

Apart from that, fear of physical violence (29.3%) and experiences of neglect (38.0%) were also highly prevalent [35]. Boys reported greater exposure than girls to physical neglect (33.0% vs. 25.9%, p =.01), sexual abuse (8.8% vs. 5.7%, p =.03), violence victimization (52.3% vs. 39.8%, p <.01), and parental substance abuse (22.4% vs. 7.3%, p =.01) than girls[35]. While in Malawi exposure to ACEs was reported to be high and the most common ACEs reported in literature among adolescents include: physical violence (50.5%), ever witnessed IPV (33.1%), community violence (29.8%), orphaned (26.6%), emotional violence (22.8%) and sexual abuse (15.6%) [25,36]. In a study conducted in Malawi, 28.9% of the adolescents' were exposed to more than three ACEs and had multiple sexual partner while 18.1% were not exposed to any of the ACEs and they had multiple sexual partners [25].

The study conducted in US, indicated that there was an association between ACEs and sexual risk behaviours'. The association between exposure to different types of ACEs and engaging in HIV risk behaviours' between males and females showed that the odds of engaging in HIV risk behaviours', for males were the highest among those who experienced childhood sexual abuse (OR = 2.23), followed by childhood exposure to interpersonal violence (OR = 1.91), substance abuse family members (OR = 1.81), physical abuse (OR = 1.78), verbal abuse (OR = 1.73), and parental divorce (OR = 1.62). Household mental illness and incarceration were not significantly associated with HIV risk behaviours' among males ($p < 0.0056$) [26].

For females, those who experienced childhood sexual abuse also had the highest odds of reporting HIV risk behaviours' (OR = 2.98), followed by childhood exposure to living with a family member who abused substances (OR = 2.53), verbal abuse (OR = 2.25), family member

incarceration (OR = 2.14), physical abuse (OR = 1.94), and living with someone with mental illness (OR = 1.67), and interpersonal violence (OR = 1.41). Parental separation or divorce was not associated with increased HIV risk behaviours' among females [37].

The association between the number of ACEs and HIV risk behaviours was examined and the relationship varied by gender. Among males, compared to those who never experienced an ACE, those with one ACE had 1.94 times the odds of engaging in HIV risk behaviours', those with two ACEs had 2.29 times the odds, those with three ACEs had 3.30 times the odds, and those with four or more ACEs had close to 4 times the odds. Among females, relative to those without a history of ACE, the odds of engaging HIV risk behaviours' did not significantly elevate until the individual experienced three or more ACEs — females who experienced three ACEs had 2.26 times the odds, and four or more ACEs had 3.27 times the odds [37].

Similar studies conducted among adolescents in high income countries like United States, Serbia have shown that ACEs such as abuse neglect have an immediate impact upon children and are associated with poor health and behavioural outcomes such as alcohol, substance abuse as well as sexual risk taking behaviours' [26,38,39]. Multiple sexual partnership is a well-recognized risk factor for HIV among adolescents [40].

Despite evidence on the prevalence of ACEs in Malawi and the correlation of ACEs and sexual risk behaviours in other western countries, there is little evidence on the association between ACEs and sexual risk behaviours among adolescents in sub-Saharan Africa, including Malawi.

It was therefore hypothesized that adolescents who were exposed to ACEs (like physical abuse, emotional abuse and sexual abuse) were more likely to experience or indulge themselves in sexual risk behaviours (like multiple sexual behaviours, non-infrequent use of condoms, teenage pregnancies, abortions and suicide) than the non-exposed.

1.3 Rationale/justification for the research project

Results from the study will help the communities and the district council to devise ways to improve the existing efforts/interventions/strategies on how to address adverse outcomes which come as a result of risky sexual behaviours'. Such outcomes may include: HIV and other sexually transmitted infections, teenage pregnancies, abortions and suicide. In addition, the results will help lobby for funding to implement interventions targeting adolescents. Among the interventions would include; providing health information that is basic, accurate, and directly contributes to health-promoting decisions and behaviors; ensuring that adolescents are provided with effective education and skills to protect themselves and others from teenage pregnancies, HIV infection, other sexually transmitted infections abortions as well as suicide. Results will help the district council in approving relevant projects coming in the district to solve the existing problems, thereby contributing in the reduction of HIV incidences in the district.

1.4 Objectives of the study

1.5.1 Broad objective

Assess the relationship between adverse childhood experiences (ACEs) and high HIV risk behaviours among female and male adolescents'.

1.5.2 Specific objectives

Primary Objective

1. To determine the association between reported physical abuse and having multiple sexual partners among male and female adolescents.

Secondary Objectives

2. To determine the association between reported emotional abuse and having multiple sexual partners among male and female adolescents.
3. To assess the association between each ACE (Physical, emotional and sexual abuse) and infrequent condom use among male and female adolescents.
4. To determine the effect of combined reported ACEs (physical and emotional abuse) and having multiple sexual partners among male and female adolescents.

Chapter 2: Methodology

This chapter presents the methodology that was used in the study. This includes; study design, study location, population targeted sample size as well data collection management and analysis.

2.1 Study design

This study used the cross-sectional study design. In order to address the study objectives, we used data from the Malawi Longitudinal Study of Families and Health (MLSFH). This is one of a very few long-standing longitudinal cohort studies in sub-Saharan African (SSA). It was initially established in 1998 to study social network influences on fertility behaviours' and HIV risk perceptions. In 2004, the focus of the MLSFH expanded to include health (including HIV/AIDS), sexual behaviours'', intergenerational relations and family/household dynamics [41].

The MLSFH cohorts were selected to represent the rural population of Malawi, where the vast majority of Malawians live in conditions that are similar to those in the rural areas of other countries with high HIV prevalence.

2.2 Study setting

The study used data collected from Balaka district which has the highest HIV prevalence among the MLSFH districts [41]. Balaka district is situated in the Southern part of Malawi. Malawi is a landlocked country in South-Eastern Africa, sharing its borders with Mozambique, Zambia and Tanzania. The country has an estimated population of 18.6 million; 48% and 52%

are males and females respectively with a growth rate of 3.32%. A total of 83.7% of the population lives in the rural areas [25,42].

2.3 Study Population

The study targeted adolescents' (males and females) aged between 10 to 19 years who were interviewed in the MLSFH study during the 2017/2018 data collection wave in Balaka district.

For this study, we only used cross-sectional data from the 2017/2018 round which recruited new adolescents into the cohort. An adolescent cohort was built on the existing MLSFH. From household rosters completed in 2008 and 2010, all children estimated to be aged 11−15 years in 2017 were selected for potential inclusion. To create sibling matches in households with only 1 adolescent, the age range was extended by 1 year in both directions and the adolescent closest in age to the index child was enrolled. Using the residential information of the original MLSFH respondent, selected adolescents were traced, their age was verified as 10−16 years, and they were invited to participate in the adolescent study.

2.4 Power calculation

The power calculation was based on the primary objective of the study. We estimated that proportion of adolescents exposed to physical abuse who have multiple sexual partners' in Malawi (P_1) is 18.1% and proportion of adolescents not exposed to physical abuse but have multiple sexual partner, P_2=4.4% at 95% confidence interval[25].

So,

$$n_i = 2\left(\frac{Z_{1-\alpha/2} + Z_{1-\beta}}{ES}\right)^2$$ [43].

Where

$\mathbf{n_i}$ =total sample of adolescents in the study =557

ES=effect size; $ES = \frac{|p_1 = p_2|}{\sqrt{p(1-p)}}$ [43].

= 0.074 (calculated).

$\mathbf{Z_{1-\alpha/2}}$ is the confidence level at 95% = 1.96 and

$\mathbf{Z_{1-\beta}}$ is the study power

Therefore, Z_{power} =[($\sqrt{n_i}/2$)*ES] - $Z_{1-\alpha/2}$

=18.75

Thus, the power of the data set was 18.75.

2.5 Data collection

The study used secondary data that were already collected under the MLSFH study. The parent MLSFH study, collected data for a number of variables among which some were used in this study. These variables include: socio-demographic characteristics (eg age, gender, education, occupation), sexual behavioural, exposure to different types of ACEs. A data extraction tool was developed and used to extract data in the main database **(see appendix 1)**. The following ACEs specifically focusing on abuse were used in the analysis of this study, thus: physical abuse, emotional abuse and sexual abuse.

2.6 Data Management, analysis and presentation of results

Data from the parent study were extracted through filtering of the required variables. Since the dataset was already provided in STATA, both filtering and analyses were conducted in STATA version 14. To ensure privacy of the study participants, all variables which could identify a

person were anonymized, e.g., name, village, etc. The data set was kept in a Laptop and backed up on google drive. The laptop was secured with the password that no one would have access to the data except the Principal Investigator.

Under analysis, STATA version 14 was used to run all the models. Cross-tabulations were run to come up with the frequencies and percentages for the socio-demographic characteristics of the respondents such as gender, age category, religion and education and these were presented in ***Table 1***. To determine the association between reported physical abuse and multiple sexual partners, a univariate logistic regression was run to obtain the crude odds ratio and a multivariate analysis was done to obtain the adjusted odds ratio. To determine the association between multiple sexual partners and individual ACEs (physical abuse and emotional abuse), univariate logistic regression was performed to obtain the crude odds ratio and a multiple regression to obtain adjusted odds ratio (OR). The results of the multivariate analyses are presented as Adjusted Odds Ratios (AOR) with the corresponding 95% Confidence Intervals. Summaries of the results were presented in tables under results section

2.9 Ethical considerations

The parent MLFSH study was approved by the Institution Review Board (IRB) at University of Pennsylvania and the National Health Science Research Committee in Malawi prior to its implementation and data collection. As such in this study, a waiver was obtained from COMREC to use data already collected from the MLSFH study **(See appendix 2).** The Principal Investigator (PI) also sought permission from the MLSFH Study leads to use the data which was granted (see appendix 3).

Chapter 3: Presentation of results

This chapter presents a summary of the key findings of the study. It outlines the socio-demographic characteristics of the study participants, frequencies of participants involved in sexual activities, and frequencies of study participants exposed to ACEs. The section further highlights the results on the univariate and multivariate analysis for the association between the physical abuse and multiple sexual partners; the association between the emotional abuse and multiple sexual partners; the association between the physical abuse, emotional abuse and sexual abuse and frequent condom use and the effect of combined ACEs (those with both physical and emotional abuse) and multiple sexual partners.

3.1a Characteristics of study participants

Table 1 presents a summary of the socio-demographic characteristics of the study participants. As shown in table 1 below, of the 557 participants, 52% were males and 48% were females. Majority of the adolescents interviewed were between the age range of 10-<14 years (76%) with an age mean of 13.1 and standard deviation of 1.6219. Frequencies of adolescents at each age; 10years= 4% (23), 11 years= 14% (80), 12years= 20% (113), 13 years= 19.6% (109), 14 years= 17% (96), 15 years= 17.6 (98) and 16 years= 6.8% (38). All participants reported to be still in school except one participant who reported to be married but still attending school (0.2%). Majority of the adolescents were being cared by their biological parents (78%) and 15% by their grandparents and a total of 58% of the study participants were under lower primary class thus, standard 1- 4.

Table 1: Showing the socio-demographic characteristics of study participants

Variable	Mean (±sd)	Number, n	Percentage (%)
Gender			
Male		290	52%
Female		267	48%
Age category			
10 -- <14 years		421	76%
≥14 --19 years		136	24%
Age mean (standard deviation)	13.1 (1.6219)		
Religion			
Muslim		397	71%
Christian		112	20%
Other		48	9%
Caregiver			
Birth/Biological Parent		433	78%
Adoptive parent		6	1%
Grandparent		83	15%
Older sibling		6	1. %
Aunt/uncle		24	4. %
Other		5	1%
Marital status (married)			
Yes		1	0.2%

No	556	99.8%
Education level		
Lower primary (1-4)	325	58.4%
Upper primary (5-8)	225	40.4%
Secondary level	7	1.3%
Occupation		
Yes	210	38%
No	346	62%

3.1b Frequencies on other key variables

Table 2 below shows that majority of the study participants were Yao with 73% (407) while Chewa were 13%, Lomwe 9%, Ngoni 4% and Sena 0.2%. During the interview, only 9% study participants reported to have changed their caregivers in the past year prior to data collection and 91% did not change their caregivers. On HIV testing, only 21% (119) reported to have ever tested for HIV, 78% (435) never tested for HIV and 0.4% (2) they said they did not know if they ever tested for HIV. Out of the tested, 2% (7) were positive cases.

Table 2: Showing frequencies of other key variables

Variable	Number, n	Percentage (%)
Tribe		
Yao	407	73%
Chewa	74	13%
Lomwe	49	9%
Ngoni	20	4%
Sena	1	0.2%
Other	6	1%
Caregiver change		
No	508	91%
Yes	49	9%
HIV testing		
No	435	78%
Yes	119	21%
Don't know	2	0.4%

3.1c Frequencies on sexual activities

Table 3 below shows that out of the 557 participants, 24% had sexual debut and out of that 57% (75) had multiple sexual partners. Only 32% had frequently used a condom in their sexual activities. Minimum age of first sex was reported to be at 6 years (percentage = 3%, mean = 12 and SD = 2.218).

Table 3: Showing the frequencies of sexual activities among study participants

Variable	Mean (±sd)	Number, n	Percentage (%)
Sexual Debut			
Yes		424	24%
No		132	76%
Multiple sexual partners			
Yes		75	57%
No		57	43%
Infrequent condom use			
Yes		42	32%
No		90	68%
Age at first sex			
Minimum age (years)		6	3%
Maximum age (years)		16	2%
Mean (sd)	11.71(2.218)		
HIV status of the sexual partner			
HIV-positive		3	2%
HIV-negative		79	60%
Do not know their status		50	38%
Type of sexual partner			
Girlfriend/boyfriend		106	80%
A once-off or other casual		25	19%

partner		
Spouse	1	0.8%

3.1d Frequencies on ACEs

Table 4 below is showing that majority of the study participants reported to have been exposed to physical abuse (54%) seconded by emotional abuse (6%) and sexual abuse 3% while 6% had experienced both physical and emotional abuse.

Table 4: Percentage of study participants with adverse childhood experiences.

Variable	**Number, n**	**Percentage (%)**
Physical abuse		
Yes	303	54%
No	254	46%
Sexual abuse		
Yes	17	3.%
No	540	97%
Emotional abuse		
Yes	34	6%
No	523	94%
Those with both physical and emotional abuse		
Yes	33	6%
No	524	94%

3.2 Association between multiple sexual partners (those with at least more than one sexual partner) and reported physical abuse

Table 5 below shows the unadjusted and the adjusted ratio for the relationship between multiple sexual partners and reported physical abuse. Adolescents who reported having exposed to physical abuse were 1.5771 times likely to have multiple sexual partners as compared to those who were not exposed to reported physical abuse (OR=1.5771, Cl = 0.7879 – 3.1566 at 95%). After controlling for other factors like gender and age category, the likelihood of the adolescents having multiple sexual partners was still high among the exposed as compared to the non-exposed (AOR = 1.4245, Cl = 0.6664 -3.0451 at 95%).

Table 5: Showing unadjusted and adjusted OR at 95% CI for multiple sexual partners and reported physical abuse

Variable	**Unadjusted OR (95% CI)**	**Adjusted OR (95% CI)**
Reported physical abuse		
No	Reference	Reference
Yes	1.5771 (0.7879 – 3.1566)	1.4245 (0.6664 – 3.0451)

3.3 Association between multiple sexual partners and reported emotional abuse

Table 6 below shows that the adolescents who were exposed to emotional abuse had 1.0989 times likelihood of having multiple sexual partners as compared to the non-exposed. However, after adjusting for gender the likelihood was 0.7685 times lower than the non-exposed (AOR = 0.7685, Cl = 0.2553 – 2.3132 at 95%).

Table 6: Showing Unadjusted and Adjusted OR at 95% Cl for multiple sexual partners and reported emotional abuse.

Variable	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Reported emotional abuse		
No	Reference	Reference
Yes	1.0989 (0.3908 – 3.0900)	0.7685 (0.2553 – 2.3132)

3.4 Association between Infrequent condom use and individual ACEs (reported physical, emotional and sexual abuse)

Table 7 below is showing a summary of results on the association between infrequent condom use and individual ACEs (reported physical abuse, reported emotion abuse and reported sexual abuse). Adolescents who were exposed to reported physical abuse had 1.2857 odds of not using a condom compared to those who were not exposed. There is no difference in odds between adolescents who were exposed to emotion abuse and those not exposed (both unadjusted and adjusted odds ratio=1). Thus being exposed to reported emotional abuse had no effect with infrequent condom use. Adolescents who were exposed to reported sexual abuse were 1.2857 times likely of not frequently use a condom. After adjusting, those who were exposed to reported sexual abuse were 1.4048 times probability of not frequently using the condom as compared to non-exposed.

Table 7: Showing the association between infrequent condom use and the individual ACEs.

Variable	Unadjusted OR (CI-95%)	Adjusted OR (CI-95%)
Reported physical abuse		
No	Reference	Reference
Yes	1.2857 (0.3099 -- 5.3341)	1.3019 (0.3096-5.4740)
Reported emotional abuse		
No	Reference	Reference
Yes	1.00	1.00
Reported sexual abuse		
No	Reference	Reference
Yes	1.2857 (0.1268 – 13.0364)	1.4048 (0.1357– 14.5454)

3.5 Association between multiple sexual partners and combined ACEs (reported physical and emotional)

Those adolescents who were exposed to multiple ACEs thus both reported physical and emotional abuse had 1.3077 times likelihood of having multiple sexual partners as compared to these were not exposed to any of the ACEs. But after adjusting for other factors, the odds of having multiple sexual partners reduced to 0.9571 times.

Table 8: Showing Unadjusted and Adjusted OR at 95% Cl for multiple sexual partners and combined ACEs (reported physical and emotional abuse)

Variable	**Unadjusted OR (CI-95%)**	**Adjusted OR (CI-95%)**
Reported both physical and emotional abuse		
No	Reference	Reference
Yes	1.3077 (0.4457-3.8372)	0.9571 (0.3036-3.0170)

Chapter 4: Discussion of results

This chapter provides the discussion of the findings.

4.1 Socio-demographic characteristics of study participants

The study participants in this study did not vary much between males and females (52% males' vs 48% females) while majority of them were under the age between 10-14years (76%). Other studies conducted mostly were targeting either adults or adolescents at least those above 19 years with most of them being married [25,32,34]. However, this study was one of the few studies which targeted adolescents below 19years who were still in school (almost 100%). Amongst the caregivers, 78% were brought up by their biological parents which was much high with 15% being brought by grandparents.

4.2 Prevalence of ACEs among adolescents and involvement in sexual debut

This study found that physical abuse (54%) was the most prevalent ACE experienced by adolescents in Balaka district while emotional abuse was at 6% and the least was sexual abuse (3%). Based on culture of most developing countries, most experiences that children experience during their childhood are perceived as not abuse because, normally they are taken as part of discipline. For instance, if a child was beaten it might be considered as an abuse. Similarly, for sexual abuse, most adolescents could be shy to voice out if they ever had been sexually abused because sexual activity issues are rarely talked about openly due to cultural beliefs.

High prevalence of ACEs was reported among males as compared to females. A similar study that was done in Russian Federation among young people who were students also gave similar

findings with high prevalence of physical, emotional and sexual abuse in males than in females [33]. However, there were other studies which were done in European countries among which reported a high prevalence of sexual and emotional abuse among females as compared to males, while finding almost similar under emotional abuse which was high in males than in females.

4.3 Association between multiple sexual partners and ACEs (reported physical & emotional abuse)

The study had revealed that there was an association between multiple sexual partners and adolescents who reported having been exposed to physical abuse. These adolescents had higher likelihood of having multiple sexual partners with 1.5771 times as compared to the non-exposed. After adjusting, the likelihood was still higher among the exposed adolescents (1.4245 times) than the non-exposed. According to the results, adolescents who were exposed to reported physical abuse were at high risk of engaging into multiple sexual partners than those not exposed. Nevertheless, 41% of adolescents who were not exposed to ACEs had multiple sexual partners. This suggests that there could be other additional contributing factors which influence adolescents being involved in multiple sexual partners apart from exposure to reported physical abuse.

On the other hand, there was a weak correlation between reported emotional abuse and multiple sexual partners among adolescents. Those who were exposed to emotional abuse were 1.0989 times risk of having multiple sexual partners but after adjusting, the odds ratio was 0.7685; this, the risk was lower in the exposed as compared to the non-exposed. According to the results, it

showed that being exposed to emotional abuse among adolescents in Balaka had no any effect to having multiple sexual abuse.

For those adolescents who had experienced both physical and emotional abuse had 1.3077 times high risk of having multiple sexual partners. However, after adjusting, risk was lowered to the exposed group 0.9571 times lower than the non-exposed.

Similar studies conducted in Europe showed a similar trend for adolescents who were exposed to physical abuse (OR=1.62) and sexual abuse (OR=4.41) with high likelihood of having multiple sexual partners [44]. Another study conducted in Malawi showed that there were high odds among young people in having multiple sexual partners among adolescents who were exposed to physical abuse (OR=1.3) as compared to the none exposed [25].

4.4 Association between Infrequent condom use and ACEs (physical, emotion and sexual abuse)

In addition, the study found that infrequent condom use was related to reported physical abuse as well as sexual abuse. Whereas there was no any association between adolescents exposed to reported emotional abuse and infrequent use of condoms (AOR=1). Adolescents who were exposed to physical abuse had 1.3019 times and for reported sexual abuse had 1.4048 times higher risk of not using the condoms frequently as compared to the non-exposed to these two ACEs under discussion (physical and sexual abuse). Majority (68%) of the adolescents who reported to have had sexual debut in the recent sexual activity had not used a condom with a higher percentage being found in boys (76%). The results have been consistent from a number

studies from high countries as well low-middle income countries. According to the MPHIA study, infrequent condom use was higher in females (24%) as compared to males (13%), among HIV positive adolescents. This also relates to what MDHS 2015-2016 reported in which condom use was high in females than in males [12,15]. Lack of infrequent condom use raises a high risk of contracting sexually transmitted diseases including HIV/AIDS resulting in increased incident cases among adolescents. Nonetheless, in Malawi most of the experiences adolescents undergo during their childhood are mostly not considered as abuse but as being disciplined. Hence, the negative correlation on some of these ACEs could be due to fact that the acts of abuse are basically viewed as part of instilling discipline among children rather than abuse itself leading to underreporting [16].

4.5 Study limitations

The study relied solely on self-reported data for all the variables; thus, there could be some kind of bias due to underreporting of the adversities. Considering the age of the target population and due to sensitivity of the questions, the responses to these sensitive questions could not have been responded as expected due to lack of understanding of the question leading to bias. The study cannot provide certainty about the temporal relationship between ACEs and HIV risk behaviours, thus, the causal inference between exposure and outcomes is not known because both the exposures and outcomes were reported as occurring at their early age, so their might be a reverse causality. The study also only examined the association between HIV risk behaviours and ACEs within abuse category only and did not examine for a broader environmental context on other categories which might have an impact on the study participants. Results from the study may not be generalizable to the general population because the study was done only in one

district in the southern region of Malawi. The results were only a representation of the rural masses in the country and not for the urban areas.

Chapter 5: Recommendations and conclusion

5.1 Conclusion

The magnitude of ACEs in Balaka was found to be high with most prevalent ACE being physical abuse. Results had shown a direct association between ACEs (reported physical and sexual abuse) and sexual risk behavior among adolescents in Balaka. Thus, there was high likelihood for the exposed adolescents to indulge in sexual risk behaviors' than the non-exposed.

5.2 Dissemination

The final copy of the results of the study will be made available and submitted to College of Medicine as partial fulfilment of the Master's degree in epidemiology. The results will also be presented to COMREC. Final copies of the thesis will be shared with COMREC, MLSFH Study leads, Public of Health department at College of Medicine, College of Medicine Library as well as Balaka district council through their District Executive Committee (DEC) meetings. Apart from that, the study findings will be presented at national and international conferences while the manuscript will be submitted to a peer-reviewed academic journal for publication.

5.3 Recommendations

5.1.1 Recommendations for programming

There is need to focus on primary prevention programmes among adolescents to address the early exposures to ACEs, especially physical abuse which is found to be more prevalent. The programmes need to targeting both male and female adolescents, as results have shown that gender males are more vulnerable to the effects of the exposures as well. Comprehensive sexuality education needs to be institutionalized from lower primary age groups, not confined to

the limited coverage in Life Skills and limitation of comprehensive sexuality education to Form 4 as at present. Also bearing in mind that parents are often the perpetrators of violence and abuse affecting their offspring, so a wider community response including education and child protection agencies is needed.

5.1.2 Recommendations for future research

Future studies can consider conducting an analysis on examining other contributing factors to increased sexual risk behaviours among adolescents and answering questions like "*why*" do we increased estimates of ACEs among adolescents (descriptive study). Future studies can also consider conducting a comparative analysis of the different categories of the ACEs against the HIV risk behaviours under discussion in this study to ascertain which category of the ACEs is more correlated with HIV risks among adolescents.

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Appendices

Appendix 1: Data extraction tool

Table 9: Demographic information

No	Question	Response
1	What is your gender?	0 = Male 1 = Female
2	ADOLESCENT's age (respondent know the age)	_____ [age in years]
3	ADOLESCENT's age (estimated by interviewer, respondent doesn't know.	_____ [age in years]
4	What tribe do you belong to? (do not read options)	1 = Yao 2 = Chewa 3 = Lomwe 4 = Tumbuka 5 = Ngoni 6 = Sena 7 = Tonga 8 = Senga 9 = Other (SPECIFY:_____)
5	Who is the person who is responsible for caring for you most in your household now? What is their relationship to you? (if parent, probe if	0 = Birth/Biological Parent 1 = Adoptive parent 2 = Grandparent T 3 = Older sibling

	biological or adoptive)	4 = Aunt/uncle 5 = Other 6 = Self
6	Has your caregiver changed over the past year?	0 = No 1 = Yes
7	How long have you lived in this household?	0 = since birth (skip to X) 1 = more than 5 years 2= 1-4 years 3 = less than a yea
8	What religion are you?	0 = No religion 1 = Catholic 2 = Quadiriya Muslim 3 = Sukutu Muslim 4 = CCAP 5 = Baptist 6 = Anglican 7 = Pentecostal 8 = Seventh Day Adventist 9 = Jehovah's Witnesses 10 = Church of Christ 11 = Indigenous Christian / AIC 12 = Other (SPECIFY_____)
9	Are you currently married or living	0 = No (skip to X)

	with a partner as if married?	1 = Yes
10	If not, at what age would you like to get married?	1 = Before age 18 years (skip to X) 2 = 18-19 years 3 = 20-24 years 4 = 25+ years 5 = I never want to marry
11	Are you currently attending school?	0 = No (skip to Q54) 1 = Yes
12	In which standard/form are you currently enrolled?	1 = Standard 1 2 = Standard 2 3 = Standard 3 4 = Standard 4 5 = Standard 5 6 = Standard 6 7 = Standard 7 8 = Standard 8 9 = Form 1 10 = Form 2 11 = Form 3 12 = Form 4 13 = University
13	What kind of school do you attend?	1 = national boarding school 2 = district boarding school

		3 = district day school 4 = community day school 5 = private school
14	What age did you start standard 1?	_____ [age in years]
15	If not in school, what is the highest grade you have passed?	1 = Standard 1 2 = Standard 2 3 = Standard 3 4 = Standard 4 5 = Standard 5 6 = Standard 6 7 = Standard 7 8 = Standard 8 9 = Form 1 10 = Form 2 11 = Form 3 12 = Form 4 13 = University

Table 10: Sexual Activity

No	Question	Response
16	Have you ever had sexual intercourse? By sexual intercourse I mean penetrative vaginal sex	0 = No (skip to X) 1 = Yes
17	How old were you when you had sexual intercourse for the very first time?	age in years [_____] [_____]
18	In total, with how many different people have you had sexual intercourse in your lifetime?	1 = 1 person 2 = 2 people 3 = 3 or more
19	When was the last time you had sexual intercourse?	1 = in the past week 2 = in the past month 3 = in the past year 4 = more than a year ago
	Now I would like to ask you some questions about your recent sexual activity in the past year. Let me assure you again that your answers are completely confidential and will not be told to anyone.	
20	In the last year, how often would you say you have sex?	0 = not at all 1 = 1-2 times/month 2 = More than twice a month, but less than twice a week 3 = 2-4 times/week 4 = More than 4 times/week

21	In the past year, how many different people have you had sexual intercourse with in total?	1 = 1 person 2 = 2 people 3 = 3 or more
22	At any time in the past year, have you had two or more sexual partners in the same month?	0 = No 1 = Yes
23	At any time in the past year, have you had sex with someone who was not your boyfriend/girlfriend?	0 = No 1 = Yes
	Now I would like you to think about the person you had sex with most recently.	
24	How would you describe your relationship to this person? Were they a…	0 = girlfriend/boyfriend 1 = a "once-off" or other casual partner
25	The last time you had sexual intercourse with your most recent partner, was a condom used?	0 = No 1 = Yes
26	Was a condom used every time you had sexual intercourse with this partner?	0 = No 1 = Yes
27	If you ask your boyfriend/girlfriend to use a condom, would he/she would get angry?	0 = No 1 = Yes
28	Still thinking about your most recent partner, what is their HIV status?	1 = HIV-positive 2 = HIV-negative 3 = I do not know their status
	Have you ever had a romantic relationship? By this	0 = No

	we mean a boyfriend, girlfriend, someone else you dated causally (even just once)? (If they say no, probe: Have you ever gone on a date? Have you ever had sex with anyone?)	1 = Yes

Table 11: Childhood Experiences (physical abuse, emotional abuse and sexual abuse).

No.	Question	Response
	Physical abuse	
29	Did a parent, guardian or other household member yell, scream or swear at you, insult or humiliate you? (read options)	1 = Many times 2 = A few times 3 = Once 4 = Never; skip to X 99 = Refused; skip to X
30	When did this happen?	1, In the past year 2, More than a year ago 99, Refused
31	Did a parent, caregiver or other household member spank, slap, kick, punch or beat you up? (read options)	1 = Many times 2 = A few times 3 = Once 4 = Never; skip to X 99 = Refused; skip to X
32	When did this happen?	1, In the past year

		2, More than a year ago 99, Refused
33	Did a parent, caregiver or other household member hit or cut you with an object, such as a stick (or cane), bottle, club, knife, whip etc? (read options)	1 = Many times 2 = A few times 3 = Once 4 = Never; skip to X 99 = Refused; skip to X
34	When did this happen?	1, In the past year 2, More than a year ago 99, Refused
	Sexual abuse	
35	Did someone touch or fondle you in a sexual way when you did not want them to? (read options)	1 = Many times 2 = A few times 3 = Once 4 = Never; skip to X 99 = Refused; skip to X
36	When did this happen?	1, In the past year 2, More than a year ago 99, Refused
37	Did someone make you touch their body in a sexual way when you did not want them to? (read options)	1 = Many times 2 = A few times 3 = Once 4 = Never; skip to X

		99 = Refused; skip to X
38	When did this happen?	1= In the past year 2=More than a year ago 99=Refused
39	Did someone attempt oral, anal, or vaginal intercourse with you when you did not want them to? (read options)	1 = Many times 2 = A few times 3 = Once 4 = Never; skip to X 99 = Refused; skip to X
40	When did this happen?	1= In the past year 2=More than a year ago 99= Refused
41	Did someone actually have oral, anal, or vaginal intercourse with you when you did not want them to? (read options)	1 = Many times 2 = A few times 3 = Once 4 = Never; skip to X 99 = Refused; skip to X
42	When did this happen?	1= In the past year 2= More than a year ago 99= Refused
	Emotion abuse	

43	Did a parent, caregiver or other household member threaten to, or actually, abandon you or throw you out of the house? (read options)	1 = Many times 2 = A few times 3 = Once 4 = Never; skip to X 99 = Refused; skip to X
44	When did this happen?	1, In the past year 2, More than a year ago 99, Refused

Appendix 2: COMREC Certificate approval

CERTIFICATE OF ETHICS APPROVAL

This is to certify that the College of Medicine Research and Ethics Committee (COMREC) has reviewed and approved a study entitled:

P.06/20/3068 - Assessing the relationship between adverse childhood experiences (ACE) and high HIV risk behaviours among male and female adolescents: A Cross sectional study in Balaka district. by Alice Kaponda

On 15-Jun-20

As you proceed with the implementation of your study, we would like you to adhere to international ethical guidelines, national guidelines and all requirements by COMREC some of which are indicated on the next page for your study

15-Jun-20

Prof. E. Umar -Chairperson (COMREC) Date

Appendix 3: Letter for data use

Penn
Arts & Sciences
Population Aging Research Center
3718 Locust Walk, 272 McNeil Bldg
Philadelphia, PA 19104-6298
parc.pop.upenn.edu

Hans-Peter Kohler
F.J. Warren Professor of Demography
Director, Population Aging Research Center

February 10, 2020

COMREC Secretariat
College of Medicine
Private Bag 360
Blantyre
Malawi

Reference: Letter of Permission for MLSFH Data Use

Dear Sir/Madam:

Malawi Longitudinal Study of Families and Health (MLSFH) is one of the longest studies being conducted in Malawi since 1998 with focus on MLSFH-MAC: mature adult cohort and MLSFH-ACE: Project on adverse Childhood Experiences (focusing on adolescents). Since 1998, a number of data collection rounds have been done (1998, 2001, 2004, 2006, 2008, 2010, 2012, 2013, 2017, 2018 and 2019) in Balaka, Mchinji and Rumphi.

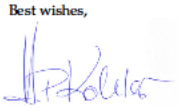
In view of this, I would like to grant permission to Alice S. Kaponda who is a Masters of Epidemiology student at University of Malawi, College of Medicine to use data collected under the MLSFH study for her thesis titled 'Assessing the relationship between adverse childhood experiences (ACE) and high HIV risk behaviors among male and female adolescents: A retrospective nested cohort study in Balaka district.'

All data that will be made available will be completely de-identified and will not contain personally identifiable information.

Permission to use these data will be subject to the MLSFH Data Use Agreement, which stipulates, among other aspects, the exclusive use of the data for research purposes and the protection of confidentiality of the data. Moreover, because the MLSFH-ACE data are not yet in the public domain, it is expected that all publications and reports based on these data will be co-authored with the PIs of the MLSFH-ACE project (R. Kidman & H.-P. Kohler).

If you would require more information, please contact me on hpkohler@pop.upenn.edu.

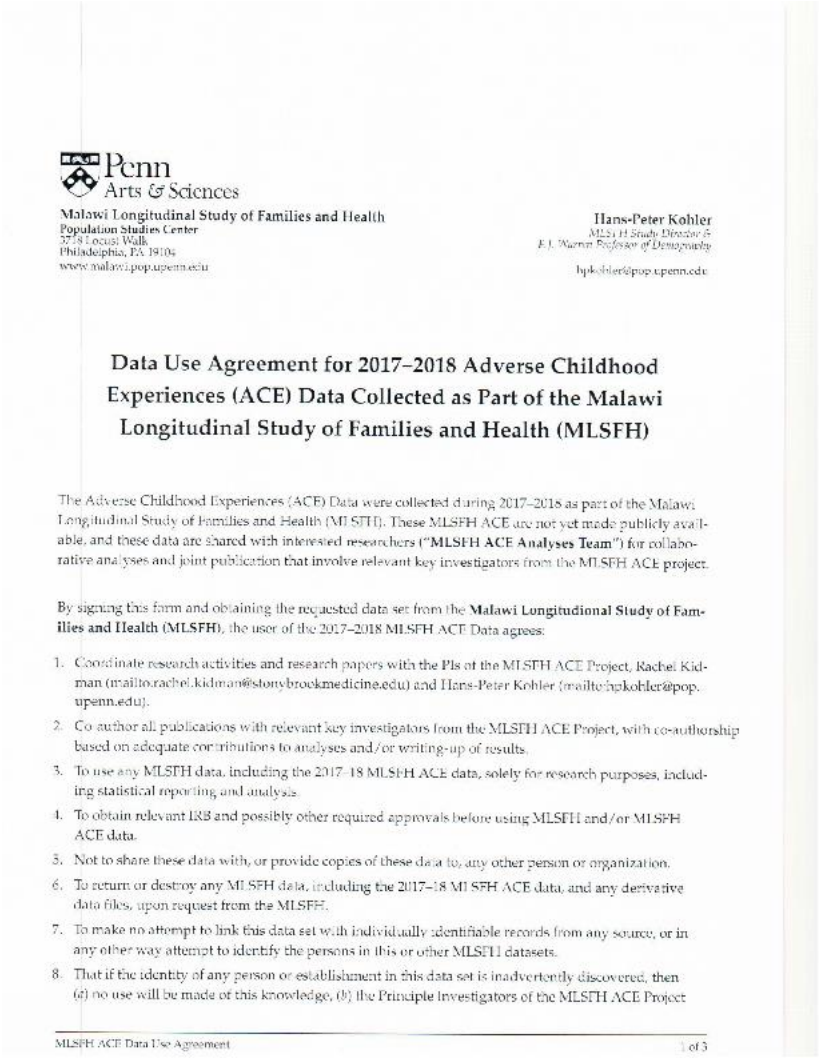
Best wishes,



Hans-Peter Kohler
Principal Investigator, Malawi Longitudinal
Study of Families and Health

UNIVERSITY of PENNSYLVANIA

Appendix 4: Data Use agreement form



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Data Use Agreement for 2017–2018 Adverse Childhood Experiences (ACE) Data Collected as Part of the Malawi Longitudinal Study of Families and Health (MLSFH)

The Adverse Childhood Experiences (ACE) Data were collected during 2017–2018 as part of the Malawi Longitudinal Study of Families and Health (MLSFH). These MLSFH ACE are not yet made publicly available, and these data are shared with interested researchers ("**MLSFH ACE Analyses Team**") for collaborative analyses and joint publication that involve relevant key investigators from the MLSFH ACE project.

By signing this form and obtaining the requested data set from the **Malawi Longitudinal Study of Families and Health (MLSFH)**, the user of the 2017–2018 MLSFH ACE Data agrees:

1. Coordinate research activities and research papers with the PIs of the MLSFH ACE Project, Rachel Kidman (mailto:rachel.kidman@stonybrookmedicine.edu) and Hans-Peter Kohler (mailto:hpkohler@pop.upenn.edu).
2. Co-author all publications with relevant key investigators from the MLSFH ACE Project, with co-authorship based on adequate contributions to analyses and/or writing-up of results.
3. To use any MLSFH data, including the 2017–18 MLSFH ACE data, solely for research purposes, including statistical reporting and analysis.
4. To obtain relevant IRB and possibly other required approvals before using MLSFH and/or MLSFH ACE data.
5. Not to share these data with, or provide copies of these data to, any other person or organization.
6. To return or destroy any MLSFH data, including the 2017–18 MLSFH ACE data, and any derivative data files, upon request from the MLSFH.
7. To make no attempt to link this data set with individually identifiable records from any source, or in any other way attempt to identify the persons in this or other MLSFH datasets.
8. That if the identity of any person or establishment in this data set is inadvertently discovered, then (*a*) no use will be made of this knowledge, (*b*) the Principle Investigators of the MLSFH ACE Project