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Polyvictimization and HIV Testing Behavior in Malawi

By

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Master of Public Health

Global Epidemiology

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Polyvictimization and HIV Testing Behavior in Malawi

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B.S.

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2016

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An abstract of

A thesis submitted to the Faculty of the  
Rollins School of Public Health of Emory University

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Master of Public Health  
in Global Epidemiology

2018

## **Abstract**

### **Polyvictimization and HIV Testing Behavior in Malawi**

**By Brian Batayeh**

Over half of all children in the world are victims of violence every year (1). This violence can be physical, sexual, or emotional in nature, with varying severities and consequences. These forms of violence can co-occur and impact children throughout their life span, resulting in polyvictimization. Violence against children has been shown to increase risk for HIV through various behavioral pathways (3-6). Thus far, there is little empirical research exploring multiple forms of violence exposures and HIV testing uptake. We hypothesize that while children exposed to violence are at higher risk for contracting HIV, they will be less likely to be tested for HIV due to violence's impact on self-efficacy. We also hypothesize that as individuals are exposed to more forms of violence, the association will strengthen in a graded fashion. Multivariable logistic regression was performed to assess the relationship between different violence exposure types and ever having been tested for HIV, with separate models for males and females. Females exposed to physical and emotional violence combined were more likely to have ever been tested for HIV in comparison to those who did not experience any form of violence (aOR= 2.559; [1.020, 6.418]). Females exposed to sexual and emotional violence combined were less likely to have ever been tested for HIV than females not exposed to any form of violence (aOR=0.058; [0.005, 0.654]). Regardless of exposure category, males exposed to violence were no more or less likely to have ever been tested for HIV than males who reported no exposure to violence. This study demonstrates that among individuals aged 13-24 years living in Malawi, different combinations of violence have varying associations with testing behavior and these associations differ by sex.

Polyvictimization and HIV Testing Behavior in Malawi

By

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B.S., Michigan State University, 2016

Thesis Committee Chair: Shakira Suglia, Sc.D.

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**Literature Review:***Intersections of Violence and HIV*

Over half of all children in the world are victims of violence every year (1). While violence against children remains a problem globally, there are certain regions where the issue remains more prevalent than others. In a study that surveyed 24 African nations, it was estimated that roughly 50 to 80 percent of children were victims of violence within the past year (2). This violence can be physical, sexual, or emotional in nature, with varying severities and consequences. These forms of violence can co-occur and impact children throughout their life span, resulting in polyvictimization. Violence against children has been shown to increase risk for HIV through various behavioral pathways (3-6). A student health survey of five African nations found that students, primarily aged 13-15, exposed to sexual or physical violence were more likely to have multiple sex partners (aOR= 2.18 [CI95%:1.87–2.55]) and have a history of being diagnosed with a sexually transmitted infection (aOR=1.72 [CI95%:1.43–2.07]). These associations were stronger for students having experienced both sexual and physical violence. Students who experienced both sexual and physical violence were more likely to report having multiple sex partners (aOR=6.59 [CI95%:4.93–8.80]) and have a history of being diagnosed with a sexually transmitted infection (aOR=3.10 [CI95%:2.24–4.29])(6). Given the body of evidence suggesting that violence against children increases HIV risk, it is imperative to focus on promoting HIV prevention behavior in regions where HIV prevalence is high and violence against children are pervasive.

*Barriers and Facilitators for HIV Testing and Counseling*

HIV testing and counseling can serve as one behavioral pathway to provide an opportunity for HIV positive individuals to attain treatment and stop further transmission.

For HIV negative individuals, HIV testing and counseling can serve as an entry point to prevention services. Studies have demonstrated that couples-based HIV testing and counselling among serodiscordant couples is associated with increased risk-reduction and lowered rates of seroconversion. However, there is equipoise surrounding the impact of HIV test receipt on risk behavior and is nuanced in terms of outcome of the test and sex (7, 8). In addition to the potential for self-protective behavior change, HIV testing and counseling has been shown to be highly cost-effective, particularly when targeting couples and in settings with high HIV prevalence (10).

There are a multitude of reasons that an individual may choose to not get tested for HIV. One quantitative study based in Malawi revealed psychosocial factors that are associated with likelihood of getting tested for HIV. Stigma toward people living with HIV served as a barrier to HIV testing uptake, shown to be negatively associated with having been tested or a desire to be tested. Increased HIV-related knowledge and perceived self-efficacy both served as facilitators to HIV testing uptake and were positively with having been tested for HIV or a desire to be tested for HIV (11). A separate qualitative study implemented door-to-door HIV testing in rural Malawi and found that engagement with testing surrounded issues of convenience, confidentiality, and credibility. Convenience refers to structural barriers such as distance and wait time in the clinic. Confidentiality refers to trust that the test results will not be shared outside of the clinic. Credibility refers to trust that the test results are valid and have not been tampered with (12). Taking these two studies into consideration, it is imperative to recognize that barriers and facilitators may be complex and multi-faceted in nature.

Currently, there is limited research regarding HIV testing uptake at the intersection of HIV and violence, particularly when considering multiple forms of violence. Several studies examining the impact of intimate partner violence (IPV) on HIV testing uptake results are conflicting and different depending on inclusion criteria surrounding high risk and location of the study population. One study of eight different US states/territories suggested that women who are victims of IPV are more likely to have been tested for HIV due to self-perceived risk (13). Another US-based study in Atlanta, Georgia restricted analyses to only high risk women and found a decrease in testing uptake for those women exposed to IPV. The article explains that increased uptake among IPV may be the result of provider perceived risk, self-perceived risk, and recurrent emergency room visits which are common venues for HIV testing (14). One study conducted in Tanzania, demonstrated that females aged 19-24 years were equally likely to know where to receive an HIV test or to have ever been tested if they were exposed to childhood sexual violence (3). While these findings suggest that violence exposure is not associated with HIV test uptake, it is limited in that it does not consider multiple forms of violence and differences by sex. Given the different contexts in which these studies were conducted and the differing conclusions that resulted, there is considerable equipoise surrounding the relationship between polyvictimization and HIV testing uptake in Malawi, particularly when addressing adolescents and young adults.

#### *Malawi Context*

The estimated prevalence of HIV in Malawi among individuals aged 15-49 is 8.8% with women having higher prevalence than men. When examining younger age groups, this disparity seems to widen, particularly among those aged 15-24 years. Over

90% of men and women know where to receive an HIV test, but women are more likely to have ever been tested with 83% of women having been tested in comparison to 70% of men. However, when considering testing behavior within the past 12 months, this disparity decreases considerably with roughly 40% of men and women having been tested. Regardless of sex, those who are married are more likely to have been tested in the past 12 months and received their results (15). Findings from the 2013 Malawi Violence Against Children Survey indicate that prior to the age of 18, roughly 25% of all children experience multiple forms of violence (16). When considering the intersections of HIV and violence outlined above, it is crucial to consider these two factors as prominent issues within the context of Malawi.

#### *Gaps in the Literature*

Thus far, there is little empirical research with quantitative data exploring the barriers to HIV testing, in particular with barriers related to violence. We hypothesize that while children exposed to violence are at higher risk for contracting HIV, they are also less likely to be tested for HIV due to violence's impact on self-esteem and self-efficacy. HIV testing is crucial as it can serve as a doorway to obtaining treatment and services. When considering this, it is important to identify barriers to care in order to connect individuals who may be at higher risk to HIV testing and needed services.

The objective of this study is two-fold: to assess HIV testing prevalence among individuals who have experienced violence, and to examine the association between violence exposures and HIV testing through a polyvictimization framework. We hypothesize that regardless of sex, individuals exposed to violence will be less likely to

have ever been tested for HIV and that this association will strengthen when considering individuals who have experienced multiple forms of violence.

**Introduction:**

Over half of all children in the world are victims of violence every year (1). While violence against children remains a problem globally, there are certain regions where the issue remains more prevalent than others. In a study that surveyed 24 African nations, it was estimated that roughly 50 to 80 percent of children were victims of violence within the past year (2). This violence can be physical, sexual, or emotional in nature, with varying severities and consequences. These forms of violence can co-occur and impact children throughout their life span, resulting in polyvictimization. Violence against children has been shown to increase risk for HIV through various behavioral pathways (3-6). Given the body of evidence suggesting that violence against children increases HIV risk, it is imperative to focus on promoting HIV prevention behavior in regions where HIV prevalence is high and violence against children are pervasive.

HIV testing and counseling can serve as one behavioral pathway to provide an opportunity for HIV positive individuals to attain treatment and stop further transmission. There are a multitude of reasons that an individual may choose to not get tested for HIV. One quantitative study based in Malawi revealed psychosocial factors that are associated with likelihood of getting tested for HIV. Stigma toward people living with HIV served as a barrier to HIV testing uptake, shown to be negatively associated with having been tested or a desire to be tested. Increased HIV-related knowledge and perceived self-efficacy both served as facilitators to HIV testing uptake and were positively with having been tested for HIV or a desire to be tested for HIV (11). A separate qualitative study implemented door-to-door HIV testing in rural Malawi and found that engagement with

testing surrounded issues of convenience, confidentiality, and credibility (12). Taking these two studies into consideration, it is imperative to recognize that barriers and facilitators may be complex and multi-faceted in nature.

Currently, there is limited research regarding HIV testing uptake at the intersection of HIV and violence, particularly when considering multiple forms of violence. Several studies examining the impact of intimate partner violence (IPV) on HIV testing uptake results are conflicting and different depending on inclusion criteria surrounding high risk and location of the study population. One study of eight different US states/territories suggested that women who are victims of IPV are more likely to have been tested for HIV due to self-perceived risk (13). Another US-based study in Atlanta, Georgia restricted analyses to only high risk women and found a decrease in testing uptake for those women exposed to IPV. The article explains that increased uptake among IPV may be the result of provider perceived risk, self-perceived risk, and recurrent emergency room visits which are common venues for HIV testing (14). One study conducted in Tanzania, demonstrated that females aged 19-24 years were equally likely to know where to receive an HIV test or to have ever been tested if they were exposed to childhood sexual violence (3). While these findings suggest that violence exposure is not associated with HIV test uptake, it is limited in that it does not consider multiple forms of violence, polyvictimization, and differences by sex. Given the different contexts in which these studies were conducted and the differing conclusions that resulted, there is considerable equipoise surrounding the relationship between polyvictimization and HIV testing uptake in Malawi, particularly when addressing adolescents and young adults.

The estimated prevalence of HIV in Malawi among individuals aged 15-49 is 8.8% with women having higher prevalence than men. When examining younger age groups, this disparity seems to widen, particularly among those aged 15-24 years. Over 90% of men and women know where to receive an HIV test, but women are more likely to have ever been tested with 83% of women having been tested in comparison to 70% of men. However, when considering testing behavior within the past 12 months, this disparity decreases considerably with roughly 40% of men and women having been tested. Regardless of sex, those who are married are more likely to have been tested in the past 12 months and received their results (15). Findings from the 2013 Malawi Violence Against Children Survey indicate that prior to the age of 18, roughly 25% of all children experience multiple forms of violence (16). When considering the intersections of HIV and violence outlined above, it is crucial to consider these two factors as prominent issues within the context of Malawi.

Thus far, there is little empirical research exploring multiple forms of violence against children and HIV testing uptake. We hypothesize that while children exposed to violence are at higher risk for contracting HIV, they will be less likely to be tested for HIV due to violence's impact on self-esteem and self-efficacy. We also hypothesize that as individuals are exposed to more forms of violence, the association will strengthen in a graded fashion. The objective of this study is to explore the relationship between multiple forms of violence exposures and HIV testing uptake while highlighting potential differences by sex.

**Methods:***Study Design*

The 2013 Malawi Violence Against Children and Young Women Survey (VACS) was a nationally representative, cross-sectional household survey of females and males aged 13-24 years. The development of this global standardized survey was led by the Centers for Disease Control and Prevention and the United Nations Children's Fund with external consultations. The following instruments informed the development of the Malawi VACS: Malawi Demographic and Health Survey, National Intimate Partner and Sexual Violence Surveillance System, the Child Sexual Assault Survey, Longitudinal Studies of Child Abuse and Neglect, the International Society for the Prevention of Child Abuse and Neglect Child Abuse Screening Tool, HIV/AIDS/STD Behavioral Surveillance Surveys, Youth Risk Behavior Survey, National Longitudinal Study of Adolescent Health, World Health Organization Multi-country Study on Women's Health and Domestic Violence against Women, Behavioral Risk Factor Surveillance System, and the Hopkins Symptoms Checklist.

The VACS utilized four-stage cluster stratified sample design with a split-sample approach to obtain separate estimates for females and males. Males and females were not sampled from the same enumeration area (EA). This sought to minimize the possibility of sexual assault perpetrators and victims being sampled from the same community. In order for an individual to have been considered eligible, they must have been aged 13-24 years and of the same sex that was being sampled from the enumeration area where their residence was located. All surveys were administered by trained interviewers. The sampling frame was derived from the 2010 Malawi Demographic Health Survey (MDHS). In the first stage, 849 EAs of the 9,145 were selected with probability

proportional to size. For the second stage, 212 EAs were selected with probability proportional to size, but stratified by region. From each EA, 30 households were selected by equal probability sampling. In the final stage, one eligible respondent was selected to complete the survey. Prior to administering the survey to the eligible respondent, a separate survey was given to the head of household to measure socioeconomic information. If the head of household was aged 13-24 years and of the same sex being sampled from the EA, they were also considered eligible for the individual survey. A total of 2,162 surveys were completed, 1,029 being females and 1,133 being males. The combined response rate for household and individual surveys was similar between females and males at roughly 85%. The surveys were administered by trained interviewers and conducted in two languages: Chichewa and Tumbuka.

### *Data Analysis*

#### I.) Violence Exposures

Although data collected on violence were comprehensive in detailing the nature of the event, exposures to violence were simplified for analytic purposes without regard to severity of exposure. Severity of exposure was not considered in our study because we decided to focus on polyvictimization, or the combination of violence exposures, and did not want to prioritize one form of violence over the others. Through a polyvictimization framework, we theorized that this combination of violent exposures served as a proxy for the severity of violence experienced. In addition, within violence exposure categories, we did not want to assume that a certain violent event experienced could be more impactful to an individual over the others. Thus, binary indicators were created for sexual, physical, and emotional violence to separate those that have ever experienced that form of violence from those that have never experienced that form of violence.

Information collected on sexual violence was inclusive of the following forms: unwanted sexual touching, unwanted attempted sex, physically forced sex, and pressured sex. If a respondent answered that they ever experienced one of these forms of sexual violence, they were classified as being exposed to sexual violence. In total, there were four questions that captured whether the respondent has ever been exposed to sexual violence.

Acts of physical violence were defined as being punched, kicked, whipped, or beat with an object, choked, smothered, tried to drown, burned, scalded intentionally, or used or threatened with weapon such as a knife or other weapon. Respondents were asked if they experienced a physical act of violence from intimate partners, peers, parents or adult caregivers, other adult relatives, or adults in the community. If a respondent answered that they experienced physical violence from any of these perpetrators, they were classified as being exposed to physical violence. There were four different perpetrator-focused sections, each with three different acts of violence described, resulting in a total of 12 questions that gathered information as to whether the respondent has ever experienced physical violence.

Emotional acts of violence were defined as being told you were not loved, someone wished you had never been born, or being ridiculed or put down. If a respondent answered that a parent or caregiver ever committed an act of emotional violence on them, they were classified as being exposed to emotional violence. There was one question focused on caregiver perpetration with three different acts of emotional violence described, resulting in a total of three questions that captured whether the respondent has ever experienced emotional violence.

Sexual, physical, and emotional violence exposures were utilized to construct unique exposures using a polyvictimization framework. Each possible violence exposure combination was modeled as its own distinct exposure. The variables were constructed nominally with no natural ordering. In total there were seven different exposures, all of which were compared to no violence exposures as the referent category. The exposure categories are as follows: 1.) sexual violence only, 2.) physical violence only, 3.) emotional violence only, 4.) sexual and physical violence, 5.) sexual and emotional violence, 6.) physical and emotional violence, and 7.) sexual, physical, and emotional violence.

## II.) Outcome

The outcome of interest for this study was HIV testing behavior. All individuals who indicated that they have ever had sex were asked whether they had ever received an HIV test. The variable is dichotomized separating those who have ever been tested from those who have never been tested. Individuals who declined to answer this question were not included in the analysis.

## III.) Covariates

A combination of theoretical knowledge and findings from previous studies were used to select covariates that could potentially confound the relationship between violence exposures and HIV testing behavior. One previous study assessing the relationship between childhood sexual violence and HIV testing behavior among women aged 19-24 in Tanzania controlled for religion, pregnancy, marriage and household wealth in their statistical modeling. The study found that controlling for religion,

pregnancy, household wealth, and marriage did not alter the relationship between childhood sexual violence and HIV testing behavior and knowledge, but that wealth was significantly associated with HIV testing behavior and knowledge (3). Despite these findings, we still decided to consider some of these variables as potential confounders on a theoretical basis given that our study includes both males and females, includes a larger age range, and models multiple exposures.

The expansion and implementation of Prevention of Mother to Child Transmission initiatives in Sub-Saharan Africa have led to pregnancy being highly associated with HIV testing behavior. The 2010 Malawi DHS indicated that roughly 95% of women aged 15-49 received Antenatal care from a skilled attendant during their most recent pregnancy (17). Malawi offers testing to all pregnant women at Antenatal Care Clinics (18). Given that the question asked the individual whether they had ever personally been pregnant, males were not asked this question.

A large proportion of groups at risk for HIV in high prevalence areas are cohabiting couples (7, 19, 20). This has led to many initiatives targeting couples for HIV testing. In order to capture both individuals in married partnerships and those living together as if married, a variable for cohabitation was created.

It was proposed that age group may serve as a potential confounder. Age may be associated with testing behavior as it is associated with sexual debut. It was proposed that age may also be associated with violence exposures due to differences in ability to recognize violent experiences and potential differences by age cohort. Age was categorized to reflect the separation between childhood and young adulthood.

#### IV.) Sampling Weights

In order to obtain nationally representative data, the Malawi VACS used a three step weighting procedure. In the first step, base weights were calculated for each respondent in the sample. In the second step, these base weights were adjusted for non-response. In the final step, the weights were adjusted using post-stratification calibration in line with the National Statistics Office's population projections distributed by urbanization, age group, and sex.

#### V.) Modeling

All data were analyzed using SAS 9.4 and accounted for the weighted nature of the dataset. The analysis of males and females were conducted using separate models. Our exposure of interest, violence exposure type, was modeled as a categorical variable. Multi-variable logistic regression was used to assess the relationship between each unique violence exposure type and HIV testing behavior while controlling for the aforementioned covariates. For both males and females, main effects modeling was conducted, excluding exposures with insufficient data ( $n < 15$ ). After the main effects modeling, interaction between age group and violence exposures was tested after excluding exposure categories with insufficient data ( $n < 30$ ). The interaction between age group and violence was not found to be statistically significant for both the female and male models ( $p = 0.1958$ ,  $p = 0.3721$ ; respectively). Since this interaction was not found to be statistically significant, our results will reflect the data, without stratification by age group.

## VI.) Post-Violence Care Sensitivity Analysis

Some studies based in the United States have found that exposure to sexual and physical violence may lead to increased uptake of HTC due to provider perceived risk during post-violence care (13, 14). In order to assess this within our dataset in the context of Malawi, a chi-square test was performed assessing the association between testing behavior and post-violence care among individuals who have ever been exposed to sexual and/or physical violence. The post-violence care variable was dichotomous separating those who experienced violence and sought post-violence care from those who experienced violence and did not seek post violence care.

### **Results:**

A total of 1,029 females and 1,133 males completed the survey. For this study, the sample was restricted to only individuals who reported having ever had vaginal, anal, or oral sex. The resulting sample size consisted of 603 females and 592 males.

### *Background Characteristics*

Table 1 provides background characteristics of the study population. Within our female sample, 85.35% were aged 18-24 years and 14.65% were aged 13-17 years. Of all males 70.85% were aged 18-24 years while 29.15% were aged 13-17 years. Among our male sample 47.01% were currently enrolled in school in comparison to 10.81% of females, a difference that is statistically significant. When comparing the proportion of individuals who have worked within the past year, there were no statistically significant differences by sex. A significantly greater proportion of females have ever cohabited in comparison to males. Of all females in our sample, 78.31% have ever been pregnant. Of

all females, 82.49% have ever been tested for HIV in comparison to 56.79% of males, a difference that is statistically significant.

### *Exposure Prevalence*

Displayed in table 2 is the violence exposure prevalence for each unique violence exposure within our study population, stratified by age and sex. There are a total of eight unique violence exposure groups, including our referent category of those who reported not being exposed to any violence. Among females, the highest violence exposure prevalence was physical only (23.16%; CI95: 18.79, 27.53) followed by sexual, physical, and emotional violence combined (15.31%; CI95: 9.30, 21.33). For males, the highest prevalence was physical violence only followed by physical and emotional violence combined. Females were significantly more likely than men to be exposed to sexual violence only and more likely to report no violent exposures. Males were significantly more likely to be exposed to physical and emotional violence combined. There were no other significant differences in exposure categories by sex.

### *Bivariate Associations*

Table 3 displays HIV testing prevalence among different violence exposure groups stratified by sex. Within this table, bivariate associations can be derived which were later tested with logistic regression to increase the robustness of the analysis. For both females and males, there were no significant bivariate associations between ever having been tested for HIV and any of the exposure categories.

### *Modeling*

Multivariable logistic regression analyses was performed to assess the relationship between different violence exposure types and ever having been tested for HIV. Separate models were constructed for male and females in order to account for the removal of exposure groups with insufficient data. The samples were restricted to only those individuals who reported no missing data for any of the variables within the model. The model for females controlled for cohabitation, age group, and pregnancy, while the male model controlled for cohabitation and age group. Table 4 shows the results of the main effects modeling. Regardless of the form, individuals exposed to only one form of violence were no more or less likely to have ever been tested for HIV. While not found to be statistically significant, there is a positive association between sexual violence only and ever having been tested for HIV among our female sample (aOR= 2.954; [0.969, 9.010]). Regardless of sex, individuals exposed to all three forms of violence were no more or less likely to have ever been tested for HIV. Females exposed to physical and emotional violence combined were 2.559 times more likely to have ever been tested for HIV in comparison to those who did not experience any form of violence (aOR= 2.559; [1.020, 6.418]). Females exposed to sexual and emotional violence combined were less likely to have ever been tested for HIV than females not exposed to any form of violence (aOR=0.058; [0.005, 0.654]). Among males, there was insufficient data present to assess the association between HIV testing and sexual and emotional violence combined. Regardless of exposure category, males exposed to violence were no more or less likely to have ever been tested for HIV than males who reported no exposure to violence.

### *Post-Violence Care Sensitivity Analysis*

Given that our results did not align with our original hypothesis, descriptive analysis were performed to potentially explain the disconnect between our original framework and the data. It was proposed that individuals who are exposed to violence and engage in post-violence care may be more likely to have ever been tested for HIV due to provider-perceived risk, in accordance with a previous study (14). In order to assess this, a dichotomous variable was created to separate individuals who received post-violence care from those who did not and a chi-square test was performed to assess if there might be a relationship that exists. Among females who received post violence care, 60.2% had ever been tested for HIV while 73.3% of females that did not receive post violence care had ever been tested for HIV. The results of the chi-square test did not find the association between post-violence care receipt and HIV testing to be significant ( $p=0.4414$ ). Among males who received post violence care, 90.01% had been ever been tested for HIV in comparison to 52.3% having ever been tested for HIV among males that did not receive post violence care. The results of the chi-square test were found to be strongly significant ( $p<0.0001$ ).

**Table 1: Background Characteristics of all Individuals Reporting having ever had Sex within our Study Population Stratified by Sex, Malawi, 2013**

<b>Weighted % [95% CI]</b>	<b>Females (n=603)</b>	<b>Males (n=592)</b>
<b>Aged 13-17</b>	14.65 [11.23, 18.08]	29.15 [23.55, 34.75]
<b>Aged 18-24</b>	85.35 [81.92, 88.77]	70.85 [65.25, 76.45]
<b>Currently in School</b>	10.81 [7.50, 14.11]	47.01 [40.50, 53.52]

<b>Worked within the past year</b>	83.87 [79.71, 88.03]	85.20 [80.06, 90.34]
<b>Ever Cohabiting or Married</b>	82.39 [77.03, 87.74]	32.68 [27.19, 38.18]
<b>Ever Pregnant</b>	78.31 [73.02, 83.60]	N/A
<b>Ever tested for HIV</b>	82.49 [77.81, 87.17]	56.79 [50.61, 62.97]

**Table 2: Violence Exposure Prevalence among Individuals Reporting having ever had Sex Within our Study Population Stratified by Sex, Malawi, 2013**

<b>Violence Type Weighted % [95% CI]</b>	<b>Females (n=603)</b>	<b>Males (n=592)</b>
<b>No Violence</b>	25.81 [21.24, 30.37]	13.36 [9.15, 17.58]
<b>Sexual Only</b>	8.06 [5.44, 10.67]	1.80 [0.32, 3.27]
<b>Physical Only</b>	23.16 [18.79, 27.53]	30.66 [26.64, 34.69]
<b>Emotional Only</b>	3.92 [2.02, 5.82]	2.56 [0.85, 4.26]
<b>Sexual and Physical</b>	13.02 [9.69, 16.34]	8.34 [5.51, 11.18]
<b>Sexual and Emotional</b>	1.16 [0.00, 2.44]	1.15 [0.00, 2.30]
<b>Physical and Emotional</b>	9.56 [5.63, 13.50]	25.91 [21.42, 30.41]
<b>Sexual, Physical, and Emotional</b>	15.31 [9.30, 21.33]	16.21 [11.57, 20.86]

**Table 3: HIV Testing Prevalence within Different Violence Exposure Categories among Individuals Reporting having ever had Sex within our Study Population by Sex, Malawi, 2013**

Violence Type Weighted % [95% CI]	Ever Tested for HIV	
	Females (n=603)	Males (n=592)
No Violence	86.71 [78.14, 95.28]	57.52 [36.47, 78.57]
Sexual Only	93.25 [85.89, 100.00]	40.02 [0.00, 81.30]
Physical Only	90.07 [83.33, 96.81]	60.56 [49.74, 71.39]
Emotional Only	84.58 [62.01, 100.00]	54.65 [18.12, 91.19]
Sexual and Physical	80.02 [68.10, 91.93]	64.55 [47.69, 81.41]
Sexual and Emotional	43.72 [0.00, 95.85]	62.39 [14.10, 100.00]
Physical and Emotional	88.78 [79.04, 98.53]	55.68 [43.83, 67.53]
Sexual, Physical, and Emotional	59.67 [40.39, 78.94]	48.71 [33.52, 63.90]

**Table 4: Main Effects Modeling for HIV Testing Associated with Violence Exposures Stratified by Sex, 2013**

	Ever Have Been Tested for HIV (aOR[95%CI])
<b>Females</b>	
No Exposure to Violence	1.0
Sexual Violence Only	2.954 [0.969, 9.010]
Physical Violence Only	1.478 [0.539, 4.053]
Emotional Violence Only	0.619 [0.072, 5.286]
Sexual Violence and Physical Violence	1.296 [0.362, 4.636]
Sexual Violence and Emotional Violence	0.058 [0.005, 0.654]

<b>Physical Violence and Emotional Violence</b>	2.559 [1.020, 6.418]
<b>Sexual Violence, Physical Violence, and Emotional Violence</b>	1.042 [0.462, 2.352]
<b>Males</b>	
<b>No Exposure to Violence</b>	1.0
<b>Sexual Violence Only</b>	0.442 [0.061, 3.232]
<b>Physical Violence Only</b>	2.170 [0.760, 6.194]
<b>Emotional Violence Only</b>	1.280 [0.137, 11.947]
<b>Sexual Violence and Physical Violence</b>	2.191 [0.785, 6.114]
<b>Sexual Violence and Emotional Violence</b>	Insufficient Data
<b>Physical Violence and Emotional Violence</b>	1.637 [0.670, 4.001]
<b>Sexual Violence, Physical Violence, and Emotional Violence</b>	1.401 [0.575, 3.412]

### **Discussion:**

Through a polyvictimization framework, this study shows that among females aged 13-24 years living in Malawi, different combinations of violence exposures have varying effects on HIV testing behavior. While not found to be statistically significant at  $p < 0.05$ , females exposed to sexual violence only were more likely to have ever been tested for HIV in comparison to females reporting no violence exposures. However when assessing sexual violence in combination with emotional violence, females are less likely to have ever been tested for HIV compared to females that did not report being exposed to violence. When assessing emotional violence in combination with physical violence, females are more likely to have ever been tested for HIV in comparison to females that did not report any violence exposures. Examining these associations, there does not seem to be any apparent pattern. We theorize that these exposure combinations may have differential impacts on self-efficacy related to HIV testing, but also understand that our

conception of violence exposures may not be nuanced enough to explain these differences within this study. This study also shows that males exposed to any combination of violence are no more or less likely than males reporting no violence exposures to have ever been tested for HIV.

Originally, it was hypothesized that HIV testing uptake would worsen as the violence exposures increased in form, as is consistent with past work on polyvictimization and cumulative adverse childhood experiences (23-26). However, the results of this study suggest that this graded relationship does not exist for HIV testing behavior, showing that individuals exposed to all three forms of violence are no more or less likely to have ever been tested for HIV than individuals not exposed to any violence. Given that several studies throughout the region have demonstrated the connection between violence against children and increased sexual risk taking behaviors, it is alarming that individuals who may be more likely to engage in risky behaviors are no more likely to have ever been tested for HIV (3, 4, 6). There is clearly a need to increase testing uptake among this population, particularly for individuals who have experienced polyvictimization.

Previous studies exploring the relationship between violence exposures and HIV testing have provided varying results within different contexts. One study conducted in Tanzania, demonstrated that females aged 19-24 years were equally likely to know where to receive an HIV test or to have ever been tested if they were exposed to childhood sexual violence (3). Within this article, wealth was used to explain the differences in testing, reasoning that the relationship between violence and HIV testing uptake may not exist. Within the United States, one study found that women exposed to intimate partner violence were more likely to have received an HIV test, while another study found that

when restricting the analysis to only high risk individuals within a United States city, HIV testing uptake was decreased (13, 14). Within this context, it was proposed that individuals exposed to intimate partner violence may be more likely to encounter venues for HIV testing, such as hospital emergency departments where the provider's perceived risk may prompt them to get tested for HIV (14). However, due to differences in health care systems, this reasoning may not translate to the context of Malawi. To test this within the context of Malawi, descriptive analyses were performed to examine the association between post-violence care receipt and HIV testing. For males, the association between post-violence care and HIV testing was found to be strongly significant ( $p < 0.0001$ ), while for females, the association was found to be not found to be statistically significant ( $p = 0.4414$ ). These results suggest that for females, this potential explanation may not apply. There may be a lack of integration of HIV care into the services that females might be more likely to seek after experiencing violence. The differences in sex may speak to different avenues through which post-violence care is sought (legal, clinical, etc.), the perpetrator of violence, differential help-seeking behaviors, differential refusal rates within post-violence care venues, and differential treatment within post-violence care services more broadly. While there are varying findings on previous work surrounding violence and HIV testing, this study was unique in considering polyvictimization. While the results of this study may align with some previous findings and conflict with others, it should be acknowledged that factors that surround testing behavior are multi-leveled, ranging from familial relationships to country-wide testing initiatives that may place vulnerable individuals more proximal to opportunities for HIV testing.

This study was subject to several limitations that may have impacted our ability to assess the true relationship between polyvictimization and HIV testing uptake. While the measures to physical and sexual violence were inclusive of a diverse array of perpetrators, the measures for emotional violence were only inclusive of caregivers, ignoring other potential perpetrators. This may substantially limit our sample size within exposure categories involving emotional violence and inhibit us from seeing the true associations between emotional violence exposures and HIV testing. The data for this study are cross sectional and thus it is difficult to establish true temporality. Although the data are cross sectional, several attempts were made to establish temporality with the survey data that were collected regarding the nature surrounding HIV testing and violence exposure. We were unable to assess the age at first exposure. Information was collected on testing behavior within the past year, but without timing for the exposures, this attempt at establishing temporality was not successful. This exposure timing survey error greatly limited any temporality that may have been established using this cross sectional survey. While temporality could not be established, it is difficult to reason that the act of testing itself would lead to a violence exposure. However, given the broad array of violence considered in this study, inclusive of multiple forms and potential perpetrators, it is reasonable to consider the possibility that this potential relationship could vary by the outcome of the test. While this study is novel in considering the polyvictimization framework within the context of HIV testing uptake, it presented unique difficulties in reasoning through foundational epidemiological principles, such as temporality. In addition, there may be bias introduced through unmeasured confounding. Religion was not collected through the Malawi Violence Against Children Survey and

thus was not explored as a potential confounder to be included in the model. Information was collected on whether a female has ever been pregnant, but information as to whether a male had impregnated a female was not collected. While women are the primary beneficiaries of Prevention of Mother to Child Transmission initiatives, male partners of pregnant women may be influenced by their testing behavior. While these may serve as potential unmeasured sources of bias, a study conducted in Tanzania assessing the relationship between childhood sexual violence and HIV testing behavior among women aged 19-24 that controlled for these variables did not find that religion or pregnancy altered the relationship between childhood sexual violence and HIV testing behavior and knowledge (3). Another limitation of this study surrounds information bias due to the sensitive nature of the survey questions and the requirement to recall these events throughout the life course. The true prevalence of violence exposures reported in this study are likely to be underestimated (27). Given the wide age range of our study population, and the varying times that individuals may have been exposed, there also may be issues with recall bias when reporting violence exposures, especially if that violence occurred at a young age (28). The reporting of HIV testing behavior may potentially introduce response bias into the study, especially given that the survey was administered face to face (29-31). Individuals may see HIV testing as more socially desirable and thus more likely to tell this to the interviewer in order to avoid feelings of shame.

Wealth was not assessed as a potential confounder for this study. Prior studies have shown a relationship between wealth and HIV testing behavior and knowledge (3, 12, 21). Household wealth may impact an individual's access to HIV testing services or to social networks that promote this form of preventative behavior. When considering the

relationship between wealth and violence, we theorized that households with lower amounts of wealth may face larger stressors leading to increased violence exposures. While the relationship between wealth and violence seemed meaningful when considering this factor theoretically, some studies, both within Malawi and throughout the region, suggest that there is little to no difference in violence exposures between different wealth groups (17, 22). Considering that this may be due to measurement error within previous studies, education and employment were explored as proxy variables for wealth. However, given the large age range of our sample, it did not seem appropriate to include these variables in our analysis. For these reasons, and particularly considering the context of Malawi, it was decided not to include wealth or any proxy for wealth into the statistical models.

A great amount was done in the analysis as to not prioritize one form of violence over the other. However, due to the survey design, there was greater potential for physical violence lifetime exposures to be captured over sexual and emotional violence due to the sheer difference in the number of questions. Our modeling approach sought to isolate different combinations of violence as to see the potential effect of each combination separately. This presented a challenge when it came to sample size within each categorical exposure group. Rather than changing the exposure framework, exposure categories with insufficient data were dropped from the model. We had considered lumping the cells with insufficient data into other categories, however, it would have inhibited the possibility of seeing the true effect of the exposure category that the smaller category joined. For example, when dropping the sexual and emotional violence combination from the model for the male sample, it was decided to not join

these observations to the sexual only or emotional only category because this would hamper our ability to see the effects of these exposure categories. In addition, it allowed for us to not prioritize one form of violence for its perceived impact over the other.

**Conclusion:**

This study demonstrates that among individuals aged 13-24 years living in Malawi, different combinations of violence have varying associations with testing behavior and these associations differ by sex. Females exposed to sexual and emotional violence were found to be less likely to have ever been tested in comparison to females who did not report being exposed to any violence. In contrast, females exposed to physical and emotional violence were found to be more likely to have ever been tested in comparison to females who did not report being exposed to any violence. Regardless of sex, individuals who were exposed to all three forms of violence were no more or less likely than individuals reporting no violence exposures to have ever been tested for HIV. For the majority of violence exposure categories assessed, individuals were no more or less likely to have ever been tested for HIV. These null results are troubling when considering the strong evidence connecting violence against children and increased sexual risk taking behaviors (3, 4, 6). These results are even more troubling when applying the polyvictimization framework. Through a polyvictimization framework, the potential graded impact of health harming behaviors places individuals exposed to multiple forms of violence at even greater risk of engaging in poor health behaviors (23, 26). Given the implications of violence exposures for sexual risk taking behaviors, there is a need for HIV testing and counseling initiatives to reach individuals exposed to violence, in particular multiple forms of violence.

Our descriptive analyses reveal sex differences in the relationship post-violence care receipt and HIV testing. However, there was limited information as to their experiences within post-violence care venues. A stronger understanding sex differences in experiences post-violence needed, both at the individual and structural level. Most previous studies have focused on associations between risk taking behavior and violence, but there is a limited understanding of how sex impacts post-violence care engagement and experience. This information could be used to guide post-violence care practices and adapt them to be more sensitive to sex. Overall, a targeted HIV testing approach on victims of violence that foregrounds sex could be efficacious in connecting at risk individuals to needed prevention and care services.

#### **Public Health Implications and Future Directions:**

This study demonstrates that among individuals aged 13-24 years living in Malawi, different combinations of violence have varying associations with testing behavior and these associations differ by sex. For the majority of violence exposure categories assessed, individuals were no more or less likely to have ever been tested for HIV. These results are troubling when considering the strong evidence connecting violence against children and increased sexual risk taking behaviors (3, 4, 6). These results may indicate a need for focused testing initiatives on individuals exposed to violence. In order to further explore the nuanced relationship between violence and HIV testing, future research might focus on violence exposures during different developmental periods, consider different methods for measuring violence exposures, and assess different HIV testing related outcomes.

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