The Prevalence of Adverse Childhood Experiences (ACEs) Among Adolescent and Young Women in Kenya and Associations in Adulthood Risk Behavior.

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1. **Specific Aims**

Adolescent girls and young women (AGYW) experience high HIV incidence in East Africa. Adverse Childhood Experiences (ACEs) are known to be related to unintended pregnancy and negative sexual and reproductive health outcomes in women. The extent to which behaviors implicated in HIV acquisition are associated with exposure to ACEs among AGYW is understudied. This study aims to characterize ACEs and their association with behavioral characteristics among AGYW seeking contraception at retail pharmacies in Kisumu, Kenya. The overarching goal is to investigate whether exposure to ACEs is associated with behavioral factors related to HIV acquisition among AGYW in this setting. We propose a secondary analysis to determine the frequency, patterns, and cofactors of exposure to ACEs using baseline data from a large cohort of AGYW in Kisumu, Kenya (AGYW Pharmacy PrEP Study). The specific aims are as follows:

**Aim 1—To characterize the frequency and patterns of exposure to ACEs among AGYW seeking contraception.** Using data from enrollment visits among participants age 18-24 years enrolled in the AGYW Pharmacy PrEP Study, we will calculate the frequency of affirmative self-reported responses to the WHO derived ACE-International Questionnaire (ACE-IQ) and summarize frequency distributions of each item. An ACE score will be calculated for each participant by summing total affirmative ACE responses and overall descriptive statistics will be calculated. *Hypothesis: Reporting experience of multiple ACEs with be common among AGYW seeking contraception, especially …..*

**Aim 2—To determine the relationship between exposure to ACEs and behavioral characteristics associated with HIV among AGYW**. We will categorize AGYW into two groups using standardized cutoffs based on WHO ACE-IQ responses: High ACE score (4+ affirmative response) and Low ACE score (3 or fewer affirmative responses). Using separate Poisson regression models, we will test the association between having a high ACE score and behavioral characteristics (e.g., having sex without a condom, exchanging money for sex, drug use, etc.). Multivariate models will adjust for and will account for site-level clustering*Hypothesis: AGYW with high ACE scores will more frequently report behaviors associated with HIV acquisition, including condomless sex and exchanging sex for money.*

1. **Background and Significance**

Adverse Childhood Experiences (ACEs) are recognized as traumatic events occurring before the age of 18 and elucidate sources of childhood stress. The initial ACE instrument was designed in 1998, centered on the experiences of children born in the United States within the categories of abuse, neglect, and household dysfunction. The WHO ACE-IQ questionnaire expands on these categories, providing an instrument to assess those impacts across diverse cultural and socio-economic landscapes (1). This global ACE instrument allows insight into the prevalence of stressful events individuals may face, as they retrospectively self-report, during childhood. This has led to numerous studies establishing a relationship between cumulative exposure to ACEs and an increase in the risk for negative health outcomes in adulthood, including mental health disorders, chronic disease, and substance use (2).

In sub-Saharan Africa adolescent girls and young women are facing significant obstacles that may contribute to an increased vulnerability to negative health outcomes later in life. Factors that contribute to this vulnerability are complex and often multi-level, arising for disparate institutional and cultural structures. Childhood adversity has been and continues to be recognized as a critical early-life stressor that may amplify these factors leading to an inability to cope with more adversity in adulthood (3). This may increase risk behavior and decision-making that leads to negative health outcomes in adulthood. The WHO ACE International Questionnaire (ACE-IQ) expansion on the original ACE questionnaire provides a comprehensive tool to promote an understanding of an associations between childhood adversity and specific risk behaviors among the young women who enroll in the AGYW PrEP study.

This proposed study provides an opportunity to advance previous research through a focus on young women in sub-Saharan Africa. The prevalence of 30 distinct ACE indicators will be presented, along with a cumulative ACE score of affirmative responses. A high ACE score includes participants who affirmatively respond to four or more ACE indicators while a low ACE score will include those that affirmatively respond to three or fewer. These scores will then be utilized to calculate risk estimates of the association between ACEs and specific behaviors that may lead to negative health outcomes in adulthood. This research will provide valuable data on ACEs in a novel population, lending to an understanding of local childhood adversity experienced by the young women participating in this study. Additionally, highly vulnerable subgroups of these individuals may be identified for future HIV prevention programming. These results may hone public health interventions, shaping policy to meet the needs of this community. Overall, *n*=1650 AGYW are anticipated to be included in the proposed analysis.

1. **Methods:**

Study design: This study will use a cross-sectional secondary analysis of survey-based data. We will analyze enrollment data from an ongoing cluster-randomized trial comparing pharmacy-based PrEP delivery models among AGYW at 20 retail pharmacies in Kisumu, Kenya (NCT05467306). Enrollment commenced in March 2023 and was completed in May 2025. All AGYW (15-24 years) purchasing contraception (emergency contraception, oral pills, injectables, implants, condoms) at retail pharmacies were eligible for the parent study. For the proposed study, we will include data from all participants ≥18 years based on WHO ACE-IQ guidelines. We will exclude participants who did not reply to at least 26 of the 30 ACE indicators.

Data collection: All data on sociodemographic characteristics, sexual behaviors, and reproductive health knowledge, attitudes, and practices were ascertained by trained study staff. Data collection included separate instruments for ACE-IQ responses, using REDCap.

Data analysis:

Aim 1: Frequency of ACEs will be assessed using participants’ responses to 30 unique ACE indicators, each falling within an ACE domain. These 13 domains provide insight into global adversity these young women may face. Each indicator will be coded as a binary variable (1 = having endured the experience, 2 = not having to endure the experience). A cumulative Total ACE Score will be calculated for each participant by summing the affirmative binary responses. The potential range of this score will be 0-30.

Aim 2: Using separate Poisson regression models, we will test the association between having a high ACE score and behavioral characteristics:

* 1. ACE-IQ scoresd for(3 or fewer affirmative ACE responses)
  2. scondomlessinjecting in the last 6 months
  3. Adjustment Variables:

Study Power: Still Calculating

1. **Ethical considerations**

Prior to commencement, the AGYW Pharmacy PrEP RCT received approval from the University of Washington Institutional Review Board (IRB) and the Kenya Medical Research Institute (KEMRI). All AGYW who were interested in participating and met the eligibility criteria provided written informed consent for their enrollment.

1. **Limitations:**

Cross-sectional design limits causal inference.

Self-reported data may be subject to recall and social desirability biases.

Sample may not be fully representative of the general population.

1. **Timeline**: End of Spring 2025 Quarter











References:

1. World Health Organization Adverse Childhood Experiences International Questionnaire. Pilot Study Review and Finalization Meeting, 4–5 May 2011, WHO Headquarters, Geneva Meeting Report. 2011. [(accessed on 2 May 2024)].
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4. Santelices, M.-P., Velasco-Hodgson, M.-C., Ferreccio, C., Undurraga, C., & Carvajal-Araneda, K. (2025). The Psychometric Properties of the ACE-IQ Questionnaire’s Binary and Frequency Scoring Methods in a Chilean Community Sample. Children (Basel), 12(3), 340-. <https://doi.org/10.3390/children12030340>
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**Table 1. Enrollment characteristics of AGYW ≥18 years seeking contraception at retail pharmacies (n=XXXX)**

|  |  |  |
| --- | --- | --- |
| **Characteristic** | | **N (%) or Median (IQR)** |
| Age (years) | |  |
| Age category |  |  |
|  | 18-20 years |  |
|  | ≥21 years |  |
| Relationship status | |  |
|  | Single, no partners at all |  |
|  | One primary partner only |  |
|  | Casual partner(s) only |  |
|  | One primary partner and casual partners |  |
|  | Other |  |
| Married |  |  |
|  | Yes |  |
|  | No |  |
| Currently in school | |  |
|  | No |  |
|  | Yes |  |
| Type of school | |  |
|  | Primary school (Boarding) |  |
|  | Primary School (Day) |  |
|  | Secondary School (Day) |  |
|  | Secondary School (Boarding) |  |
|  | Tertiary Vocational/Trade School |  |
|  | College/University (degree-seeking) |  |
|  | Other |  |
| Completed years of education | |  |
| Formally employed | |  |
|  | Yes |  |
|  | No |  |
| Ever been pregnant | |  |
|  | No |  |
|  | Yes |  |
| Currently using contraception | |  |
|  | No |  |
|  | Yes |  |
|  | Prefer not to answer |  |
| Contraceptive purchased today | |  |
|  | Injectable |  |
|  | Oral contraceptive pill |  |
|  | Emergency contraception |  |
|  | Male Condoms |  |
|  | Female Condoms |  |
|  | Implant |  |
| Previously used emergency contraception more than twice | |  |
|  | No |  |
|  | Yes |  |
| Current has any sexual partner(s) | |  |
|  | No |  |
|  | Yes |  |
| Partner providers financial support | |  |
|  | No |  |
|  | Yes |  |
| Partner has other sexual partners | |  |
|  | No |  |
|  | Yes |  |
|  | Unsure/Don’t know |  |
| Lives with partner | |  |
|  | Yes |  |
|  | No |  |
| Primary partners HIV status | |  |
|  | Negative |  |
|  | Positive |  |
|  | Unknown |  |
| Partner age (years) | |  |
| Partner age difference | |  |
|  | <10 years |  |
|  | ≥10 years |  |
| Drank any alcohol in the last 30 days | |  |
|  | Yes |  |
|  | No |  |
| Ever tested for HIV before today | |  |
|  | No |  |
|  | Yes |  |
|  | Don’t know/unsure |  |
|  | Prefer not to answer |  |
| Had sex without condom (last 6 months) | |  |
|  | No |  |
|  | Yes |  |
| Had sex while being intoxicated (last 6 months) | |  |
|  | No |  |
|  | Yes |  |
| Exchanged sex for money/favors (last 6 months) | |  |
|  | No |  |
|  | Yes |  |
| Been diagnosed or treated for an STI (last 6 months) | |  |
|  | No |  |
|  | Yes |  |
| Forced to have sex against will (last 6 months) | |  |
|  | No |  |
|  | Yes |  |
| Depression (PHQ-9 score) | |  |
|  | No Depression (<10) |  |
|  | Yes Depression (≥10) |  |
|  | Missing |  |
| Intimate Partner Violence (HITS score) | |  |
|  | No IPV (<10) |  |
|  | Yes IPV (≥10) |  |
|  | Missing |  |
| HIV Risk Perception | |  |
|  | No risk at all |  |
|  | Small chance |  |
|  | Moderate chance |  |
|  | Great chance |  |
|  | Prefer not to answer |  |
|  | Missing |  |

**Table 1. Frequency distribution of ACE-IQ items among AGYW ≥18 years seeking contraception at retail pharmacies (n=XXX)**

|  |  |  |  |
| --- | --- | --- | --- |
| ACE Category | Type of ACE | N | % |
| Physical abuse | A3) Did a parent, guardian or other household member spank, slap, kick, punch or beat you up? |  |  |
|  | A4) Did a parent, guardian or other household member hit or cut you with an object, such as a stick (or cane), bottle, club, knife, whip etc? |  |  |
| Emotional Abuse | A1) Did a parent, guardian or other household member yell, scream or swear at you, insult or humiliate you? |  |  |
|  | A2) Did a parent, guardian or other household member threaten to, or actually, abandon you or throw you out of the house? |  |  |
| Contact sexual abuse | A5) Did someone touch or fondle you in a sexual way when you did not want them to? |  |  |
|  | A6) Did someone make you touch their body in a sexual way when you did not want them to? |  |  |
|  | A7) Did someone attempt oral, anal, or vaginal intercourse with you when you did not want them to? |  |  |
|  | A8) Did someone actually have oral, anal, or vaginal intercourse with you when you did not want them to? |  |  |
| Alcohol and/or drug abuser in the household | F1) Did you live with a household member who was a problem drinker or alcoholic, or misused street or prescription drugs? |  |  |
| Incarcerated household member | F3) Did you live with a household member who was ever sent to jail or prison? |  |  |
| Household member that is chronically depressed, mentally ill, institutionalized or suicidal | F2) Did you live with a household member who was depressed, mentally ill or suicidal? |  |  |
| Household member treated violently | F6) Did you see or hear a parent or household member in your home being yelled at, screamed at, sworn at, insulted or humiliated? |  |  |
|  | F7) Did you see or hear a parent or household member in your home being slapped, kicked, punched or beaten up? |  |  |
|  | F8) Did you see or hear a parent or household member in your home being hit or cut with an object, such as a stick (or cane), bottle, club, knife, whip etc.? |  |  |
| One or no parents, parental separation or divorce | F4) Were your parents ever separated or divorced? |  |  |
|  | F5) Did your mother, father or guardian die? |  |  |
| Emotional Neglect | P1) Did your parents/guardians understand your problems and worries? |  |  |
|  | P2) Did your parents/guardians really know what you were doing with your free time when you were not at school or work? |  |  |
| Physical neglect | P3) Did your parents/guardians not give you enough food even when they could easily have done so? |  |  |
|  | P4) Were your parents/guardians too drunk or intoxicated by drugs to take care of you? |  |  |
|  | P5) Did your parents/guardians not send you to school even when it was available |  |  |
| Bullying | V1) Were you bullied? |  |  |
| Community violence | V4) Did you see or hear someone being beaten up in real life? |  |  |
|  | V5)Did you see or hear someone being stabbed or shot in real life? |  |  |
|  | V6) Did you see or hear someone being threatened with a knife or gun in real life? |  |  |
| Collective violence | V7) Were you forced to go and live in another place due to any of these events? |  |  |
|  | V8) Did you experience the deliberate destruction of your home due to any of these events? |  |  |
|  | V9) Were you beaten up by soldiers, police, militia, or gangs? |  |  |
|  | V10) Was a family member or friend killed or beaten up by soldiers, police, militia, or gangs? |  |  |

**Table 3. Frequency of factors association with HIV acquisition among AGYW seeking contraception at retail pharmacies who had high versus low ACE-IQ scores (n=XXX)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Outcome** | **ACE-IQ Score1** | | **Prevalence ratio PR (95% CI)** 1 | **p-value** |
| **High**  **(n=XX)** | **Low**  **(n=XX)** |
| **Behavioral factors** |  |  |  |  |
| Has partner of unknown/positive HIV status | XX (XX.X%) | XX (XX.X%) | X.XX (X.XX – X.XX) | X.XXX |
| ≥ 4 total lifetime sexual partners |  |  |  |  |
| Had condomless sex2 |  |  |  |  |
| Engaged in transactional sex2 |  |  |  |  |
| Forced to have sex against will2 |  |  |  |  |
| Experienced intimate partner violence3 |  |  |  |  |
| High self-perceived HIV risk4 |  |  |  |  |
| Partner age difference ≥10 years |  |  |  |  |
| **HIV risk score factors (Balkus et. al.5)** |  |  |  |  |
| Unmarried/not living with partner |  |  |  |  |
| Alcohol use (past 30 days) |  |  |  |  |
| Partner does not provide financial support |  |  |  |  |
| Primary partner has other partners |  |  |  |  |
| High behavioral HIV risk score**5** |  |  |  |  |
| **Psychosocial characteristics** |  |  |  |  |
| Low social support |  |  |  |  |
| Depressive symptoms |  |  |  |  |
| High self-efficacy to take daily medication6 |  |  |  |  |

1 Tabulations reported for ACE-IQ scores (high/low) and other characteristics are reported as column percentages. Prevalence ratios were estimated using Poisson regression, clustered by facility.

2 Within the last 6 months

3 Measured using the 4-item Hurt, Insult, Threaten, and Scream scale (HITS), defining intimate partner violence as scores of 10 and above (IPV: HITS score ≥10 = “Yes”, HITS score <10 = “No”)

4 We evaluated self-perceived HIV risk by asking “What is your gut feeling about how likely you are to get infected with HIV?”, with possible responses of “very likely”, “somewhat likely”, “very unlikely”, “extremely unlikely”. (High self-perceived HIV risk: Very/somewhat likely = “Yes”, Extremely/very unlikely = “No”)

5We evaluated behavioral HIV risk using the Balkus et al. HIV risk scoring: Age <25 = 1, Married = 2, any alcohol = 1, partner provides financial support = 1, partner has other partners: yes = 2, do not know = 2. Scores of ≥5 correspond to 5-15 incident HIV cases per 100 person-years in cohorts of African women; risk scores of ≤4 correspond to <5 incident HIV cases per 100 person-years. (High HIV risk: HIV risk score ≥ 5 = “Yes”, HIV risk score <5 = “No”)

6 We evaluated self-efficacy to take a daily oral medication by asking participants to rank on a 0-10 scale (0=Cannot do it at all, 10=Completely certain can do it) their response to the question: “How confident are you that you can integrate a daily medication into your daily routine?”  
\*Significance level p<0.05