# Age-disparate relationships at first sex and reproductive autonomy, empowerment, and sexual violence among adolescent girls and young women in Rwanda

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## ARTICLE INFO

## ABSTRACT

*Background:* Age-disparate relationships (ADR) place adolescent girls and young women (AGYW) at higher risk of unprotected sex and HIV infection; few studies have investigated ADR at first sex in sub-Saharan Africa. This study investigates ADR at first sex and its association with reproductive autonomy, reproductive empowerment, contraception coercion, and consent at first sex among female Rwandan youth.
*Methods:* Cross-sectional data from a randomized trial (n = 5768) of in-school youth ages 12–19 at enrollment were analyzed with focus on those who reported sexual activity (n = 1319). General estimating equation linear models and Poisson models were used to estimate linear coefficients and prevalence ratios (PR), with 95% confidence intervals (CIs) estimated using robust standard errors.
*Results:* Females reported a significantly higher average partner age gap than males by 2.43 years (2.90 years vs. 0.46 years, 95% CI: 2.01, 2.86). Overall, 23.4% (n = 102) of sexually active AGYW engaged in an ADR at first sex. The prevalence of non-consensual first sex was 60% higher among AGYW reporting ADR at first sex compared to AGYW reporting similar-aged partners (adjusted PR = 1.59, 95% CI: 1.25, 2.02). No association was found between ADR at first sex and reproductive autonomy, reproductive empowerment, or contraception coercion.
*Conclusions:* Our results suggest a high prevalence of sexual violence among AGYW engaging in first sex with an age-disparate partner. However, we did not find evidence that ADR at first sex affects reproductive autonomy or empowerment within the first few years of sexual initiation. Further research is needed to explore the impact of ADR at first sex and longer-term trajectories of sexual behavior, empowerment and autonomy.

## 1. Implications and contributions

This study of Rwandan youth found adolescent girls and young women (AGYW) in age-disparate relationships (ADR, ≥ 5-year difference) at first sex were significantly less likely to consent compared to AGYW in non-ADR; consent and gender-based violence should be addressed with adolescents prior to sexual initiation.

## 2. Introduction

Age-disparate relationships (ADR), defined as partnerships between individuals with a ≥5 year age difference (UNAIDS, 2015), are frequently reported in many countries in sub-Saharan Africa (SSA) and have been associated with a higher risk of unprotected sex and HIV infection, particularly among adolescent girls and young women ages 15–24 (AGYW) (Bajunirwe et al., 2020; Mabaso et al., 2021; McCloskey et al., 2021; Stoner et al., 2019). Compared to partnered women of all ages not engaging in ADRs, women in ADRs are also less likely to use contraception, more likely to experience unwanted pregnancy, and have

**Abbreviations:**

| | |
|---|---|
| ADR | age-disparate relationship |
| AGYW | adolescent girls and young women |
| aOR | adjusted odds ratio(s) |
| AYA | adolescents and young adults |
| CI | confidence interval |
| FP/RH | family planning and reproductive health |
| FP/RH | family planning and reproductive health |
| GEE | generalized estimating equations |
| HIV | Human Immunodeficiency Virus |
| ICRW | International Center for Research on Women |
| PD | prevalence difference(s) |
| PR | prevalence ratio |
| S1 | school level secondary 1 |
| S2 | school level secondary 2 |
| SES | socioeconomic status |
| SRE | sexual and reproductive empowerment |
| SRH | sexual and reproductive health |
| STI | sexually transmitted infection |
| USAID | United States Agency for International Development |

lower odds of employment and professional advancement (Chang et al., 2021; Toska et al., 2015).

Equality in age-disparate partnerships may be compromised due to the perceived power imbalances driven by the inherent age and economic disparities within the relationship (Mabaso et al., 2021; Toska et al., 2015). Some studies emphasize the vulnerability of the younger partner, who is often female (Mabaso et al., 2021; Toska et al., 2015); however, other studies suggest that girls may derive empowerment from and express a degree of control within age-disparate relationships, particularly if there is a transactional element (e.g., an exchange of goods or money for a sexual act) (Mabaso et al., 2021; Wamoyi et al., 2011, 2019). This transactional element, which is sometimes present in ADRs, is often considered "sexual exploitation" (Kyegombe et al., 2020); however, social norms in some areas of SSA dictate the opposite, namely that consensual sex without the offering of gifts/cash from a usually older male partner is exploitative for the young woman (Wamoyi et al., 2019). Therefore, the concept of exploitation in ADR is culturally-dependent and often intertwined with transactional sex, which is not always present in ADR.

While ADRs might be advantageous to a subset of AGYW, there are undoubtedly complex power dynamics such that some AGYW with older partners, at any point in their relationship, may have limited ability to control negotiations related to contraceptive use (Mabaso et al., 2021; Wamoyi et al., 2011) or have autonomy over their reproductive choices, as indicated by prior robust studies (Loll et al., 2019; Upadhyay et al., 2014). Decision-making reproductive autonomy, defined as the power to make reproductive decisions without influence from partners and/or family members, has been positively associated with contraception use (Loll et al., 2019; Upadhyay et al., 2014) and linked to a woman's perceived equality within relationships (Loll et al., 2021; Upadhyay et al., 2014). However, there is limited research on decision-making reproductive autonomy among AGYW, particularly at sexual debut, when vulnerability to adverse reproductive health outcomes is pointedly heightened (Casmir et al., 2021).

It is well established that sexual initiation is an important milestone in an AGYW's life, and the circumstances of sexual debut are associated with an individual's future sexual risk, especially as it relates to HIV and pregnancy (Becker et al., 2018; Senn & Carey, 2011; Toska et al., 2015). Adolescents, particularly those with an older partner, may be at a significantly higher risk of coercion and violence at first sex (Decker et al., 2014; Hawks et al., 2019; Swedo et al., 2019). Yet, few studies have investigated ADR at sexual debut; the few available studies indicate that ADR may also expose AGYW to riskier sexual behaviors at first sex, including low contraceptive use (Amo-Adjei, 2012; Gómez et al., 2008). One 2012 study conducted in Ghana, to our knowledge, the only study of this type to have been conducted in SSA, found that 34% of women report a partner age gap of 5–9 years and 8% report an age gap of 10+ years at sexual initiation; those who engaged with a partner 10+ years older were significantly less likely to use contraception at first sex (Amo-Adjei, 2012).

Although previous research indicates that ADR at first sex is frequent among women, to our knowledge, there have been no recent studies on ADR and first sex conducted in SSA, and none have investigated the association between reproductive autonomy within ADR in the AGYW population. More specifically, no prior studies to our knowledge have leveraged data collected in the Rwandan setting to further explore AGYW autonomy in ADRs. To address this research gap, this study utilized primary data from the midline survey of an ongoing effectiveness-implementation study of 6000 youth in Rwanda to further understand the relationship between ADRs at first sex and reproductive autonomy, reproductive empowerment, contraception coercion, and sexual violence, which was modeled by consent at first sex, among Rwandan AGYW. Conducted by our research team, this survey focused on evaluating *CyberRwanda*, a digital health education initiative created by Y-labs for Rwandan adolescents aged 12–19 at enrollment (Nolan et al., 2020). It strives to improve access to health products, family planning information, and employment opportunities (Nolan et al., 2020).

## 3. Methods

### 3.1. Study design, setting, and procedures

This study used cross-sectional data collected from the 2022 midline (12 months after study initiation) survey round of an ongoing cluster-randomized controlled trial evaluating the effectiveness of *CyberRwanda,* a direct-to-consumer digital education program delivering youth-friendly family planning and reproductive health (FP/RH) information and care as well as economic empowerment to youth aged 12–19 years in schools and youth centers. The CyberRwanda intervention and impact evaluation methodology have been previously described elsewhere (Nolan et al., 2020). In brief, across eight districts in Rwanda (Bugesera, Gatsibo, Gasabo, Nyagatare, Huye, Kayonza, Nyarugenge, and Rwamagana), 60 schools were randomly selected to participate, of which 40 schools were randomly assigned to receive the CyberRwanda intervention (Nolan et al., 2020). Eligible study participants attended a participating study school, were between 12 and 19 years of age at enrollment, in school levels secondary S1 or S2, and willing to provide contact information for follow-up. For participants over 18 years old, consent was attained prior to data collection. For participants under 18 years old, participant assent and parental consent was attained prior to data collection.

In total, 6079 Rwandan youth were initially enrolled and participated in the 2021 baseline survey. The midline survey used for this analysis included 5768 of the 6079 (94.9%) participants enrolled at baseline, with 5.1% of the study population lost-to-follow-up at the 12-month survey round due to relocation, illness, death, and other factors beyond the scope of our study. Demographic characteristics of participants lost-to-follow-up can be found in Supplemental Table S1. We restricted the analysis to only those who reported being sexually active (21.7%). Notably, the baseline survey did not assess partner age at first sex, which is why our analysis is limited to midline survey data.

### 3.2. Exposure of interest

The exposure of interest, ADR at first sex, was derived from age at first sex (years) and partner age at first sex (years). Partner age at first sex, which was self-reported by the study participant, was collected in

categories to facilitate better recall. The variable was ultimately coded as the midpoint of the partner age-range reported, apart from the "12 years or younger" category. Thus, the variable was coded as 12 for individuals who indicated a partner age of 12 or younger, 15 for the 13–17 category, 21 for the 18–24 category, 29.5 for the 25–34 category, and 44 for the 35 and older category. Though participants' ages were restricted from 12 to 19, the age of their partners, who were not participants of the study, were not restricted. Partner age gap was calculated as the difference between partner age at first sex and age at first sex. An ADR was defined as a partner age gap ≥5 years (Toska et al., 2015; UNAIDS, 2015).

### 3.3. Outcomes of interest

The primary outcome, reproductive autonomy, was adapted from the reproductive autonomy-decision-making subscale of the reproductive autonomy scale developed by Upadhyay et al. (2014). Four questions were scored and summed to create a numeric variable ranging from 4 to 12, with 12 indicating highest autonomy. Scale weighting (via multiplying their existing total sum by the number of questions asked (4) and dividing by the number of questions responded to) was used to account for missing outcomes. Of note, this scale has not been validated in the Rwanda context; however, it has been utilized by other studies set in SSA (Wollum et al., 2023).

Secondary outcomes included contraception coercion by current partner, reproductive empowerment, and consent at first sex. Contraception coercion was constructed as a binary indicator using a question from the reproductive autonomy-coercion subscale by Upadhyay et al. (2014) which assessed partner interference with a method of pregnancy prevention. In line with the International Center for Research on Women (ICRW), we define reproductive empowerment as an individual's "capacity to make informed decisions about their reproductive lives … participate meaningfully in public and private discussions related to sexuality … and act on their preferences to achieve desired reproductive outcomes, free from violence, retribution or fear" (Edmeades et al., 2018). Reproductive empowerment was calculated via the Sexual and Reproductive Empowerment for Adolescents and Young Adults (SRE for AYA) scale developed by Upadhyay et al. (2021). The midline survey assessed four of seven total SRE for AYA sub-domains (choice of partners, marriage, and children; sexual safety; sense of future; and sexual pleasure) via 12 survey questions. The SRE for AYA score is a summation of the four sub-domain scores and was calculated via a standardized method (Upadhyay et al., 2021). Similar to the reproductive autonomy scale, the SRE for AYA scale has not been validated in the Rwandan context. Consent at first sex was measured in the survey as a four-level variable: "not willing at all", "somewhat willing", "very willing", and "refuse to answer." A binary variable for consent at first sex was constructed with non-consensual sex defined as being "not willing at all" at first sex. Further details on variable creation can be found in Supplemental Table S2.

This study protocol was reviewed and approved by the University of California, Berkeley Committee for Protection of Human Subjects and by the Rwanda National Ethics Committee. All participants provided written informed consent.

### 3.4. Analysis

All analyses were conducted via R version 2021.09.2 (R Core Team, 2020).

We first descriptively explored the sexual behavior of midline participants (n = 5768). We then analyzed the prevalence of ADR at first sex and non-consensual first sex among sexually active males and females who reported both an age at sexual debut and their partner's age at sexual debut at midline (n = 1319), as well as their mean age gap with first sexual partner, age of sexual debut, reproductive autonomy, and contraceptive coercion by a current partner. We then examined

bivariate relationships between the mean age gap with first sexual partner, age of sexual debut, reproductive autonomy, and contraceptive coercion by sex via generalized estimating equation (GEE) linear models for continuous outcomes and GEE Poisson regression with robust standard error (modified Poisson) for binary outcomes (Zou, 2004).

The analysis of the relationships between ADR at first sex, reproductive empowerment, reproductive coercion, and consent was restricted to AGYW (n = 434), excluding those who did not respond to all Reproductive Autonomy Scale- Decision Making sub-score questions.

GEE models were constructed for unadjusted and adjusted multivariate analyses to account for clustering within schools and nesting within districts. GEE modified Poisson models were run for the binary outcome of non-consensual sex to estimate unadjusted and adjusted prevalence ratios (PR/aPR). Significance for all models was assessed using 95% confidence intervals.

All unadjusted multivariate models included district as a covariate, as randomization was stratified at the district level for the parent trial. All adjusted multivariate models additionally included age at first sex and baseline indicators for socioeconomic status (SES) (i.e., smartphone in household, food insecurity, parental education, and wealth index) as covariates for confounder adjustment. Confounders were assessed via directed acyclic graph (Supplemental Figure S3).

## 4. Results

### 4.1. Descriptive analysis of the study population

#### 4.1.1. Demographic characteristics

Of the 5768 participants reached at midline, 1319 (22.9% overall) were sexually active and reported an age at first sex and a partner age at first sex. Of these 1319 participants (33.0% female, 67.0% male), 434 (7.5% overall, 14.6% of all females) were AGYW in our study population who also reported an age of sexual debut, partner age at first sex, and reproductive autonomy responses and therefore met our inclusion criteria. Females reported a significantly higher average partner age gap than males by 2.43 years (2.90 years female vs. 0.46 years male, 95% CI: 2.01, 2.86). Overall, 23.4% of females reported an ADR (≥5 year age gap) at first sex compared to 4.1% of males (Table 1) (PR: 5.73, 95% CI: 3.82, 8.59). Among sexually active females specifically, AGYW were, on average, 16.8 years of age and had experienced sexual debut at 14.1 years of age. The mean partner age gap was 8.75 years among AGYW in an ADR at first sex. Demographic characteristics were similar between AGYW who reported ADR at first sex and those who did not (Supplemental Table S4).

#### 4.1.2. Univariate/bivariate analysis

Reproductive autonomy-decision making was not significantly different between male and female participants (Reproductive autonomy score [ref. Male]: −0.02, 95% CI: −0.05, 0.01); however, contraception coercion by current partner was slightly higher for females by 0.04 points (95% CI: 0.02, 0.06), while reproductive empowerment scores were slightly lower among females by 0.08 points (95% CI: −0.11, −0.04). Markedly, the frequency of non-consensual first sex was over three times higher among females than males (PR: 3.09, 95% CI: 2.50, 3.80), with 41.8% of females reporting being "not at all willing" at first sex, compared to 13.3% of males (Table 1).

Among AGYW participants specifically, most reported few sexual experiences. Overall, 25.8% AGYW reported having sex more than one time (31.0% of those in an ADR at first sex, 24.3% of those with a similar/same-aged partner). Most participants (86.3% AGYW overall) had engaged with only one sexual partner (77.0% ADR at first sex and 89.1% similar/same aged partner at first sex) (Supplemental Table S4).

**Table 1**

Demographic characteristics and sexual behavior of sexually active study participants in Rwanda in 2020–2021, stratified by sex (n = 1319).

| | Female (n = 435) | Male (n = 884) | Overall (n = 1319) |
|---|---|---|---|
| **ADR at First Sex** | 102 (23.4%) | 36 (4.1%) | 138 (10.5%) |
| **Age** | | | |
|   Mean (SD) | 16.7 (1.56) | 17.2 (1.65) | 17.0 (1.64) |
|   Median [Min, Max] | 17.0 [13.0, 21.0] | 17.0 [12.0, 22.0] | 17.0 [12.0, 22.0] |
| **Age of Sexual Debut** | | | |
|   Mean (SD) | 14.1 (2.15) | 14.3 (2.23) | 14.2 (2.21) |
|   Median [Min, Max] | 14.0 [12.0, 19.0] | 14.0 [12.0, 20.0] | 14.0 [12.0, 20.0] |
| **Partner Age Gap** | | | |
|   Mean (SD) | 2.90 (4.54) | 0.46 (2.22) | 1.27 (3.38) |
|   Median [Min, Max] | 2.00 [-4.00, 32.0] | 0 [-6.00, 16.5] | 0 [-6.00, 32.0] |
| **District** | | | |
|   Bugesera | 42 (9.7%) | 83 (9.4%) | 125 (9.5%) |
|   Gasabo | 98 (22.5%) | 185 (20.9%) | 283 (21.5%) |
|   Gatsibo | 28 (6.4%) | 54 (6.1%) | 82 (6.2%) |
|   Huye | 44 (10.1%) | 80 (9.0%) | 124 (9.4%) |
|   Kayonza | 17 (3.9%) | 34 (3.8%) | 51 (3.9%) |
|   Nyagatare | 58 (13.3%) | 160 (18.1%) | 218 (16.5%) |
|   Nyarugenge | 31 (7.1%) | 70 (7.9%) | 101 (7.7%) |
|   Rwamagana | 117 (26.9%) | 218 (24.7%) | 335 (25.4%) |
| **Partnered** | 180 (41.3%) | 304 (34.4%) | 484 (36.7%) |
| **Number of Sexual Partners** | | | |
|   One | 376 (86.4%) | 627 (70.9%) | 1003 (76.0%) |
|   Two | 49 (11.3%) | 157 (17.8%) | 206 (15.6%) |
|   Three or more | 9 (2.1%) | 96 (10.9%) | 105 (8.0%) |
| **Number of Sexual Encounters** | | | |
|   One | 316 (72.6%) | 547 (61.9%) | 863 (65.4%) |
|   Two or three | 79 (18.2%) | 238 (26.9%) | 317 (24.0%) |
|   Four or more | 32 (7.4%) | 81 (9.2%) | 113 (8.6%) |
| **Currently Enrolled in School** | 388 (89.2%) | 832 (94.1%) | 1220 (92.5%) |
| **Food Insecurity** | | | |
|   Little to No hunger | 272 (62.5%) | 623 (70.5%) | 895 (67.9%) |
|   Moderate hunger | 151 (34.7%) | 238 (26.9%) | 389 (29.5%) |
|   Severe hunger | 12 (2.8%) | 22 (2.5%) | 113 (2.6%) |
| **Household Smartphone** | 126 (29.0%) | 346 (39.1%) | 472 (35.8%) |
| **Parent's Education Level** | | | |
|   None | 35 (8.0%) | 90 (10.2%) | 125 (9.5%) |
|   Primary or higher | 352 (80.9%) | 717 (81.1%) | 1069 (81.0%) |
|   Don't Know | 48 (11.0%) | 77 (8.7%) | 125 (9.5%) |
| **Wealth Index Quartiles** | | | |
|   1 | 130 (29.9%) | 200 (22.6%) | 330 (25.0%) |
|   2 | 106 (24.4%) | 223 (25.2%) | 329 (24.9%) |
|   3 | 97 (22.3%) | 217 (24.5%) | 314 (23.8%) |
|   4 | 102 (23.4%) | 243 (27.5%) | 345 (26.2%) |
| **Arm** | | | |
|   Control | 137 (31.5%) | 274 (31.0%) | 411 (31.2%) |
|   CyberRwanda: Facilitated | 157 (36.1%) | 316 (35.7%) | 473 (32.9%) |
|   CyberRwanda: Self-Service | 141 (32.4%) | 294 (33.3%) | 435 (33.0%) |
| **Reproductive Autonomy Decision Making Score** | | | |
|   Mean (SD) | 8.61 (1.90) | 8.81 (1.70) | 8.75 (1.77) |
|   Median [Min, Max] | 8.00 [4.00, 12.0] | 8.00 [4.00, 12.0] | 8.00 [4.00, 12.0] |
| **Contraception Coercion Score** | | | |
|   Mean (SD) | 3.13 (0.634) | 3.26 (0.657) | 3.22 (0.652) |
|   Median [Min, Max] | 3.00 [1.00, 4.00] | 3.00 [1.00, 4.00] | 3.00 [1.00, 4.00] |
| **Reproductive Empowerment Score** | | | |
|   Mean (SD) | 25.7 (7.73) | 27.8 (7.28) | 27.1 (7.50) |
|   Median [Min, Max] | 27.0 [0, 48.0] | 29.0 [0, 48.0] | 28.0 [0, 48.0] |
| **Consent at First Sex** | | | |
|   Very willing | 167 (38.4%) | 651 (73.6%) | 818 (62.0%) |
|   Somewhat willing | 68 (15.6%) | 102 (11.5%) | 170 (12.9%) |
|   Not willing at all | 182 (41.8%) | 118 (13.3%) | 300 (22.7%) |
|   Refuse to answer | 18 (4.1%) | 13 (1.5%) | 31 (2.4%) |

Missing variables: Number of sexual partners (Females = 1; Males = 4); Number of Sexual Encounters (Females = 8, Males = 18); Currently Enrolled in School (Females = 0, Males = 1); Food insecurity (Females = 0, Males = 1); Household Smartphone (Females = 0, Males = 1); Wealth Index Quartiles (Females = 0, Males = 1).

### 4.2. Univariate/multivariate analysis among AGYW

#### 4.2.1. Reproductive autonomy decision-making

AGYW who reported an ADR at first sex had a mean reproductive autonomy decision-making sub-score of 8.81 (range of 4–12) compared to 8.58 among those who did not report having an age-disparate partner at first sex (Table 2). There was no association between ADR at first sex and power to make decisions regarding contraception, pregnancy, and childbearing (β: 0.22, 95% CI: −0.25, 0.69; adjusted β: 0.30, 95% CI: −0.15, 0.76) (Table 3).

#### 4.2.2. Contraception coercion

The mean score for contraception coercion was 3.10 (range: 1–4) among ADR and 3.14 among the participants with a similar/same-aged partner (Table 2). Models revealed no association between ADR at first sex and contraception coercion (β: −0.03, 95% CI: −0.18, 0.12; adjusted β: −0.04, 95% CI: −0.19, 0.12) (Table 3).

#### 4.2.3. Reproductive empowerment

Average reproductive empowerment scores were 25.2 among AGYW reporting ADR at first sex and 26.0 among AGYW who had sexual debut with a similar/same aged partner (range: 0–48) (Table 2). The multivariate analysis revealed no association between reproductive empowerment and ADR at first sex (β: −0.78; 95% CI: −2.69, 1.12; adjusted β: −0.84; 95% CI: −2.71, 1.03) (Table 3).

#### 4.2.4. Consent at first sex

There was a significant relationship between ADR at first sex and the binary indicator of non-consensual first sex. The proportion of sexually active AGYW who engaged in ADR at first sex report 1.6 times the prevalence of non-consensual first sex compared to sexually active AGYW who engaged with a similar or same-aged partner (PR: 1.53, 95% CI: 1.20, 1.96; aPR: 1.59, 95% CI: 1.25, 2.02). When analyzed as a four-level categorical variable, 55.9% of AGYW with ADR at first sex reported being "not willing at all" at first sex, compared to 37.3% of AGYW with no ADR at first sex (Table 2, Fig. 1).

**Table 2**

Reproductive autonomy-decision-making, contraception coercion, reproductive empowerment scores, and consent at first sex responses, by ADR at first sex among sexually active AGYW in Rwanda, 2021–2022

| | No ADR at First Sex (N = 332) | ADR at First Sex (N = 102) | Overall (N = 434) |
|---|---|---|---|
| **Reproductive Autonomy- Decision-Making (Range 4–12)** | | | |
| Mean (SD) | 8.58 (1.86) | 8.81 (2.03) | 8.63 (1.90) |
| Median [Min, Max] | 8.00 [4.00, 12.00] | 9.00 [4.00, 12.00] | 8.00 [4.00, 12.00] |
| **Contraception Coercion Score (Range 1–4)** | | | |
| Mean (SD) | 3.14 (0.620) | 3.10 (0.682) | 3.13 (0.634) |
| Median [Min, Max] | 3.00 [1.00, 4.00] | 3.00 [1.00, 4.00] | 3.00 [1.00, 4.00] |
| **Reproductive Empowerment (SRE for AYA Score) (Range 0–48)** | | | |
| Mean (SD) | 26.0 (7.60) | 25.2 (7.76) | 25.8 (7.63) |
| Median [Min, Max] | 27.0 [0, 48.0] | 26.0 [0, 44.0] | 27.0 [0, 48.0] |
| **Consent at first sex** | | | |
| Very willing | 139 (41.59%) | 28 (27.5%) | 167 (38.5%) |
| Somewhat willing | 55 (16.6%) | 13 (12.7%) | 68 (15.7%) |
| Not willing at all | 124 (37.3%) | 57 (55.9%) | 180 (41.7%) |
| Refuse to answer | 14 (4.2%) | 4 (3.9%) | 18 (4.1%) |

**Table 3**

The association between ADR at first sex and reproductive autonomy-decision-making subscale, ADR at first sex and contraception coercion, and ADR at first sex and reproductive empowerment among AGYW in Rwanda, 2021–2022 (n = 434).

| | Reproductive Autonomy-Decision-Making | Contraception Coercion | Reproductive Empowerment |
|---|---|---|---|
| **ADR at First Sex Unadjusted Linear Coefficient (95% CI)** | 0.22 (−0.25, 0.69) | −0.03 (−0.18, 0.12) | −0.78 (−2.69, 1.12) |
| **ADR at First Sex Adjusted\* Linear Coefficient (95% CI)** | 0.30 (−0.15, 0.76) | −0.04 (−0.19, 0.10) | −0.84 (−2.71, 1.03) |

All models include district as a covariate.

\*Adjusted models additionally include age at first sex and SES proxies (household smartphone, food insecurity, parental education, wealth index quartiles, and study arm).
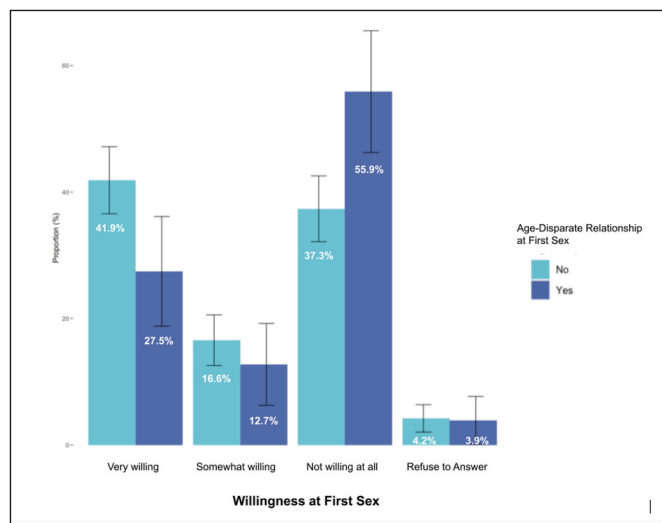


**Fig. 1.** Willingness at first sex among sexually active AGYW in Rwanda, by ADR at first sex (N = 434).

## 5. Discussion

This analysis examined age disparities between partners at first sex and decision-making reproductive autonomy, contraception coercion by current partner, reproductive empowerment, and consent at first sex among sexually active youth and AGYW, leveraging the midline survey of an ongoing cluster randomized trial with nearly 6000 youth in Rwanda. Our results revealed that ADR at first sex was significantly more common amongst AGYW compared to adolescent males in Rwanda, with nearly one in four sexually active females (23.4%) reporting ADR at sexual debut. There was no association found between ADR at first sex and the participant's power to make decisions regarding contraception, pregnancy, and childbearing. We also did not observe any association between ADR at first sex and reproductive empowerment, as well as ADR at first sex and contraception coercion from their current partner. These findings are inconsistent with prior studies and suggest that in some situations, age disparate partnerships may not reduce perceived empowerment or control over contraception within a relationship (Mabaso et al., 2021; Wamoyi et al., 2011).

We also found reported high levels of sexual coercion and/or violence at first sex among females. Notably, more than 40% of females reported engaging in first sexual intercourse despite being "not at all

willing" to do so, compared to just 13.3% of males. Our results also revealed a significant relationship between non-consensual first sex and ADR at first sex, with 56% of those who were in an ADR at first sex reporting non-consensual first sexual intercourse. The prevalence of non-consensual first sex was 60% higher amongst AGYW engaging in an age-disparate relationship at first sex, compared to AGYW engaging with similar or same-aged partners. Given the high prevalence of early sexual debut among this study population (Hémono et al., 2023), this finding adds insight into our understanding of the multifaceted relationship between age of first sex, ADR at first sex, and sexual violence at sexual initiation. Programming for AGYW in ADRs should consider that many may have experienced or be experiencing sexual coercion and/or violence and provide supportive care and referrals for survivors of violence.

We find the prevalence of ADR at first sex among AGYW to be slightly less than prior studies, which report a prevalence of 35% among young women in Ghana and Haiti (Amo-Adjei, 2012; Gómez et al., 2008). It is important to note our finding that the majority of AGYW are with partners of a similar age. Indeed, previous large-scale interventions that focused primarily on preventing ADRs with "sugar daddies'' have had limited impact on reproductive health outcomes at scale and these findings may be partially explained by the lower than expected occurrence of ADR relationships. Additionally, our findings on ADR at first sex and reproductive decision-making power are inconsistent with previous literature about the potential negative effects of ADR on AGYW's power to negotiate contraception use, as well as their feelings of empowerment (Loll et al., 2019; Mabaso et al., 2021; Upadhyay et al., 2014; Wamoyi et al., 2011). The lack of association between ADR at first sex and autonomy, empowerment, and contraception coercion suggests that some AGYW may not be particularly vulnerable at first sex or in age-disparate relationships, and AGYW retain their ability to assert control over contraception use for at least the first few years after sexual initiation. However, this relationship could be influenced by the lack of sexual experience among sexually active youth. Within the first years after sexual initiation, most sexually active youth in our sample had not had more than one sexual encounter. Other analyses within this study population have also found that misinterpretations of sexual intercourse are common (Hémono et al., 2023), suggesting that some of the sexually active population included in this analysis may not be having penetrative sex and may not be actively considering family planning methods and/or affected by autonomy and empowerment to seek contraception. Therefore, the null findings do not rule out the possibility that an ADR at first sex could be linked to the trajectories of reproductive empowerment and control over contraception differently in the future than they do shortly after sexual debut. It is also possible that the high prevalence of sexual violence at first sex may partially explain lower contraception use among those who are in ADR, who likely do not have the ability to make decisions about contraception in forced or non-consensual sex (Moore et al., 2007).

Our study is subject to various limitations. Notably, partner age at first sex is reported as a categorical range, which raises issues of potential misclassification of ADR in some situations. More specifically, this potential measurement error of the partner age gap variable raises concerns about non-differential misclassification of ADR at first sex between males and females and potentially biased our results towards the null. Additionally, the reproductive autonomy scale and SRE for AYA scale were originally developed in the United States and, at the time of study and to our knowledge, have not been validated in Rwanda. This may limit the validity of our findings, as reproductive autonomy-decision-making is a multifaceted, nuanced measure that is impacted by the social, cultural, and religious context of the family and region (Darteh et al., 2019). This is likely also true of reproductive empowerment. Finally, this study uses cross-sectional data and is therefore limited in establishing causality between ADR at first sex and our autonomy, empowerment, and contraception coercion measures, and though extensive measures were taken to maximize accuracy of

reporting, social desirability bias and stigma in reporting on sexual behavior are still of concern given the sensitive nature of the questions asked in the study.

Nonetheless, this study has several strengths. We analyze a sample of 1319 youth and utilize best practices to maximize privacy and alleviate participant concerns about privacy and confidentiality (Nolan et al., 2020). The association between ADR at first sex and lack of contraception use at first sex has been established by multiple studies (Amo-Adjei, 2012; Gómez et al., 2008); however, to our knowledge, no previous research has further investigated ADR at first sex and variables investigating reproductive empowerment and autonomy.

## 6. Conclusion

Our analysis indicates that although we found no association between ADR at first sex and reproductive autonomy, contraception coercion, and reproductive empowerment within the few years after sexual initiation, AGYW are significantly less likely to provide consent at first sex when engaging with an age-disparate partner. This finding is concerning and worthy of further investigation, and it reinforces the need to directly address consent and gender-based violence with young men and boys and engage males in education on equitable gender norms and sexual violence prevention at a young age, prior to sexual initiation. Moreover, the current *CyberRwanda* intervention is considering expanding *CyberRwanda* to those younger than 12 to begin education on topics such as consent at an earlier age. Going forward, they may also consider developing and integrating a mental health module into the *CyberRwanda* curriculum, as well as a module that further addresses norms surrounding sexual negotiation in adolescence. Future longitudinal studies should explore the multidimensional relationship between ADR at first sex, coercion, and contraception use over time in order to better understand the role of age and power-dynamics in family planning and HIV/STI transmission among AGYW in sub-Saharan Africa, a high-risk group for HIV infection (Skovdal et al., 2022).

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## CRediT authorship contribution statement

**Jacqueline Kunesh:** Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing, Validation. **Rebecca Hémono:** Formal analysis, Methodology, Validation, Writing – review & editing. **Emmyson Gatare:** Data curation, Validation, Writing – review & editing. **Laetitia Kayitesi:** Data curation, Validation, Writing – review & editing. **Laura Packel:** Conceptualization, Project administration, Validation, Writing – review & editing. **Rebecca Hope:** Conceptualization, Funding acquisition, Validation, Writing – review & editing. **Sandra I. McCoy:** Conceptualization, Methodology, Validation, Writing – review & editing.

## Declaration of competing interest

None.

## Data availability

Data will be made available on request.

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## Appendix ASupplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmph.2024.101617.

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