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The influence of gender-equitable attitudes on sexual behaviour among unmarried adolescents in rural Tanzania: a longitudinal study

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Abstract: *Patriarchal systems in Africa can perpetuate inequitable gender norms and power differentials that disadvantage women. This study aimed to examine the influence of community and individual gender-equitable attitudes on adolescents' sexual health and risk behaviour in rural Tanzania, and whether the association of those attitudes differs between males and females. We conducted logistic regression using longitudinal data from a cluster randomised controlled trial in rural Tanzania to examine the association of gender-equitable attitudes with the sexual risk behaviour of 2017 adolescent males and females. High community-level gender-equitable attitudes were significantly associated with higher odds of HIV testing (OR = 1.31, 95% CI [1.00–1.72]) and lower odds of age-disparate partnerships (OR = 0.52, 95% CI [0.30–0.88]) for the pooled male and female sample. High individual-level (but not community) gender-equitable attitudes were associated with increased condom use (OR = 2.07, 95% CI [1.07–4.00]) and contraceptive use (OR = 2.08, 95% CI [1.04–4.13]) for girls. Among sexually debuted adolescents, no significant associations were found between community or individual high gender-equitable attitudes and transactional sex, early sexual debut, HIV testing, concurrent sexual partners, or number of sexual partners. We found evidence of effect modification by sex for community-level attitudes and age-disparate sex ($p = 0.005$) and individual-level attitudes and condom use ($p = 0.051$). Efforts to incorporate gender transformative programming for whole communities may increase gender-equitable attitudes.*

Plain language statement: *Gender norms that centre men and disadvantage women create gender inequality, which can lead to risky sexual behaviour. This study examined how both community and individual attitudes toward gender norms influenced risky sexual behaviour in adolescents, and whether that influence was different between males and females. We found that higher gender-equitable attitudes were linked to increased odds of HIV testing in the last 12 months, and decreased odds of engaging in a sexual relationship with a much older partner. Individual high gender-equitable attitudes among girls were also linked to higher odds of them using condoms and contraceptives. Gender-equitable attitudes did not seem to influence early sexual debut, engagement in transactional sex, having multiple sexual partners at the same time, or the number of sexual partners a participant had in the last 12 months. Based on these findings, programming designed to increase gender-equitable attitudes might be helpful in increasing HIV testing and condom and contraceptive use, but it needs to involve the entire community, not just individual boys and girls. DOI: 10.1080/26410397.2023.2260169*

Keywords: adolescents, sexual risk behaviour, sexual and reproductive health, transactional sex, gender norms, Tanzania

Background

Gender norms vs. gender attitudes

Social norms are defined as a shared understanding of how an individual and others around them should behave. Gender norms are a subset of social norms, reflecting a shared understanding of how women, compared with men, are expected to behave.¹ Due to deeply entrenched hierarchical and patriarchal systems in much of the world, men's rights, wants, and needs are often privileged over women's, and the masculine ideology is valued over the feminine. Gender defines roles (e.g. men as the financial supporter of the family and women the domestic labourers), dictates socialisation (e.g. men are allowed to be promiscuous with their sexuality while women are expected to remain chaste), and affects power dynamics between men and women. Inequitable norms perpetuate power differentials that disadvantage women, leaving them especially vulnerable to such issues as sexual exploitation and gender-based violence.² When a woman's autonomy is restricted and her value situated squarely in the domestic realm of childbearing and rearing, she is left with little recourse to negotiate for her own needs, safety, and well-being.³ This is then generationally reinforced as children internalise how to "do" gender from their parents, solidifying gender norms across cultures and generations.⁴

Community gender norms are generally reflected in individual gender attitudes.⁵ However, the relationship between norms and attitudes toward them is much more complicated. Gender norms are broadly defined as the social understanding of how women are expected to behave in comparison with men.¹ They govern a complex system of social rules with the expectation that each gender will perform specific roles and socialise with one another in specific ways. Gender norms uphold and reinforce inequitable power dynamics that tend to privilege men and disadvantage women.² They are reproduced and reinforced through social institutions such as schools, religious organisations, and workplaces. This reproduction influences community beliefs and drives the acceptance of such norms, delivering sanctions to those who deviate from them.⁶ Thus, individual attitudes, beliefs, and actions are shaped by the

understanding of what is and is not acceptable within the larger community. Gender attitudes are an individual's personal opinion about a norm. They can either be aligned with or in opposition to an accepted social norm.² Personal attitudes fall into two categories: (1) concordant norms, in which an individual's attitude is aligned with the accepted norm and the individual understands that both the behaviour itself and acting out the behaviour are approved by others in their social group; (2) discordant norms, in which an individual's attitude is not aligned with the accepted norm. In this case, the individual understands either that the behaviour is good, but that acting out the behaviour will result in social sanctioning, or that the behaviour is bad, but acting it out will gain approval from his/her social group.²

Peers and other community members can have significant influence on adolescent normative behaviour.⁷ Social acceptance and rejection by their peers and/or romantic partners hold significant weight among adolescents:⁸ for example, if an adolescent's peer group supports risky sexual behaviour (e.g. concurrent sexual partners for boys), the adolescent is likely to do the same, whether he or she agrees with the norm or not. Conversely, prosocial behaviour is also influenced by peers, so if an adolescent's peer group is using condoms, an adolescent in that group will likely engage in that practice as well.^{9,10} Adolescence is the time when worldviews become solidified, particularly those surrounding gender norms,⁷ as adolescents learn how to "do" gender from influential adults (e.g. their parents) and their peers. Since adolescence is also a time of flexibility in motivations and values,⁸ it can be a particularly integral time to intervene and provide education that might change attitudes toward gender and reduce sexual risk behaviours.¹¹

Sexual risk behaviour and sexual and reproductive health

Gender norms that centre heteronormative, masculine ideologies above all else can lead to gender inequality, which is a structural driver of sexual risk behaviour and intimate partner violence (IPV). Inequality can result from disparity between men and women regarding the distribution of resources, educational opportunities, or access

to positions of power and decision-making.⁵ In parts of Africa, as in other parts of the world, where many cultures subscribe to strict gender hierarchies and patriarchal norms, there are socio-cultural beliefs that put adolescent girls and young women (AGYW) at increased risk for IPV victimisation and sexual exploitation. As boys age into adolescence, their sexual concurrency is encouraged – the more sexual partners a boy has, the more masculine he is perceived to be.¹² Boys and men are considered to “need” sex more than women and girls, and boys have been found to have increased risky sexual behaviour due to influence from peers to engage in such behaviours.¹³ It is expected that women give sex to men when they want it, and it is acceptable to punish women with violence when they do not comply.¹⁴ Multiple sexual partners for boys are rewarded, and this reinforcement of proving one’s manhood through aggressive masculine norms can lead to coercive sexual behaviour that puts AGYW at risk of sexual violence.¹⁵ Adolescent girls, however, are expected to remain chaste until they are married and are considered to be responsible for any arousal their sexuality might cause men to experience.¹² Condom use is also thought to indicate promiscuity, particularly on the part of the woman, so negotiating for safe sexual practices is difficult,¹⁶ even when AGYW are able to do so (which they often do not, due to disparate power dynamics between men and women in sexual relationships).¹² This can leave both adolescent boys and girls at increased risk of HIV and other sexually transmitted infections (STIs).¹⁷

Gender inequality impacts the sexual and reproductive health (SRH) of AGYW in both the short- and long-term. Since girls do not receive education surrounding SRH, there is a critical dearth of understanding surrounding menstruation, fertility, and childbearing.¹⁸ AGYW are often married at a very young age, sometimes to older men, often to prevent them from having sex before marriage or to boost the family’s assets through a bride price.¹⁹ This places a woman’s value solely in producing and caring for children, situating her in the realm of domestic labour and eliminating or reducing the chance for education and economic independence.³ Additionally, young adolescent girls’ reproductive tracts are under-developed, leaving them at increased risk of HIV and other STIs, as well as risky or complicated childbirth.³ Additionally, child marriage results in coerced sexual debut, with the

adolescent girl forced to have sex by her husband.²⁰ This lays the groundwork for future non-consensual and coercive sex, reinforced by the gender norm that a woman must give her husband sex and that it is acceptable to punish her with physical violence for withholding it.¹⁴

When women and girls lack recourse for economic independence, they are at higher risk for sexual exploitation and practices such as transactional sex. Transactional sex is defined as “non-marital, non-commercial sexual relationships, motivated by the implicit assumption that sex will be exchanged for material support or benefits” (p. 2).²¹ Importantly, transactional sex is not sex work. Rather, it lacks up-front negotiations of expectations from participants, and operates on the vaguely implicit assumption of exchange based on traditional gender roles: the man provides financial or material support, and the woman will reciprocate that support with sexual or domestic labour.²² There may or may not be a level of romantic attachment and one or both members of the partnership may be married or carrying on other extracurricular relationships. Motivation for transactional sex exists on a continuum ranging from extreme deprivation to increasing social status through clothing and other gifts that increase social capital.²³

While transactional sex is not inherently risky, and many AGYW identify a sense of agency in choosing their partner,¹⁶ there is strong evidence to suggest that agency is short-lived.²³ Once the material goods have been received, men expect women to provide the sexual services implied at the onset of the relationship. When the sexual portion of the relationship is engaged, AGYW have little to no recourse to negotiate what they want – condom use, birth control, when and whether to have sex. Since transactional sex relationships are often age-disparate (with the man at least five years older than the woman), transactional sex can leave AGYW vulnerable to the exploitation of men who are more powerful economically and have more control sexually.²⁴ AGYW then are at risk of coercive sex, rape, and other forms of intimate partner violence, and vulnerable to unwanted pregnancy, sexually transmitted infection, and/or HIV.²⁵

Research gaps

Current literature regarding sexual health and risk behaviour for adolescents has recently recognised the need for interventions outside of individual-level risk-factors, acknowledging structural

determinants as major drivers of gender inequity.^{26,27} Varga qualitatively examined gender roles and sexual health among adolescents at the individual level in South Africa. Her research found that adolescents' behaviour was governed by their beliefs around what was considered "appropriate social conduct" (p. 163).²⁷ In other words, their behaviour was influenced by what the community around them considered to be normal. Gender norms reinforced negative sexual negotiation dynamics and double standards. This ultimately left all adolescents, but particularly girls, vulnerable to early pregnancy and other reproductive and sexual health repercussions, as well as the negative consequences that accompany teen parenthood (e.g. derailing professional aspirations). Stephenson²⁸ noted that while much was known about individual-level behaviour and sexual risk factors, little was understood about how community-level attitudes influenced the same. His study utilised community environmental characteristics as a proxy for community norms, and used multi-level modelling to examine the association between community factors (e.g. educational attainment, employment levels, knowledge of HIV and availability of health resources) and adolescent sexual behaviour in Burkina Faso, Ghana, and Zambia. Findings indicated great variance across countries in terms of factors that influence sexual risk behaviour, but consistently found that there were disparate expectations of marriage and fidelity between genders and that education had a protective effect against risky sexual behaviours. In a cluster randomised trial, Pettifor and colleagues²⁹ examined the effects of a community mobilisation intervention in South Africa on individual-level gender-equitable attitudes. They found that the intervention supported a reduction in negative gender norms among men, but did not find significant change in attitudes toward norms that reduced sexual risk behaviours. In India, Andrew and colleagues³⁰ designed a programme to improve AGYW's education, delay marriage, and promote well-being. They used a cluster randomised controlled trial to compare the outcomes between two groups: one that targeted only adolescent girls, and one that engaged community norm influencers in addition to adolescent girls. The group that included the norm influencers saw improvements in the mental health and overall well-being of the adolescent girls, most likely due to the promotion of more progressive norms

and a reduction in the manner of sanctioning that the girls had previously experienced when they deviated from traditional norms. The study concluded that changing the attitudes of community norm influencers was necessary for achieving well-being among women.

While each of the aforementioned studies examined gender norms and adolescent sexual risk behaviour, none have examined the association of those behaviours with clustered community-level attitudes toward gender norms. Only Andrew and colleagues³⁰ incorporated community norm enforcers (community members who have the greatest influence on setting and reinforcing norms, e.g. community leaders) as part of their intervention. Thus, the body of knowledge surrounding the influence of community and peer gender norms on individual behaviour has considerable gaps. This is partly because much of the behaviour (e.g. sexual activity or violence between partners) is difficult to observe and therefore measure, and there is social desirability bias in reporting both the behaviours and attitudes toward them. It is also due to a lack of studies that attempt to quantitatively capture gender attitudes at the community level and examine the association between those attitudes and sexual behaviours, and study designs that only collect data from one level of the community (e.g. only adolescents or only parents).

The current study aims to build on the research literature by incorporating the recommended use of both community- and individual-level attitudes³¹ toward gender, and examining the association of those attitudes with a host of sexual health outcomes for both adolescent boys and girls, instead of girls alone. In order to understand how community-level attitudes might be associated with individual behaviours, we utilised gender-equitable attitude scores from the Gender-equitable Men Scale,³² clustered at the community-level. We examined the influence of those clustered community gender-equitable attitudes on the following individual sexual risk behaviours: transactional sex, early sexual debut, HIV testing, contraceptive uptake, condom use, concurrent sexual partners (concurrency), number of sexual partners, and age-disparate partnerships. We sought to answer two research questions: (1) What is the association between community gender-equitable attitudes, individual gender-equitable attitudes, and individual sexual risk behaviours? (2) Is there a difference in the aforementioned association between male and female adolescents?

Theoretical framework

This paper is framed within Bronfenbrenner's³³ social-ecological model, a multi-level framework that considers the complex and concurrent influence of individual, relational, community, and societal factors on one another.³³ Each level has the potential to simultaneously influence other levels,³³ as follows:

Societal: Societal factors that can influence health, such as laws or policies, as well as social and cultural norms.

Community: Any communal spaces where people engage in social connection, such as religious institutions, schools, workplaces, and neighbourhoods. Community factors such as school culture and leadership can influence social norms.

Relationship: Any person in an individual's close social circle, such as family members, close friends, or peers, who might influence their attitudes and behaviour (positively or negatively).

Individual: Biological, psychosocial, and demographic characteristics, such as socio-economic status, health, education, and age.³⁴

Gender equity cannot be achieved without involving all levels of the social-ecological model. Simply educating an individual or group of individuals (e.g. adolescent girls) in isolation from the community will not drive lasting change.⁶ Social norms dictate that individuals need to behave in accordance with the accepted norms of their communities, or they risk being sanctioned.² In a community that subscribes to patriarchal gender attitudes and upholds strict gender roles aligned with those attitudes, there is generally a de-centring and devaluing of women, especially in relation to men,¹⁴ leaving women without the social capital to affect change. Hence, addressing only the individual or relationship level is ineffective. Alternatively, only changing policies, without community leaders or influencers on the ground working to educate individuals and shift attitudes, would also not be effective. In order to create effective normative change, it is critical to involve all levels of the social ecological model.^{1,6}

Methods

Study design and participants

This study used secondary data from the Ujana Salama (or “Safe Youth” in Swahili) multi-year cluster randomised controlled trial. The trial was

conducted in two government administrative areas in mainland Tanzania, one in Iringa and one in Mbeya. These areas covered four districts/councils (Mufindi and Mafinga in Iringa region; Rungwe and Busokelo in Mbeya region). The trial layered an adolescent-focused intervention for health and livelihoods training onto an existing government-run social protection programme, the Productive Social Safety Net (PSSN) program, that provided bimonthly cash transfers and livelihood programming to eligible households in Tanzania. As such, prior to selection, households in the study were already receiving cash benefits. The trial intended to measure impacts of the Ujana Salama pilot on youth well-being, violence reduction, and safe transitions to adulthood. The study included 130 villages, all of which were participating in the PSSN, and were then randomised (1:1) to the treatment or control arms of the Ujana Salama pilot.

Eligible participants for the Ujana Salama pilot and evaluation were 14–19 years old at baseline in 2017 and living in households already participating in PSSN. We used 2015 PSSN-beneficiary listings to identify participants before recruitment began. Forty-five percent of potential respondents on those lists were found to be ineligible because they were outside of the eligible age range ($n = 745$), no longer lived in a PSSN-beneficiary household ($n = 1724$), or the household refused to/did not consent ($n = 491$). One hundred and thirty villages across both districts were publicly randomised in July 2017 to an intervention or control arm at a ratio of 1:1. Next, the study team aimed to interview all adolescents in the eligible age range in PSSN households in the study district, regardless of programme take-up status. A total of 2458 participants were interviewed at baseline (Control $n = 1272$; Intervention $n = 1186$). The current study was an observational study because we did not examine programme impacts, but rather we leveraged the data to understand the aforementioned research questions. However, more information on the overall trial study design and sampling is provided in *Appendix E*.

Ethical approval for the original study was obtained from the National Institute for Medical Research and the Tanzania Commission for Science and Technology. The trial was registered retrospectively in the Pan-African Clinical Trials Registry (trial PACTR201804003008116) on 25 January 2018. The study reported in this paper was found to be exempt from human research study

by the Internal Review Board at the University at Buffalo in January of 2022.

Data collection and procedures

The Ujana Salama pilot aimed to address multi-sectoral risk factors, including economic, health, and social factors, to a safe and healthy transition to adulthood. It was implemented by the Tanzania Social Action Fund (TASAF), a government agency, with technical assistance from the United Nations Children’s Fund (UNICEF) and the Tanzania Commission for AIDS (TACAIDS). The intervention was comprised of: (1) 12 weeks of livelihoods (e.g. vocational and entrepreneurial training) and life skills (including HIV and sexual and reproductive health) training; (2) mentoring and a productive (cash) grant in the amount of 80 USD; and (3) linkages to strengthened, adolescent-friendly SRH services in government, primary care facilities in study areas. A community-based approach was used in order to simulate real-world recruitment (as opposed to recruitment in a clinic or school, which might not have captured youth who were not enrolled in school or did not seek health care). More information on the intervention activities can be found elsewhere, but they are not the focus of the current study.^{35,36}

Baseline data from youth, household, and community surveys were collected in 2017. Follow-up data were collected as follows: Wave 2 (2018), Wave 3 (2019), and Wave 4 (2021). After baseline (2017, $n = 2458$), this sample was followed-up again in 2018 and 2019, with re-interview rates of 86% and 89%, respectively.^{37,38} Wave 3 data were collected nine months after mentoring activities had ended, roughly two months after final grant receipt, and 12 months after the intensive face-to-face training period. Topics of youth surveys included livelihoods skills and knowledge, economic activities, sexual debut, pregnancy, marriage, school attendance, aspirations, gender attitudes, psychosocial well-being, violence victimisation and perpetration, sexual exploitation, and health and sexual risk-taking behaviours. Household surveys were administered to the main PSSN beneficiary (generally a female) or the household head and included topics related to dwelling characteristics, household composition, and education, health, age, time use, and marital status of household members.

Written informed consent was obtained from participants 18 years or older, or married participants (at any age). For unmarried participants

under 18 years, assent was obtained from the adolescents and informed consent was obtained from a parent. Our sub-sample for analysis included unmarried youth at Waves 2 and 3, who were 16–21 years old ($n = 2017$). Additional analyses related to sexual behaviour outcomes were run on a subset of these participants who were unmarried and who had sexually debuted ($n = 619$). Waves 2 and 3 were chosen for this analysis because the youth were older than at baseline, meaning that more participants were likely to have sexually debuted, (only 17% reported ever having had sexual intercourse at baseline), but young enough for the majority to be unmarried. We used two waves of data for the analysis to enable us to analyse the data longitudinally, examining the association between gender norms at Wave 2 on behaviours at Wave 3.

Measures

Independent variables

The Gender-equitable Men Scale (GEM Scale) was used to measure individual attitudes toward gender norms among individuals in participating villages.³² Rooted in social constructivist theory, the scale assumes that norms are taught in childhood and reinforced and internalised throughout adolescence and adulthood through peer groups and institutions (e.g. schools). It acknowledges the root of gender as based in power relations between men and women and the interaction between them. The 24-item scale addresses four domains within the construct of gender norms: intimate partnerships, reproductive health and disease prevention, domestic and daily life, and violence.³² It consists of two subscales, which measure support for both equitable and inequitable norms that can reliably be used together or individually. Both scales were used for this study. Response options were 1 = agree, 2 = somewhat agree, 3 = disagree. Higher scores indicate more gender-equitable attitudes. See *Appendix D* for full scale with subscales.

Individual GEM scores were computed from responses to 24 items on the GEM scale (1–3 where 1 = agree, 2 = somewhat agree, and 3 = disagree). An additive scale was created with a possible range of 24–72 for individuals. Tertiles were then created where individuals with scores ranging from 24 to 50 were classified as “Low”, those with scores ranging from 50.1 to 58.5 were classified as “moderate”, and those with scores of 58.6–72 were classified as “high”. Next,

community GEM scores were created from individual GEM scores clustered (or aggregated) at the village level ($n = 130$ villages), as recommended by Cislighi and colleagues.³¹ These scores were calculated separately for Waves 1–3 of data collection. At each wave, the individuals' scores were averaged by village in order to construct the community-level GEM score (possible range 44–63). Following Balk,³⁹ the community-level means were calculated as non-self-clustered means, calculating the average at the village level separately for each individual in the dataset, while removing the index individual.³⁹ This approach avoids the potential endogeneity issue of including individual respondents' GEM score in the community means. Tertiles were created from these village non-self-clustered mean GEM scores, where communities with scores ranging from 45.2 to 51.3 were classified as “Low”, those with scores ranging from 51.4 to 53.8 were classified as “moderate”, and those with scores of 54.9–63.8 were classified as “high”. Next, a binary indicator for high community-level GEM scores was created combining the low and medium scores (= 0) and together these are referred to in the tables and results as “Low GEM Score” versus high scores (= 1). Internal reliability of the scale was assessed using Cronbach's alpha. The alpha coefficient for the 24 items was 0.84, suggesting high internal consistency.

Primary outcome variables (among all participants)

Transactional sex was constructed as a binary variable, where 0 indicated no participation in transactional sex and 1 indicated participation in transactional sex. This variable was constructed using previously validated questions,²¹ and based on youth self-reported answers, to create an additive transactional sex index. Questions used to construct the index included:

- Would you leave the relationship if [most recent partner] did not give you money or things that were important to you? (Affirmative responses coded as 1 and 0 otherwise.)
- Has [most recent partner] ever given you money? (Affirmative responses coded as 1 and 0 otherwise.)
- What are the three main reasons you are/were with [most recent partner]? (Affirmative responses for gifts/money/assistance were coded as 1 and 0 otherwise.)

- In the past 12 months, did you start a relationship with [most recent partner] in order to get things you needed, such as money or gifts? (Affirmative responses coded as 1 and 0 otherwise.)

Affirmative responses were then coded to generate an additive transactional sex scale ranging 0–4. A new dichotomous indicator for transactional sex was created, where an affirmative response to at least one question was coded as 1 and 0 otherwise. Affirmative response indicated participation in transactional sex. If the youth had never had sex, transactional sex was coded as 0. Early sexual debut was a binary variable, where 0 indicated normal debut and 1 indicated early debut, constructed using youth self-reported age at first sex. Early debut was defined as first having sexual intercourse at age 15 years or younger. Youth who reported sex at or before age 15 years were coded as 1 and youth who reported sex at or above age 16 years were coded as 0. If youth never had sex, early sexual debut was coded as 0. HIV test in the last 12 months was coded as a binary variable, where 0 indicated No and 1 indicated Yes, constructed based on youth self-reported answer to whether they received an HIV test in the last 12 months. In high prevalence settings, even if adolescents have not engaged in sex, they may have been infected perinatally, and thus should be aware of their status before they sexually debut, in order to protect themselves and others, and to potentially access pre-exposure prophylaxis (PrEP)⁴⁰. Thus, HIV testing behaviour was asked to all participants, regardless of whether they had sexually debuted.

Secondary outcome variables (among sexually debuted participants)

Modern contraceptive use was a binary variable where 0 indicated No and 1 indicated Yes, constructed based on youth self-reported answer to whether they were using a modern contraceptive method. Condom use at last sex was a binary variable where 0 indicated No and 1 indicated Yes, constructed based on youth self-reported answer to whether they or their partner used a condom at last sex. Concurrency was a binary variable where 0 indicated No and 1 indicated Yes, constructed based on youth self-reported answers to whether they had more than one sexual partner at the same time. Age-disparate partnership was

a binary variable where 0 indicated No and 1 indicated Yes, constructed based on youth self-reported answer to the age difference between them and their partner (cut point was a difference of five years or more). Number of sexual partners in the last 12 months was a continuous variable, constructed using youth self-reported number of sexual partners in the past 12 months.

Data analyses

Descriptive analyses were conducted on all variables of interest, including outcome variables, individual- (age, sex, educational attainment, treatment) and household-level (gender of household head) characteristics. Bivariate analyses (chi-squared tests for binary outcomes and *t*-test for number of sexual partners) were conducted to assess the relationship between outcome variables and community GEM scores. Primary outcomes included early sexual debut, participation in transactional sex, and HIV test in the last 12 months, among the entire sample of unmarried adolescents ($n = 2017$), and then again among the sub-sample of unmarried sexually debuted participants ($n = 619$). Secondary outcomes were also examined among unmarried participants who had sexually debuted ($n = 619$) and included condom use at last sex, modern contraceptive use, concurrency, age-disparate partnerships, and number of sexual partners in the last 12 months. Bivariate analyses were conducted on the pooled male and female sample, then stratified by sex. We also tested for selective attrition, examining differences in demographic characteristics and outcomes at baseline between those in the panel sample and those lost to follow-up, using linear regressions for continuous outcomes and linear probability models for binary outcomes. In these regressions we controlled for district of residence and adjusting standard errors for clustering at the community-level.

Research question 1 focused on the association between community gender-equitable attitudes and individual sexual risk behaviours. Multivariate analyses were conducted to examine whether community- and individual-level gender-equitable attitudes were associated with the primary outcomes of interest (transactional sex, early sexual debut, and HIV testing in the last 12 months). Since all primary outcomes were binary, logistic regressions were conducted where behaviours at Wave 3 were regressed on attitudes at Wave 2. A lag term was created using the non-self-clustered mean

community high GEM score from Wave 2 in order to have temporal ordering, whereby the main predictor of interest was measured prior to the outcome we hypothesised that it influenced. A lag term was also created at the individual level, using the individual high GEM score from Wave 2. In the first set of models (referred to as Model 1), we included only community gender-equitable attitudes (high v. low). In the second set of models (referred to as Model 2), we included both high community gender-equitable attitudes and high individual gender-equitable attitudes. Both sets of models were conducted for the entire sample, as well as the sub-sample of adolescents who had sexually debuted.

Next, we examined the secondary outcomes of modern contraceptive use, condom use at last sex, concurrent sexual partners, and age-disparate partnerships among respondents who reported sexual debut. Again, we ran these models first with just community-level high gender-equitable attitudes and then with both community- and individual-level attitudes. We ran these models in the pooled male and female sample and then stratified by sex. For binary outcomes, we used logistic regressions where behaviours at Wave 3 were regressed on attitudes at Wave 2. Then, for number of sexual partners in the last 12 months we ran a Poisson regression, where number of partners at Wave 3 was regressed on attitudes at Wave 2.

Research question 2 sought to understand whether there was a difference in the aforementioned associations between male and female adolescents. To answer this question, we ran the aforementioned analyses, including for primary and secondary outcomes, stratified by sex. As in the above-summarised analyses, we ran logistic regressions for binary outcomes and Poisson for the one count variable (number of sexual partners). For any outcomes that were statistically significant in one group (e.g. pooled, female, male) but not another, we then formally tested for effect modification using an interaction between high gender attitudes and female. For these interaction models, we used linear ordinary least squares (OLS) regressions due to issues with interpreting interaction terms in nonlinear models such as logistic⁴¹. A statistically significant coefficient on the interaction term would indicate effect modification (i.e. the relationship between community attitudes and the outcome of interest is moderated by sex).

Controls for all models included age, sex, educational attainment, whether the participant had received the intervention (treatment), and whether the head of household was female. Although we did not examine intervention impacts in this study, treatment was considered a confounder because the intervention was found to affect both gender attitudes and HIV testing; as such, we controlled for it in our analyses. Variance of inflation factor (VIF) tests were conducted to assess multicollinearity between individual and community level GEM scores. VIF was <10 , indicating multicollinearity was not an issue, and thus individual and community GEM scores were included in the same model (Model 2). Robust standard errors were calculated to account for clustering at the village level. Model fit was assessed using AIC and BIC, with Model 1 indicating a better fit for the majority of outcomes. All analyses were conducted using Stata Version 16.1 (College Station, TX). As a sensitivity analysis to account for testing multiple hypotheses, we implemented the Benjamini-Hochberg (B-H) procedure to control the false discovery rate (FDR). Assuming an FDR of 10%, none of our outcomes met the critical threshold for statistical significance after applying the B-H procedure. (See *Appendix F* for full B-H procedure results.)

Results

Participant characteristics

The mean age of participants was 18.1 years ($SD = 1.87$), with females comprising 43% of the sample. Bivariate analyses revealed that among all adolescents in communities with low gender-equitable attitudes, 47.1% had completed Form IV (secondary school) or were still in secondary school, compared to 55.8% in communities with high gender-equitable attitudes ($p < 0.001$). There was a nearly six percentage point difference for HIV testing in the last 12 months between communities with high gender-equitable attitudes and those with low gender-equitable attitudes, with adolescents from high gender-equitable attitude communities more likely to have been HIV tested ($p = 0.024$). More than 25% of girls from communities with high gender-equitable attitudes reported participating in transactional sex, while just 7.9% of boys from those same communities reported participation in transactional sex. See [Table 1](#) for participant characteristics; see *Appendix A* for characteristics stratified by sex.

In our analysis of selective attrition (*Appendix G*), we found differences only in educational attainment (at baseline, 60.3% of the panel sample had completed Form IV or was still attending school v. 53.3% of the sample lost to follow-up; $p = 0.024$) and number of sexual partners in the last 12 months (the panel sample had on average 1.17 partners v. 1.0 among those lost to follow-up; $p = 0.023$) between the those lost to follow up and those in the panel sample. Overall, we conclude selective attrition is not a large problem in this sample.

Results for full sample (males and females)

Logistic regression analyses of pooled male and female adolescents ($n = 2017$) suggest that there was marginally significant association between lagged high community gender-equitable attitudes and HIV testing in the last 12 months ($p < .10$). In both Models 1 and 2, adolescents from those communities had approximately 30% increased odds of being tested (for Model 1, $OR = 1.29$, 95% CI [0.99–1.69] and Model 2, $OR = 1.31$, 95% CI [1.00–1.72]) as compared to adolescents in communities with medium/low gender-equitable attitudes. Other characteristics positively associated with HIV testing included female sex and female head of household. There was no association between individual-level attitudes and HIV testing. There were also no significant associations between lagged community- or individual-level gender-equitable attitudes for the primary outcomes of transactional sex or early sexual debut.

Among sexually debuted adolescent males and females ($n = 619$), both models showed that high gender-equitable attitudes were protective against age-disparate partnerships, with adolescents from communities with high gender-equitable attitudes having 48% decreased odds of participating in an age-disparate partnership (Model 1, $OR = 0.52$, 95% CI [0.30–0.88] and Model 2, $OR = 0.52$, 95% CI [0.30–0.93]). The sexually debuted sub-group did not see any associations, however, between community- or individual-level gender-equitable attitudes and the primary outcomes of transactional sex, early sexual debut, or HIV testing in the last 12 months. Nor were there associations found for the secondary outcomes of modern contraceptive use, condom use at last sex, concurrency, or number of sexual partners in the last 12 months. See [Table 2](#) for primary outcome results and [Table 3](#) for secondary outcome results.

Table 1. Descriptive characteristics for male & female adolescents 14–19 years old in Tanzania at community level GEM scores

	Mean (SD) or N (%)			
	Pooled GEM	Low GEM score	High GEM score	<i>p</i> -value*
<i>Among all participants (n = 2017)</i>				
Age	18.1 (1.87)	18.1 (1.77)	18.0 (1.80)	0.843
Sex				0.831
Female	865 (42.9%)	612 (43.0%)	253 (42.5%)	
Male	1152 (57.1%)	810 (57.0%) ³	342 (57.5%)	
Female head of household	1334 (66.1%)	962 (67.7%)	372 (62.5%)	0.026*
Treat	974 (48.3%)	599 (42.1%)	375 (63.0%)	<0.000*
Attending/completed Form IV	1002 (49.7%)	670 (47.1%)	332 (55.8%)	<0.000*
Ever had sex	619 (30.7%)	454 (31.9%)	165 (27.7%)	0.062
Early sexual debut	90 (4.5%)	69 (4.9%)	21 (3.5%)	0.189
Engaged in transactional sex	325 (16.1%)	233 (16.4%)	92 (15.5%)	0.607
HIV testing in last 12 months	858 (42.5%)	582 (40.9%)	276 (46.4%)	0.024*
<i>Among sexually debuted adolescents (n = 619)</i>				
Age	18.5 (1.59)	19.1 (1.55)	19.2 (1.73)	0.183
Sex				0.065
Female	281 (45.4%)	196 (43.2%)	85 (51.5%)	
Male	338 (54.6%)	258 (56.8%)	80 (48.5%)	
Female head of household	422 (68.2%)	318 (70.0%)	104 (63.0%)	0.098
Treat	284 (45.9%)	188 (41.4%)	96 (58.2%)	<0.000*
Attending/completed Form IV	162 (26.2%)	115 (25.3%)	47 (28.5%)	0.430
Early sexual debut	90 (14.5%)	69 (15.2%)	21 (12.7%)	0.441
Engaged in transactional sex	325 (52.5%)	233 (51.3%)	92 (55.8%)	0.328
HIV testing in the last 12 months	414 (66.9%)	298 (65.6%)	116 (70.3%)	0.276
Number of sexual partners in last 12 months	1.40 (1.29)	1.47 (1.39)	1.25 (1.02)	0.891
Modern contraceptive use	404 (65.3%)	303 (66.7%)	101 (61.2%)	0.202
Condom use at last sex	362 (58.5%)	270 (59.5%)	92 (55.8%)	0.407
Concurrency	54 (8.7%)	45 (9.9%)	9 (5.5%)	0.082
Age disparate partner (>5 years)	79 (12.8%)	63 (13.9%)	16 (9.7%)	0.168
*Indicates significance at <i>p</i> < 0.05.				

Table 2. Pooled primary outcomes

	Transactional sex		Early sexual debut		HIV testing in the last 12 months	
	M1 [§]	M2	M1 [§]	M2	M1 [§]	M2
Community high lag	1.01 (0.73–1.40)	1.01 (0.73–1.39)	0.84 (0.51–1.37)	0.87 (0.53–1.43)	1.29 [^] (0.99–1.69)	1.31 [^] (1.00–1.72)
Individual high lag	–	1.02 (0.74–1.43)	–	0.80 (0.46–1.38)		0.92 (0.74–1.15)
Age	1.65*** (1.51–1.80)	1.65*** (1.51–1.80)	0.98 (0.83–1.15)	0.97 (0.83–1.15)	1.37*** (1.29–1.45)	1.37*** (1.29–1.45)
Female	6.67*** (4.88–9.10)	6.70*** (4.84–9.26)	0.97 (0.59–1.61)	0.93 (0.56–1.55)	2.41*** (1.93–3.01)	2.37*** (1.90–2.94)
Treat	0.95 (0.68–1.34)	0.95 (0.68–1.34)	0.95 (0.64–1.43)	0.96 (0.64–1.45)	1.32* (1.03–1.68)	1.32* (1.03–1.68)
Attending/Completed Form IV	0.25*** (0.18–0.35)	0.25*** (0.19–0.34)	0.10*** (0.05–0.22)	0.11*** (0.05–0.22)	0.76* (0.60–0.95)	0.76* (0.60–0.96)
Female head of household	1.07 (0.81–1.41)	1.06 (0.80–1.41)	0.98 (0.63–1.50)	0.98 (0.63–1.50)	1.41*** (1.18–1.69)	1.42*** (1.18–1.69)
<i>Among sexually debuted adolescents (n = 619)</i>						
Community high lag	1.00 (0.62–1.61)	1.00 (0.64–1.59)	0.82 (0.48–1.41)	0.87 (0.49–1.53)	1.11 (0.77–1.60)	1.14 (0.79–1.65)
Individual high lag	–	0.98 (0.64–1.50)	–	0.76 (0.41–1.42)	–	0.88 (0.60–1.29)
Age	0.97 (0.87–1.09)	0.97 (0.87–1.09)	0.64*** (0.51–0.79)	0.64*** (0.51–0.79)	1.29*** (1.12–1.50)	1.29*** (1.12–1.50)
Female	8.60*** (5.87–12.61)	8.56*** (5.79–12.64)	0.61 (0.37–1.02)	0.58* (0.35–0.97)	4.55*** (3.01–6.86)	4.42*** (2.90–6.74)
Treat	1.12 (0.75–1.68)	1.12 (0.75–1.68)	0.98 (0.65–1.49)	1.00 (0.65–1.53)	1.23 (0.89–1.71)	1.24 (0.89–1.73)
Attending/Completed Form IV	0.71 (0.46–1.11)	0.71 (0.46–1.11)	0.32** (0.16–0.66)	0.34** (0.16–0.70)	0.87 (0.56–1.35)	0.89 (0.57–1.38)
Female head of household	0.77 (0.53–1.13)	0.77 (0.53–1.13)	0.76 (0.49–1.19)	0.77 (0.49–1.21)	1.22 (0.86–1.73)	1.23 (0.86–1.75)
<p>Odds ratios and 95% confidence intervals by community high GEM scores (M1) and individual (M2) high GEM scores for primary outcomes among all adolescents (n = 2017)</p> <p>95% confidence intervals in parentheses *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ [^]$p < .10$ [§] indicates best model fit.</p> <p>Model 1 (M1) included community gender equitable attitudes only.</p> <p>Model 2 (M2) included both high community gender equitable attitudes and high individual gender equitable attitudes.</p>						

Table 3. Pooled secondary outcomes

	Modern contraceptive use		Condom use at last sex		# of sexual partners in last 12 months		Concurrent sexual partners		Age-disparate partnership	
	M1 [§]	M2	M1 [§]	M2	M1 [§]	M2	M1 [§]	M2	M1 [§]	M2
Community high lag	0.83 (0.53–1.30)	0.77 (0.49–1.22)	0.95 (0.61–1.47)	0.90 (0.58–1.39)	0.89 (0.77–1.03)	0.90 (0.77–1.04)	0.58 (0.28–1.24)	0.59 (0.28–1.27)	0.52* (0.30–0.88)	0.52* (0.30–0.93)
Individual high lag	–	1.41 (0.94–2.11)	–	1.30 (0.89–1.91)	–	0.97 (0.82–1.14)	–	0.92 (0.49–1.73)	–	0.93 (0.45–1.93)
Age	1.08 (0.97–1.21)	1.08 (0.97–1.21)	1.01 (0.90–1.12)	1.01 (0.90–1.13)	1.00 (0.97–1.04)	1.00 (0.97–1.04)	1.01 (0.81–1.26)	1.01 (0.81–1.25)	0.95 (0.81–1.12)	0.95 (0.81–1.12)
Female	0.44** (0.31–0.62)	0.47** (0.33–0.67)	0.28*** (0.19–0.40)	0.29*** (0.20–0.42)	0.64*** (0.58–0.72)	0.64*** (0.57–0.72)	0.15*** (0.06–0.39)	0.14*** (0.05–0.39)	47.64*** (14.37–157.98)	46.89*** (14.39–152.84)
Treat	1.02 (0.67–1.54)	1.01 (0.67–1.54)	0.97 (0.64–1.47)	0.97 (0.64–1.46)	0.99 (0.84–1.16)	0.99 (0.84–1.16)	0.99 (0.51–1.90)	1.00 (0.52–1.91)	0.99 (0.57–1.71)	0.99 (0.57–1.71)
Attending/Completed Form IV	0.78 (0.52–1.15)	0.74 (0.50–1.11)	1.23 (0.83–1.82)	1.18 (0.80–1.75)	0.80* (0.68–0.95)	0.81* (0.68–0.96)	0.41* (0.18–0.95)	0.42* (0.18–0.97)	0.55 (0.30–1.01)	0.55* (0.30–1.00)
Female head of household	0.82 (0.59–1.15)	0.82 (0.59–1.13)	0.83 (0.59–1.18)	0.82 (0.58–1.17)	1.03 (0.90–1.18)	1.03 (0.90–1.18)	0.93 (0.54–1.60)	0.93 (0.53–1.63)	1.15 (0.65–2.04)	1.15 (0.65–2.04)

Odds ratios and 95% confidence intervals by community high GEM scores and individual and community high GEM scores for secondary outcomes among sexually debuted adolescents ($n = 619$)

95% confidence intervals in parentheses | *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ | [§] indicates best model fit.

Model 1 (M1) included community gender equitable attitudes only.

Model 2 (M2) included both high community gender equitable attitudes and high individual gender equitable attitudes.

Results for female sample

We now turn to results stratified by sex. Among all females ($n = 865$), there was a significant association between community-gender-equitable attitudes and HIV testing in Model 2. Results showed that girls from high gender-equitable communities had nearly 50% increased odds of being HIV tested in the last 12 months (OR = 1.48, 95% CI [1.00–2.19]) compared to those in communities with low/medium gender-equitable attitudes. As in the pooled sample, having a female head of household was also positively associated with HIV testing among females. There was no association between community- and individual-level gender-equitable attitudes and the primary outcomes of transactional sex or early sexual debut in either model.

Among females who had sexually debuted ($n = 281$), both models showed significant association between high community gender-equitable attitudes and age-disparate partnerships. Girls from communities with high gender-equitable attitudes had 51% decreased odds of participating in an age-disparate partnership in Model 1 (OR = 0.49, 95% CI [0.28–0.84]), and 49% decreased odds of the same in Model 2 (OR = 0.51, 95% CI [0.28–0.91]). In Model 2, high individual gender-equitable attitudes were significantly associated with both condom use at last sex (OR = 2.07, 95% CI [1.07–4.00]) and contraceptive use (OR = 2.08, 95% CI [1.04–4.13]), with girls who held high gender-equitable attitudes having more than two-fold increased odds of using both. Neither model showed an association between high community-level gender-equitable attitudes and the primary outcomes of transactional sex, early sexual debut, and HIV testing in the last 12 months, or the secondary outcomes of modern contraceptive use, condom use at last sex, concurrency, and number of sexual partners in the last 12 months. See *Appendix B* for full results stratified by sex.

Results for male sample

For males in the full sample ($n = 1152$), gender-equitable attitudes for both the community and combined community and individual models were not significantly associated with the primary outcomes of transactional sex, early sexual debut, or HIV testing in the last 12 months. Among males who had sexually debuted ($n = 338$), neither model found association between community- or individual-level gender-equitable attitudes and

transactional sex, early sexual debut, HIV testing in the last 12 months, modern contraceptive use, condom use at last sex, concurrency, number of sexual partners in the last 12 months, or age-disparate relationships. See *Appendix B* for full results stratified by sex.

Tests for effect modification

In our interacted models that tested whether sex moderates the relationship between community attitudes and outcomes of interest, we found evidence of effect modification by sex for community-level attitudes and age-disparate sex ($p = 0.005$) and individual-level attitudes and condom use ($p = 0.051$). Further, we found evidence of effect modification by sex at the 10% level for individual-level attitudes and contraceptive use ($p = 0.104$) and HIV testing ($p = 0.075$). See *Appendix C* for full results.

Discussion

This study examined the association between gender-equitable attitudes at both the community and individual levels, and a number of sexual risk behaviours among male and female adolescents in rural Tanzania. We found that community gender-equitable attitudes were most significantly associated with HIV testing and age-disparate relationships: in the pooled sample, adolescents from communities with high gender-equitable attitudes had higher odds of HIV testing in the last 12 months and reduced odds of age-disparate partnerships (both driven by females). Moreover, high individual gender-equitable attitudes were associated with higher odds of contraceptive uptake and condom use among girls (but not boys). Among sexually debuted adolescents, no significant associations were found between community or individual high gender-equitable attitudes and transactional sex, early sexual debut, HIV testing, concurrent sexual partners, or number of sexual partners. No significant associations were found for males for any of the primary or secondary outcomes in the sex-stratified analysis.

Community-level attitudes

Our finding that higher community-level gender-equitable attitudes were associated with increased odds of HIV testing suggests that communities with high gender-equitable attitudes may experience less stigma around HIV health-seeking behaviour, and may better prioritise access to, and awareness

of, HIV testing. However, when examining separately by sex, results were only significant among females, not males. Women typically seek HIV testing (and other related care) more often than men.⁴² Masculine norms of not wanting to appear weak either prevent men from seeking care altogether, or they seek it at far later stages of disease progression than women.⁴² Thus, our findings suggest that there are still barriers to care-seeking for men, even in communities with high gender-equitable attitudes, and that more needs to be done to dismantle norms that prevent men from accessing HIV care.

Adolescents from communities with high gender-equitable attitudes had nearly half the odds of participating in an age-disparate partnership; however, as with HIV testing, this association appears to be driven by females, as it was not significant in the male-only analysis (less than 1% of males participated in age-disparate relationships, so this finding is likely due to low prevalence of those relationships among the male sample). Age-disparate relationships with older male sexual partners put AGYW at increased risk for HIV,²⁴ indeed, AGYW have nearly twice the rates of HIV than adolescent boys.⁴² A driver of these age-disparate relationships is often the financial security or material goods those partners can provide,⁴³ largely due to normative gender roles where women need to be provided for by men. This reflects women's economic vulnerability and restricted opportunities to meet basic needs on their own, which in turn can lead to engagement in transactional sex, often with older male partners. Seventy-eight percent of all sexually debuted girls reported engagement in transactional sex, while just 31% of boys reported the same. Although these findings cannot be directly linked to gender-inequitable attitudes with our current data, our study further contributes to the body of evidence suggesting that the gender and economic disparities experienced by women in Tanzania perpetuate practices that can put them at higher risk for sexually transmitted infections, HIV, and gender-based violence. Importantly though, while adolescent girls had much higher odds of participating in transactional sex and being involved in age-disparate partnerships than their boy counterparts, girls from communities with high gender-equitable attitudes had significantly lower odds of age-disparate relationships as compared to girls in communities with medium/low gender-equitable attitudes. This suggests that gender equity can influence risk

behaviours for transactional sex and illustrates a possible mechanism of intervention through gender transformative education. Notably, recent research has found that adolescent boys and young men are more likely to reject transactional sex than older men, which may also be an avenue for intervention.⁴⁴ However, these adolescent and younger men also frequently do not have the means to provide the necessary goods in a transactional relationship, putting them at a structural disadvantage,⁴⁴ possibly skewing their view on the practice.

Individual-level attitudes

The female-only analysis indicated an association between high individual gender-equitable attitudes and increased odds of both condom and contraceptive use for AGYW. This finding suggests that gender-equitable attitudes may help to overcome barriers to condom and contraceptive use for AGYW. Disparate power dynamics driven by patriarchal gender norms in sexual relationships and/or a lack of sexual and reproductive health education for girls may mean that girls are not comfortable negotiating, or unaware of how to negotiate, contraceptive or condom use with their partners.^{42,45} Because the stigma around sex is still more for adolescent girls than boys in Tanzania, increasing gender-equitable attitudes toward reproductive health and sexual behaviours (e.g. de-stigmatising condom use as a sign of a woman's infidelity) may help to increase AGYW's ability to negotiate terms of sex with their partners.¹²

Boys living in households with a female head of household had lower odds of contraceptive use, perhaps suggesting higher rates of poverty and, subsequently, lower access to health services in households with a female head. Alternatively, this finding could reflect that conversations about safe sex practices are not occurring between parents and children, particularly when they are not of the same sex,⁴⁶ or that these conversations do not provide accurate information when they do occur.⁴⁷ Despite evidence that discussions about sexual risk behaviour can delay sexual debut and increase condom use in adolescents,⁴⁸ gender norms that make sex a taboo topic often contribute to conversations rooted in fear (e.g. informing their children that sex leads to disease) or morality (e.g. unilaterally labelling sex as bad).^{47,48} Thus, while parental involvement in discussing

safe sex practices might play a larger role in preventing risky sexual behaviour, whether this role positively or negatively influences sexual risk-taking is largely dependent on parental knowledge of safe sex practices and comfort discussing them.

In line with previous findings that used this study data,⁴⁹ education appeared to have a protective effect on both transactional sex and early sexual debut for both sexes. Adolescence is indeed a time when gender norms are solidified, and peers begin to have stronger influence than family members.^{7,10} Higher levels of community education have also been associated with reduced sexual risk-taking.²⁸ Thus, remaining in or completing secondary school may mean that adolescents are exposed to peers with more equitable gender attitudes. Particularly for girls, remaining in school means that they are less likely to marry young because education presents options for adolescent girls outside of the domestic sphere, which can lead to economic empowerment and a better understanding of how to negotiate sexual interactions.³ While these findings again cannot be directly connected to gender-equitable attitudes, sustained schooling, SRH education, and gender-transformative programming can all contribute to gender equity by empowering girls and giving them viable alternatives to risky practices like transactional sex.

While education was protective for the primary outcomes of transactional sex and early sexual debut, and the secondary outcomes of number of sexual partners in the last year, concurrent sexual partners, and age-disparate partnerships, this was not the case for HIV testing. Both boys and girls who had completed or were still attending secondary school had significantly lower odds of receiving HIV testing than their out-of-school peers. This is possibly due to the fact that education was protective against these risky sexual behaviours, and that in-school adolescents had later sexual debuts and lower odds of concurrent and age-disparate partnerships. As such, it would follow that they would also have lower need for HIV testing. While this finding is consistent with evidence linking increased education with lower rates of HIV and risky sexual behaviour among school-aged adolescents,⁵⁰ the body of evidence for education, HIV, and risky sexual practices overall is inconsistent, indicating further research is needed in this area.

Future recommendations

Our findings demonstrate that adolescents are susceptible to the influence of perceived norms, particularly from a prosocial perspective^{9,10} (e.g. higher equitable norms are associated with the prosocial behaviours of using condoms and getting HIV tested). They underscore why adolescence is a critical time to intervene around sexual risk behaviour, especially when it comes to the intersection of sexual behaviour and gender norms. Previous literature surrounding gender norms and SRH has examined outcomes only among female participants,^{51,52} and/or observed associations between individual-level attitudes or community factors and sexual risk behaviour.^{27–29} Our study contributes to the literature by utilising clustered community-level attitudes as well as individual-level attitudes and examining their association with individual behaviours of both male and female adolescents. Our research suggests the possibility that incorporating community attitudes, and examining outcomes for boys as well as girls, may be important to achieving greater gender equity than focusing on girls alone. Gender-transformative work then, should strive to involve all levels of the community, from adolescents and their caregivers, to community leaders and policy makers.⁶

Interventions that focus on HIV risk behaviours through the promotion of gender equality (such as Stepping Stones in South Africa, which places particular focus on risk behaviours in men and boys) may be helpful in further reducing the stigma that masculine norms place on HIV testing and care.^{42,53} Combining sexual education with gender norms behavioural change communication could further increase knowledge, awareness, and use of condoms and contraception for females,¹⁸ and may help to increase HIV prevention knowledge among all adolescents.⁵³ Considering how caregivers of adolescents might supplement this knowledge, and subsequently support a normative shift in educating their children about sexual risk, is also important when designing programmes for adolescent sexual health.^{46,47,54} Lastly, previous research has found that when women are less dependent on men for financial security, they find it less necessary to participate in age-disparate and transactional sex.⁵⁵ Programmes such as Empowerment and Livelihood for Adolescents that focus on bodily agency, economic empowerment, SRH knowledge, and

awareness of sexual risk factors specific to AGYW may be helpful in empowering AGYW and enabling them to make choices driven by aspirations rather than adherence to normative behaviours.¹⁸

Limitations

Our study had some limitations. First, the data relied on self-reporting of topics that are not typically publicly discussed and have strong social norms attached to them; thus, there may be social desirability bias in participant responses. While we used non-self-clustered means³⁹ and clustering of attitudes toward difficult-to-observe behaviours³¹ to measure community norms, the community-level attitudes reflected only those of adolescents, not the entire community. Because of this, other potential drivers of attitudes and norms (e.g. the influence of non-adolescent community members, parents, or religious leaders) may not have been adequately captured in our measures. Our sample was also drawn from extremely poor households, which may partially explain the high rates of engagement in transactional sex among sexually debuted girls. Therefore, our results may not generalise to adolescents and youth across the socio-economic distribution. Lastly, when married adolescents were removed from the sexually debuted sample, particularly for AGYW, the sample size decreased (girls, $n = 281$ and boys, $n = 338$). Sex-stratified results should thus be interpreted cautiously, as such low-powered data may not have been able to detect a significant relationship among the variables of interest, even if a relationship does exist. Additional research with larger samples would help to further illuminate the relationship between gender norms and sexual health and risk behaviours.

Conclusion

Our findings highlight the importance of incorporating gender-equitable attitudes when discussing sexual risk behaviour and sexual and reproductive health among adolescents. This research further contributes to the evidence that a focus on gender equity can have protective effects on a number of sexual risk behaviours,⁵⁶ including age-disparate partnerships, condom and contraceptive use, and HIV testing. It highlights the importance of keeping both girls and boys in school and underscores the need for gender transformative programming among whole communities, including

boys and men, not just girls and women. Such programming could address gender inequity and improve the health and well-being of adolescents in low-and middle-income countries as they transition to adulthood.

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Author contributions statement

KR: conceptualisation, formal analysis, methodology, visualisation, and writing (original draft). MR, LK, JAL: writing (review and editing). RLC: supervision, writing (review and editing). TP: formal analysis, methodology, supervision, writing (review and editing).

Supplemental data

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Résumé

Les systèmes patriarcaux en Afrique peuvent perpétuer des normes inéquitables en matière de genre et des différences de pouvoir qui désavantagent les femmes. Cette étude visait à examiner l'influence des attitudes individuelles et communautaires en matière d'égalité de genre sur la santé sexuelle et les comportements à risque des adolescents en Tanzanie rurale, et à déterminer si l'association de ces attitudes diffère entre hommes et femmes. Nous avons effectué une régression logistique à l'aide de données longitudinales provenant d'un essai contrôlé randomisé

Resumen

Los sistemas patriarcales en África pueden perpetuar las normas de género y diferencias de poder inequitativas que desfavorecen a las mujeres. Este estudio pretendía examinar la influencia de actitudes de género equitativas comunitarias e individuales en salud sexual y en el comportamiento de riesgo de adolescentes en zonas rurales de Tanzania, y determinar si la asociación de esas actitudes difiere entre hombres y mujeres. Realizamos regresión logística utilizando datos longitudinales de un ensayo aleatorio controlado por grupos en zonas rurales de Tanzania para examinar la

par grappes en Tanzanie rurale pour examiner l'association des attitudes soucieuses d'égalité de genre et les comportements sexuels à risque de 2017 adolescents des deux sexes. De fortes attitudes soucieuses d'égalité de genre au niveau communautaire étaient associées de manière significative à des probabilités accrues de dépistage du VIH (RC = 1.31, IC 95% [1.00–1.72]) et des probabilités plus faibles de relations avec un partenaire ayant une grande différence d'âge (RC = 0.52, IC 95% [0.0–0.88]) pour l'échantillon commun de filles et de garçons. De fortes attitudes soucieuses d'égalité de genre au niveau individuel (mais pas communautaire) étaient associées à une utilisation accrue du préservatif (RC = 2.07, IC 95% [1.07–4.00]) et d'un contraceptif (RC = 2.08, IC 95% [1.04–4.13]) pour les filles. Chez les adolescents déjà sexuellement actifs, aucune association significative n'a été observée entre de fortes attitudes communautaires ou individuelles soucieuses d'égalité de genre et les rapports sexuels transactionnels, le début précoce des rapports sexuels, le dépistage du VIH, plusieurs partenaires sexuels simultanés ou le nombre de partenaires sexuels. Nous avons noté des indices d'une modification de l'effet selon le sexe pour les attitudes au niveau communautaire et les relations sexuelles avec un partenaire ayant une grande différence d'âge ($p = 0.005$) et les attitudes au niveau individuel et l'utilisation du préservatif ($p = 0.051$). Les activités destinées à inclure des programmes transformateurs dans le domaine du genre pour des communautés entières peuvent renforcer les attitudes soucieuses d'égalité de genre.

asociación de actitudes de género equitativas con el comportamiento de riesgo sexual de 2017 hombres y mujeres adolescentes. El alto nivel de actitudes de género equitativas comunitarias estaba asociado de manera significativa con mayores probabilidades de pruebas de VIH (RM = 1.31, IC al 95% [1.00–1.72]) y menores probabilidades de relaciones entre personas de distintas edades (RM = 0.52, IC al 95% [0.30–0.88]) para la muestra colectiva de hombres y mujeres. El alto nivel de actitudes de género equitativas individuales (pero no comunitarias) estaba asociado con mayor uso de condones (RM = 2.07, IC al 95% [1.07–4.00]) y anticonceptivos (RM = 2.08, IC al 95% [1.04–4.13]) por niñas. Entre adolescentes al inicio de relaciones sexuales, no se encontraron asociaciones significativas entre un alto nivel de actitudes de género equitativas comunitarias o individuales y sexo transaccional, inicio sexual temprano, pruebas de VIH, parejas sexuales simultáneas, o número de parejas sexuales. Encontramos evidencia de modificación del efecto por sexo para las actitudes comunitarias y relaciones sexuales entre personas de diferentes edades ($p = 0.005$) y las actitudes individuales y el uso de condones ($p = 0.051$). Los esfuerzos por incorporar los programas transformadores de género para comunidades enteras podrían aumentar las actitudes de género equitativas.