Words: 3453

RUNNING HEAD: Intergenerational relationships and HIV among South African women

Determinants of Intergenerational Sexual Relationships and HIV Risk Among

South African Women Outpatients in Gauteng

Laura Ann McCloskey [1]

Irma Eloff [2]

Kelly Doran [3]

1   Department of Applied Health Science, School of Public Health, Indiana University,

1025 E. 7th St, Bloomington IN 47408. 812-855-4980. lmcclosk@indiana.edu

(Corresponding author)

2   Department of Educational Psychology, University of Pretoria School of Education,

Groenkloof, Pretoria 0002. 011-27- 012-420-5503 irma.eloff@up.ac.za

3   UNH Institute on Disability, College of Health and Human Services, 10 West Edge

Drive, University of New Hampshire, Durham, NH. 03824 603-228-2084.

Kelly.Doran@unh.edu

Abstract

Age-discrepant sexual relationships may place women at risk for HIV infection in South Africa. Results are based on medical records and case-control interview data of 889 sexually experienced women outpatients aged 15-29 in a Gauteng township. Women with partners at least ten years older (intergenerational) show an elevated chance of having an early sexual debut, concurrent and transactional partners, and intimate partner violence. Hardship during childhood including parental loss, food insecurity and abuse are related to age asymmetric relationships. HIV is two times more likely (aOR=1.96) with an intergenerational partner. Transactional sex increases the odds of HIV independently (aOR=1.76) as does intimate partner violence (aOR=1.6). To the extent that transactional and intergenerational sex overlap the chance of contracting HIV increases more than two-fold (uOR=4.57). Girls (15-19) with intergenerational partners face the highest chance of HIV (uOR=8.55) compared to other age groups. They are also five times more likely than controls to have lived with a cross-age partner. Our findings indicate there are multiple pathways emanating from childhood leading to women's choice of intergenerational partners, and the link to HIV is strongest among the youngest women.

Introduction

   HIV is hyperendemic throughout South Africa with women comprising up to 62% of the seropositive population (UNAIDS, 2017). The incidence rate for girls (15-19 years) overtakes that of their male agemates by four to one (Kharsany et al., 2014) with the upshot that South African women contract the virus five to seven years ahead of men (Dellar et al., 2015). Risk behaviors common to both sexes and linked to HIV such as early sexual debut (Wand & Ramjee, 2012), multiple or concurrent partners (Mah & Halperin, 2010; Maughan-Brown et al., 2014), failure to use condoms (Pettifor et al., 2009) and alcohol consumption (Kalichman et al., 2007) invariably apply more to men than women despite the fact that they lag behind them in the pandemic. Risk behaviors, therefore, often fail to account for gender asymmetrical rates of HIV infection. On the other hand, young women face a gender-specific threat when they attach to older men. The older their sexual partner the more opportunities he has had to contract the virus against the backdrop of high prevalence in the source population (UNAIDS, 2017). Male partners ten years older are emblematic of an "intergenerational" gap in disease liability. The meaning and context of age asymmetry between women and their mature partners warrant investigation.

   Age asymmetry in sexual unions is widespread throughout southern and eastern Africa within and outside of marriage (Evans et al., 2016). Prevalence in South Africa ranges from 39% for a five-year difference ("age-discordant") (Maughan-Brown et al., 2016) to 9% for a ten-year age interval (Harling et al., 2014). Age discrepancies surface early among South African teenage girls with 33% pairing with men 8.7 years older on average (Harrison et al., 2008). Intergenerational marriage is a cultural norm across sub-Saharan Africa (Clark, 2004; Leclerc-Madlala, 2008; Watkins, 2010); African brides between 15 and 19 often marry grooms ten years

older (Magadi, 2011). In fact, in Zimbabwe intergenerational relationships are concentrated within long-term unions or marriage, with only about 2.5% of men admitting to transactional sex with a much younger woman or girl outside of permanent unions (Wyrod, 2011). Although early marriage is commonly believed to be protective for daughters it may present a hazard through the sexual histories of older husbands (Clark, 2004; Kelly et al., 2003).

Women in sub-Saharan Africa with age discrepant partners show elevated rates of HIV in various countries including South Africa (Maughan-Brown et al., 2016; Evans et al., 2016; Street et al., 2016), Malawi (Beauclair, et al., 2018; Watkins, 2010), Zimbabwe (Schaefer et al., 2017; Wyrod et al., 2011), Uganda (Kelly et al., 2003), Kenya and Zambia (Dunkle et al., 2008). Not all researchers in Africa replicate this finding (c.f., Harling et al., 2014) possibly due to parameters of sampling. Sexual risk behaviors such as early sexual debut, concurrent sexual partners, or lower odds of using a condom at last sex are more prevalent among South African women in age-discrepant relationships (Maughan-Brown et al., 2016; Morrison-Beedy, et al., 2013; Pettifor et al., 2009). Age asymmetry and HIV also co-occur outside of Africa: In the United States seropositive teenage girls show increased odds of having a partner four to six years older (Sturdevant et al., 2001) and young American men with older male partners show elevated rates of HIV (Hurt et al., 2010).

Age superiority itself fuels relationship inequality, disempowering women (Evans et al., 2016) and giving rise to intimate partner violence (Durevell & Lindskog, 2015). Transactional sexual exchanges are also linked to intimate partner violence (Evans et al., 2016) and age disparities (Jewkes et al., 2012; Wyrod et al., 2011). Transactional sex, as distinct from commercial sex, may stem from poverty as seen in South African orphans (Cluver et al., 2011). Childhood poverty and abuse have been associated with sexual risk-taking and sexually

transmitted infections among girls (Gibbs et al., 2018; Gregson et al., 2005; Thurman et al., 2006). In Zimbabwe orphaned teenage girls are at heightened risk for sexually transmitted infections including HIV (Gregson et al., 2005), and in South Africa a history of child abuse is associated with transactional sex and intimate partner violence (Gibbs et al., 2018) and HIV in adulthood (Jewkes et al., 2010). Losing a parent may catapult girls in search of a substitute caregiver directly into transactional encounters with older men (Cluver et al, 2011; Weiser et al., 2007). Yet transactional sex may meet needs beyond survival such as the desire for status-laden consumer products, reflecting the "pursuit of modernity" identified in ethnographic work. (Leclerc-Madlala, 2008; Mojola, 2014). Despite the enduring script of the older "sugar daddy" (Luke, 2005) it remains uncertain to what degree age mixing, transactional sex and other dynamics combine to enhance the risk of HIV. The aims of our study are to identify childhood determinants of intergenerational relationships or HIV risk, to investigate a range of co-varying sources of sexual behavioral risk for HIV, and to examine how certain risk behaviors intersect as in transactional and intergenerational sex.

Materials and Methods

Study design

This one:one case-control interview study of 889 women outpatients (seropositive=429; seronegative=460) took place within a peri-urban hospital and affiliated clinics within the City of Tshwane (Pretoria) in Gauteng Province. Multi-lingual interviewers recruited women in clinics who were between 15 and 29 years of age and sexually experienced. Most participants were sufficiently fluent to respond to the questionnaire in English since English instruction begins in fourth grade for this cohort.

Ethics approval

The University of Pretoria Faculty of Health Sciences Research Ethics Committee and the institutional review boards of the School of Education at the University of Pretoria, Indiana University, Kalafong Hospital, four clinics and the City of Tshwane (Pretoria) approved the protocol. Written informed consent was obtained and parental consent was required for minors (n=16). Women were offered professional counseling with a Masters-level therapist.

Measures

HIV measurement Blood samples were collected in the clinic or hospital testing center and results recorded in the medical records on which our data are based. Samples were subjected to an antibody rapid screening test (OraQuick Advance® or ABON™ HIV 1/2/0 Tri-line HIV test®), which detects antibodies to HIV type 1 or 2. In the case of discordant results (first one positive, second one negative), a blood sample was sent out to a laboratory for an HIV ELISA (enzyme-linked immunosorbent assay) test, which detects both HIV antibodies and antigens. Data from women whose HIV diagnosis occurred before the age of 15 were excluded to eliminate positive cases based on maternal transmission rather than sexual experiences.

Questionnaire Demographics include women's age, educational level completed (12th grade matriculation), and relationship status (ever married, divorced, widowed or currently married or living with a partner). Women were asked about stressful experiences before the age of 18 including parental loss, food insecurity (C-CHIP) (Wehler et al., 1992), adverse experiences (Adverse Child Experience International Questionnaire, ACES-IQ) (World Health Organization, 2011). If women endorsed one out of three items gauging childhood food insecurity (e.g., "Up until the age of 18 did you ever go to bed hungry because there was not enough money to buy food?") they were coded as positive for child hunger. Women responded

to ten items from the ACES-IQ such as "Did a parent threaten to, or actually [did], abandon you or throw you out of the house?" Childhood adversity was scored dichotomously with four or more positive responses out of ten possible selected as the cut-off because previous research linked four or more events with diminished life expectancy (Anda et al., 2009). Women were asked about early sexual debut, intergenerational, transactional or concurrent partners, and intimate partner violence. Age at first sex was accompanied by an empirically based definition of intercourse (Koss et al., 2007). Women were asked whether they used a condom at last sex. Respondents affirming a current or past relationship (for at least one month) with a man ten or more years were classified as (ever) having had an intergenerational sexual partner. Transactional sex was measured with one question derived from Jewkes et al., (2012) "Did you ever have sex [with someone you had no interest in] mainly because the man offered you money or anything of value [like food, clothing, drugs, etc.]" Two questions probed concurrent partner history asking about "roll-on sexual relationships with two or more men" or whether they "were ever involved for at least a month with a man who was married to or living with another woman." Intimate partner violence was captured with six questions originating from the World Health Organization IPV inventory measuring exclusively acts of physical and sexual violence; a single positive response classified women as experiencing intimate partner violence (Garcia-Moreno et al., 2006).

Results

Statistical analyses were performed using SAS 9.4 (SAS Institute). Because questions regarding intergenerational and transactional partners were framed as "ever (occurring)" the path of causation to HIV could be blurred. That is, time frame left open whether key independent variables precede the HIV diagnosis. Women were asked their age at first transactional or

intergenerational sexual encounters and initial diagnosis providing a chronology of events. We subtracted their age at first intergenerational or transactional incident from their age at HIV diagnosis. Seropositive women (N=429) were 23.7 years old (SD=2.41) when their HIV test first returned positive. They were on average 19.84 (SD=2.54) when they initiated intergenerational sex (n=152) and 20.53 (SD=2.41) at the time of their first transactional sexual encounter (n=94). The predictors anticipated HIV by 3.3 to 3.9 years on average.

The mean age of the total sample is 24 (SD=3.27). A total of 24.9% had ever been with an intergenerational sexual partner and 33.6% of such partners are current. HIV positive women without intergenerational partners disclose larger age differences in years within their current relationships compared to controls (M=5.27, SD=3.8; M=4.48, SD=3.68), t = -2.90, p=.0039). Most (81.9%) intergenerational partners are thirty years of age or older. Descriptive statistics with HIV as the outcome are shown in Table 1. Seropositive women are 2.6 years older than controls, less likely to finish secondary school, and more likely to have been married, divorced, or widowed or cohabitating with a man. The average age of sexual debut is commensurate across HIV groups (M=17 years). Childhood variables spanning parental loss, childhood adversity (ACES-IQ) and food insecurity are no more common among HIV positive women than controls, although a substantial proportion of women overall experienced hunger (22.43%), parental death (39.77%) or abuse (31.15%). Concurrent, transactional, and intergenerational sexual relationships are more prevalent among HIV positive women as is intimate partner violence (IPV).

Table 1. Participant characteristics and risk variables by HIV diagnosis

Risk variables	HIV+ positive n=429 48.26%	HIV-negative n=460 51.74%	Bivariate tests χ^2 , t-test	p
Sociodemographic/ Structural	% or M (SD)	% or M (SD)		
Age in years Mean, SD	M=25.32 SD=2.87	M=22.73 SD=3.1	t=-12.85	<.0001
Matriculated Completed 12th year (%)	48.72%	61.98%	$\chi^2(1)$=15.72	<.0001
Childhood hunger/food insecurity (%)	37.7%	43.49%	$\chi^2(1)$=3.04	n.s. (=.08)
Either parent deceased < 18 (%)	42.86%	38.71%	$\chi^2(1)$=2.6	ns
Adverse child experiences ACES_HI 4 %	32.63%	29.67%	$\chi^2(1)$=.86	n.s.
Ever married, divorced or widowed (%)	19.35%	10.55%	$\chi^2(1)$=13.54	=.0002
Ever lived with a man	66.43%	47.14%	$\chi^2(1)$=33.42	<.0001
Sexual Experiences				
Age of sexual debut Mean, SD	17.41 SD=1.86	17.46 SD=1.86	t (1)=.042 (1.86)	ns
Concurrent partner(s)	58.1%	36.28%	$\chi^2(1)$=41.89	<.0001
Transactional sex (any)	22%	5.98%	$\chi^2(1)$=30.93	<.0001
Intimate partner violence (any) %	62.3%	40.27%	$\chi^2(1)$=42.64	<.0001
Intergenerational sex (any) %	35.43%	18.9%	$\chi^2(1)$=30.66	<.0001

Key: n.s.= not significant, p>.05

Table 2 displays the same covariates listed in Table 1 with intergenerational partner as the outcome. Women with intergenerational partners are older by about a year, less likely to have matriculated, and about 20% more likely to have lived with a man although marriage history is the same between groups. More women with older partners meet the threshold (4/10) for the ACES-IQ than controls, although there are no differences in parental death or childhood

food insecurity between women based on having an intergenerational partner. Age of first sex,

transactional or concurrent partners and IPV are associated with cross-generational relationships.

Table 2. Participant characteristics and risk variables with and without a history of intergenerational partners.

Risk variables	Any partner 10+ years older (n=283)	No partner 10+ years older (n=645)	Bivariate tests χ^2, t-test	p=
Sociodemographic/ Structural	% or M (SD)	% or M (SD)	χ^2 or t= (p=)	
Age in years Mean, SD	24.93 (SD=2.88)	23.66 (SD=3.34)	t=-5.20	=<.0001
Matriculated Completed 12th year (%)	46.22%	59.07%	χ^2=11.6311	=.0006
Current hunger/food insecurity (%)	39.83%	37.89%	χ2=.2754	n.s.
Childhood hunger/food insecurity (%)	37.71%	41.68%	χ^2=1.1268	n.s.
Either parent deceased < 18 (%)	21.61%	25.55%	χ^2=1.4454	n.s.
Adverse child experiences (ACES_HI 4) %	38.24%	28.53%	χ^2=7.6407	=.0057
Ever married, divorced or widowed (%)	13.45%	15.35%	χ^2=0.4985	n.s.
Ever lived with a man (%)	65.13%	53.3%	χ^2=9.84	=.0017
Sexual Experiences Common to Both Sexes:				
Age of sexual debut Mean, SD	16.91 (SD=1.76)	17.63 (SD=1.86)	t=5.26	=.0001
Concurrent partner(s) (%)	66.67%	(39.63%)	χ^2=50.8	=.0001
Transactional sex (any)	26.79%	9.7%	χ^2=53.4	<.0001
Intimate partner violence (any) (%)	60 (58.25%)	357 (46.12%)	χ^2=5.316	=.02

Key: n.s.= not significant, p>.05

Table 3 displays models building on the effect of intergenerational partners on HIV odds with additional sexual experiences (transactional sex, intimate partner violence, concurrent partners). Model 1 illustrates the age-adjusted odds of contracting HIV without further covariates (aOR=1.96). In Model 2 when transactional sex and intimate partner violence are entered in Model 2 both have an independent effect on HIV, and intergenerational partners remain significant. In the third model concurrent sex drops out as a predictor and adds no variance as measured with the Nagerkele pseudo R^2 (24%)

Table 3. Age-adjusted logistic regressions predicting HIV from intergenerational partners and behavioral risk variables

Restricted and nested models	OR (CI) Ref: HIV negative	p=	Nagelkerke pseudo R^2
I. Intergenerational partner model [1]			
Intergenerational partner	1.96 (1.39-2.65)	<.0001	.21
II. Gender-based sexual experiences [2]			
Intergenerational partner	1.48 (1.04-2.09)	.03	.24
Transactional sex	1.76 (1.11-2.81)	.017	
Intimate partner violence	1.6 (1.17-2.2)	.003	
III. Gender-neutral concurrent partner [3]			
Intergenerational partner	1.48 (1.05-2.1)	.026	.24
Transactional sex	1.82 (1.15-2.88)	.01	
Intimate partner violence	1.77 (1.3-2.4)	.0003	
Concurrent partners	1.18 (.85-1.63)	n.s.	

[1]   Adjusted for age

[2]   Adjusted for age and covariates (transactional sex, intimate partner violence)

[3]   Adjusted for age, covariates (transactional sex, intimate partner violence, concurrency)

Because of the overlap between two constructs with 26.79% of age-discordant participants engaged in transactional sex in contrast to 9.7% in age-concordant unions we performed separate analyses to compare the unique effects of transactional or intergenerational sex separately and then merged into a compound variable. As illustrated in Table 4 the unadjusted odds of HIV rise when either intergenerational or transactional sex occur alone doubling when women experience both (uOR=4.57**).**

Table 4.   The compounded risk of HIV for women with a history of concomitant intergenerational and transactional sexual partners

_____

Predictors	n=	uaOR	CI
Intergenerational sex excluding transactional	70	1.67	(1.19-2.35)
Transactional sex excluding intergenerational	63	2.07	(1.21-3.54)
Intergenerational plus transactional v. whole sample [1]	168	3.62	(2.06-6.36)
Intergenerational plus transactional v. dual controls [2]	70	4.57	(2.58-8.08)

_____

[1]   Both intergenerational and transactional added within the full sample including
      those with values for only a single type of relationship (intergenerational or transactional)
[2]   Both intergenerational and transactional compared only to controls for either risk variable.

We also test whether age modifies the association of intergenerational partners and HIV. Logistic regressions were performed for each of three age groups: teens (15-19), early twenties (20-24), and mid to late twenties (25-29). The youngest (n=96) are least likely to be seropositive (14.43%) followed by 36.21% of the 20-24 year olds (n=381) and 68.23% of the 25-29-year-olds (n=406). The youngest group face the highest odds of HIV if they had an intergenerational partner (uOR=8.55, CI=2.1-35.3, p<.0001), followed by the 20-24-year-olds (uOR=2.08, CI=1.29-3.35, p=.002), and the 25-29- year-old group (uOR=1.6, CI=1.01-2.54, p=.045).

Cohabitation with a man is more common among teenage girls (15-19) who had an intergenerational partner. As many as 25% of girls who co-resided with a partner had an intergenerational relationship compared to only 5.5% of girls who had not lived with a man with an odds ratio of 5.66 (CI=1.44-22.4). The 20-24-year-old age group who lived with a man also had an elevated chance of having an intergenerational partner (uOR=1.62, CI=1.01-2.6), although there was no association among women 25-29.

Discussion

Women outpatients with a history of intergenerational partners show twice the odds of contracting HIV. The majority of their intergenerational partners are at least 30 years old, an age that demarcates an epidemiologic spike in HIV prevalence among men in South Africa (Akullian et al., 2017). Age asymmetry and the partner's age appear to be bidirectional. Akullian and colleagues contend that men's actual age accounts for HIV heterosexual transmission more than an age gap per se with the nexus of contagion in South Africa falling between women aged 15-24 and men 30-34 (Akullian et al., 2017). Further exploration of the significance of male partner's age may help to explain why the youngest participants in our study show the highest risk of infection when paired with an intergenerational partner despite originating from a low prevalence age group yet women over 30 are inured to the virus with intergenerational partners (Harling et al., 2015).

Our measures of childhood hardship were unrelated to HIV. The ACES-IQ assesses memories of child abuse and neglect distinguished women with intergenerational partners but not HIV. Although research in Tanzania, Namibia and Zimbabwe demonstrates HIV risk among women recounting abusive childhoods (Jewkes et al., 2010; Shamu et al., 2019) a meta-analysis

examining the link of child abuse history with HIV across studies is inconclusive including both null and positive findings (Norman et al., 2012). Within our sample the trajectory from child abuse and loss to HIV may only be indirect through intergenerational relationships. Retrospective accounts of childhood are distal forms of measurement and as such are subject to forgetting which attenuates the strength of association between child variables and adult outcomes.

Intergenerational relationships raise HIV risk for women adjusting for gender-based sources of risk such as transactional sex and intimate partner violence, which also influence the odds of HIV. Intergenerational and transactional sex are often linked in the literature (Jewkes et al., 2012; Mojola, 2014). We find that women who have both transactional and intergenerational partners – not necessarily the same person – see their risk for HIV double when compared to either experience alone.

The chance of HIV also multiplies for the youngest women with an age-disparate partner (OR=8.8). The widening peril adolescent girls face alarming (Magadi, 2011). In Kwazulu-Natal 8.3% of seropositive women under 25 have male partners at least 41 years old and only 30% pair with men close in age (De Oliveira et al., 2017). Compounding the risk for young women is our finding that one in four teenage girls with an intergenerational partner lives with a man outside marriage, in contrast to only 5% with age-concordant partners. Co-residing with a man may increase the risk of exposure to HIV due in part to more frequent sexual contact in contrast to dating relationships (Watkins, 2010). Moreover, the characteristics and motives of a man in his thirties who seeks a relationship with a teenager are dubious. Such men may be ill equipped to attract women closer in age due to perceived social or financial shortcomings or even a violent past. In fact, men who admit to cross-generational sexual contacts are less likely to use

condoms, more likely to retain multiple concurrent partners, to drink alcohol in excess and to engage in transactional sex than men whose partners are closer in age (Maughan-Brown et al, 2016). In addition to behaving irresponsibly, age discrepant men harbor misogynist attitudes (Dunkle et al, 2007) and rape acceptance myths (Kalichman et al., 2005). Yet co-residing with or without marriage in mixed-age long-term unions may be the key to "sustaining a generalized epidemic across generations." (Wyrod et al., 2011).

Limitations

Subjects were recruited in clinics non-randomly which tends to magnify the association between sexual risk behaviors and HIV compared to patterns in the general population (Geary et al., 2018). Nevertheless, the findings apply to patient populations seen every day in South Africa. Another study limitation is the ambiguity surrounding the time frame of key constructs designated as "ever" having occurred. Such protracted measurement leaves open whether the events occurred before or after receiving an HIV diagnosis. This lack of clarity is addressed in the Results section in which the age of onset for select risk behaviors is subtracted from the age at receiving an HIV diagnosis. We calculate that more than three years intercede between transactional sex or having an intergenerational partner and HIV. Such calculations confirm that these risk events precede contracting the virus and therefore may play a causal role. Finally, it is unknown whether our results apply to rural populations in South Africa. Gauteng is home to 25.8% of the country's population hosting large numbers of provincial migrants which make our findings relevant to a quarter of the population even if generalizability to rural provinces is indeterminate.

Conclusions

Gender disparities influence the spread of HIV in sub-Saharan Africa (Dellar et al., 2015; Gibbs et al., 2019; Jewkes & Morrell, 2010). Women's subordination may arise from cultural templates governing heterosexual relationships inflated with age discrepant partners (Magadi, 2011). Men's age superiority in relationships upholds gender inequality as reflected in transactional sex, intimate partner violence and ultimately the heightened risk of infection in our study. Without addressing gender disparities in sexual agency the "feminization" of the HIV epidemic will persist in South Africa and elsewhere in the world (Dworkin & Ehrhardt, 2007; Quinn & Overbaugh, 2005).

There are media campaigns in South Africa with the aim of discouraging girls' entry into cross-generational relationships while at the same time there is regular television coverage of men promoting themselves as "blessers" for young girls as in sexual predators disguised as benefactors. Yet women who accept their patronage run the risk of beatings (Durevall & Lindskog, 2015), sexually transmitted infections (Street et al., 2016), and HIV (Maughan-Brown et al.,2016; Ritchwood et al., 2016), offsetting any tangible gains. Promoting age-concordant relationships, with attention to teenage girls, could reduce the divergent sex ratio in HIV. Knowledge gaps about HIV poses another barrier to prevention since according to a recent survey of university students only 10% showed 100% knowledge of HIV, with extensive gaps in their knowledge of transmission (de Wet et al, 2019).   Promoting condom use is critical to prevention, and age discrepant couples report less condom use (Pettifor, 2009). Our data was restricted to "last sex" with HIV positive women reporting higher use and since the reference point follows the HIV diagnosis we were unable to explore this topic further. Had pre-exposure prophylaxis (PrEP) been available during the year of data collection (2016) we would have

inquired about its uptake in relation to age disparities but it was not and today only about 44,000 South African adults have received PrEP or tenofovir (PrEPwatch, 2019). Our findings do indicate that young women in cross-generational or transactional relationships should be placed at high priority for its distribution. Interventions narrowly focused on behavior change (e.g., ABC messages) may miss the chance to shape a wider canvas of gender norms (Dworkin & Ehrhardt, 2007). Programs advancing women's equality such as those addressing intimate partner violence have reduced the HIV risk for women in sub-Saharan Africa (Jewkes & Morrell, 2010; McCloskey et al., 2016). Research on gender inequities and HIV risk in South Africa can inform fresh approaches to prevention to stem the tide of HIV as it thwarts the health of both women and men in their prime (UNAIDS, 2018).

Disclosures

 "No potential competing interest was reported by the authors."

References

Akullian, A., Bershteyn, A., Klein, D., Vandormael, A., Bärnighausen, T., & Tanser, F. (2017). Sexual partnership age pairings and risk of HIV acquisition in rural South Africa. *AIDS (London, England)*, *31*(12), 1755–1764.

Anda, R. F., Dong, M., Brown, D. W., Felitti, V. J., Giles, W. H., Perry, G. S., ... & Dube, S. R (2009). The relationship of adverse childhood experiences to a history of premature death of family members. *BMC public health*, *9*(1), 106.

Beauclair, R., Dushoff, J., & Delva, W. (2018). Partner age differences and associated sexual risk behaviours among adolescent girls and young women in a cash transfer programme for schooling in Malawi. *BMC public health*, *18*(1), 1-12.`

Clark S. (2004) Early marriage and HIV risks in sub-Saharan Africa. *Studies in Family Planning*. 35(3):149-60.

Cluver L, Orkin M, Boyes M, Gardner F, Meinck F. (2011) Transactional sex amongst AIDS-orphaned and AIDS-affected adolescents predicted by abuse and extreme poverty. *JAIDS Journal of Acquired Immune Deficiency Syndromes.* 58(3):336-43.

Dellar RC, Dlamini S, Karim QA. (2015) Adolescent girls and young women: key populations for HIV epidemic control. *Journal of the International AIDS Society*. 18:19408.

De Oliveira, T., Kharsany, A. B., Gräf, T., Cawood, C., Khanyile, D., Grobler, A., ... & Karim, S. S. A. (2017). Transmission networks and risk of HIV infection in KwaZulu-Natal, South Africa: a community-wide phylogenetic study. *The lancet HIV*, *4*(1), e41-e50.

De Wet, N., Akinyemi, J., & Odimegwu, C. (2019). How Much Do They Know? An Analysis of the Accuracy of HIV Knowledge among Youth Affected by HIV in South Africa. *Journal of the International Association of Providers of AIDS Care (JIAPAC)*, *18*.

Dunkle, K. L., Stephenson, R., Karita, E., Chomba, E., Kayitenkore, K., Vwalika, C., ... & Allen, S. (2008). New heterosexually transmitted HIV infections in married or cohabiting couples in urban Zambia and Rwanda: an analysis of survey and clinical data. *The Lancet*, *371*(9631), 2183-2191.

Dunkle, K. L., Jewkes, R., Nduna, M., Jama, N., Levin, J., Sikweyiya, Y., & Koss, M. P. (2007). Transactional sex with casual and main partners among young South African men in the rural Eastern Cape: prevalence, predictors, and associations with gender-based violence. *Social science & medicine*, *65*(6), 1235-1248.

Durevall, D., & Lindskog, A. (2015). Intimate partner violence and HIV in ten sub-Saharan

African countries: what do the Demographic and Health Surveys tell us?. *The Lancet Global Health*, *3*(1), e34-e43.

Dworkin, S. L., & Ehrhardt, A. A. (2007). Going beyond "ABC" to include "GEM": critical reflections on progress in the HIV/AIDS epidemic. *American journal of public health*, *97*(1), 13-18.

Evans M, Risher K, Zungu N, Shisana O, Moyo S, Celentano DD, et al. (2016) Age-disparate sex and HIV risk for young women from 2002 to 2012 in South Africa. *Journal of the International AIDS Society.* 19(1):21310.

Garcia-Moreno C, Jansen HA, Ellsberg M, et al. (2006) Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. *The Lancet*. 368:1260-9.

Geary, R. S., Copas, A. J., Sonnenberg, P., Tanton, C., King, E., Jones, K. G., …& Mercer, C. H. (2018). Sexual mixing in opposite-sex partnerships in Britain and its implications for STI risk: findings from the third National Survey of Sexual Attitudes and Lifestyles (Natsal-3). *International journal of epidemiology*, *48*(1), 228-242.

George G, Maughan-Brown B, Beckett S, Evans M. (2018) An examination of men's wealth and age disparate partnerships in South Africa: a nationally representative cross-sectional survey. *Sexuality & Culture*. 2018:1-2.

Gibbs, A., Dunkle, K., Willan, S. et al. (2019) Are women's experiences of emotional and economic intimate partner violence associated with HIV-risk behavior? A cross-sectional analysis of young women in informal settlements in South Africa. *AIDS Care,* 31, 556-

674. relationship between poverty and HIV?. *Public Health Reports*, *125*(4_suppl), 16-24.

Gibbs A, Dunkle K, Washington L, Willan S, Shai N, Jewkes R. (2018) Childhood traumas as a risk factor for HIV-risk behaviours amongst young women and men living in urban informal settlements in South Africa: a cross-sectional study. *PloS one*. 13(4):e0195369.

Gillespie S, Kadiyala S, Greener R. (2007) Is poverty or wealth driving HIV transmission? *AIDS*. 2007;2:5-16.

Gregson, S., Nyamukapa, C. A., Garnett, G. P., Wambe, M., Lewis, J. J., Mason, P. R., ... & Anderson, R. M. (2005). HIV infection and reproductive health in teenage women orphaned and made vulnerable by AIDS in Zimbabwe. *AIDS care*, *17*(7), 785-794.

Hargreaves, J. R., Morison, L. A., Kim, J. C., Busza, J., Phetla, G., Porter, J. D., ... & Pronyk, P. M. (2009). Characteristics of sexual partnerships, not just of individuals, are associated with condom use and recent HIV infection in rural South Africa. *AIDS care*, *21*(8), 1058-1070.

Harling G, Newell ML, Tanser F, Kawachi I, Subramanian SV, Barnighausen T. (2014) Do age-disparate relationships drive HIV incidence in young women? Evidence from a population cohort in rural KwaZulu-Natal, South Africa. *Journal of Acquired Immune Deficiency Syndromes*. 2014;66(4):443–451

Harling, G., Newell, M. L., Tanser, F., & Bärnighausen, T. (2015). Partner age-disparity and HIV incidence risk for older women in rural South Africa. *AIDS and behavior*, *19*(7), 1317-1326.

Harrison A, Cleland J, Frohlich J. (2008) Young people's sexual partnerships in KwaZulu-Natal,

South Africa: patterns, contextual influences, and HIV risk. *Studies in family planning.* 2008; 39 (4):295-308.

Hurt CB, Matthews DD, Calabria MS, et al. (2010) Sex with older partners is associated with primary HIV infection among men who have sex with men in North Carolina. *J Acquir Immune Defic Syndr.* 54:185–90.

Jewkes, R., Dunkle, K., Nduna, M., & Shai, N. J. (2012). Transactional sex and HIV incidence in a cohort of young women in the stepping stones trial. *Journal of AIDS and Clinical research*, *3*(5).

Jewkes, R. K., Dunkle, K., Nduna, M., Jama, P. N., & Puren, A. (2010). Associations between childhood adversity and depression, substance abuse and HIV and HSV2 incident infections in rural South African youth. *Child abuse & neglect*, *34*: 833-841.

Jewkes R, Morrell R. (2010 Gender and sexuality: emerging perspectives from the heterosexual epidemic in South Africa and implications for HIV risk and prevention. *Journal of the International AIDS society.* 13:6-11.

Kalichman, S. C., Simbayi, L. C., Kaufman, M., Cain, D., Cherry, C., Jooste, S., & Mathiti, V. (2005). Gender attitudes, sexual violence, and HIV/AIDS risks among men and women in Cape Town, South Africa. *Journal of sex research*, *42*(4), 299-305.

Kelly, R. J., Gray, R. H., Sewankambo, N. K., Serwadda, D., Wabwire-Mangen, F., Lutalo, T., & Wawer, M. J. (2003). Age differences in sexual partners and risk of HIV-1 infection in rural Uganda. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *32*(4), 446-451.

Kharsany, A. B., Buthelezi, T. J., Frohlich, J. A., Yende-Zuma, N., Samsunder, N., Mahlase, G.,

... & Karim, S. S. A. (2014). HIV infection in high school students in rural South Africa: role of transmissions among students. *AIDS research and human retroviruses*, *30*(10), 956-965.

Koss, M. P., Abbey, A., Campbell, R., Cook, S., Norris, J., Testa, M., & White, J. (2007). Revising the SES: A collaborative process to improve assessment of sexual aggression and victimization. *Psychology of Women Quarterly*, *31*(4), 357-370.

Kalichman, S. C., Simbayi, L. C., Kaufman, M., Cain, D., & Jooste, S. (2007). Alcohol use and sexual risks for HIV/AIDS in sub-Saharan Africa: systematic review of empirical findings. *Prevention science*, *8*(2), 141.

Leclerc-Madlala, S. (2008). Age-disparate and intergenerational sex in southern Africa: the dynamics of hypervulnerability. *Aids*; 22: S17-S25.

Luke N. (2005) Confronting the 'sugar daddy' stereotype: age and economic asymmetries and risky sexual behavior in urban Kenya. *International Family Planning Perspectives*. Mar:6-14.

Magadi MA. (2011) Understanding the gender disparity in HIV infection across countries in sub-Saharan Africa: evidence from the Demographic and Health Surveys. *Sociology of Health & Illness.* 2011 33(4):522-39.

Mah TL, Halperin DT. (2010) Concurrent sexual partnerships and the HIV epidemics in Africa: evidence to move forward. *AIDS and Behavior.* 14(1):11-6.

Maughan-Brown B, Kenyon C, Lurie MN. (2014) Partner age differences and concurrency in South Africa: implications for HIV-infection risk among young women. *AIDS and Behavior.* 2014;182469-2476. doi:10.1007/s10461-014-0828-6

Maughan-Brown B, Evans M, George G. (2016) Sexual behaviour of men and women within
    age-disparate partnerships in South Africa: implications for young women's HIV risk.
    PloS One. 11(8):e0159162.

McCloskey LA, Boonzaier F, Steinbrenner SY, Hunter T. (2016) Determinants of intimate
    partner violence in sub-Saharan Africa: a review of prevention and intervention
    programs. *Partner abuse*; 7:277-307.

Mojola, SA. (2014) *Love, money and HIV: becoming a modern African woman in the age of
    AIDS.* Oakland: University of California Press; 2014.

Morrison-Beedy D, Xia Y, Passmore D. (2013) Sexual risk factors for partner age discordance in
    adolescent girls and their male partners. *Journal of Clinical Nursing*. 22(23-24):3289-99.

Norman, R. E., Byambaa, M., De, R., Butchart, A., Scott, J., & Vos, T. (2012). The long-term
    health consequences of child physical abuse, emotional abuse, and neglect: a systematic
    review and meta-analysis. *PLoS Med*, *9*(11), e1001349.

Peltzer, K., & Mlambo, G. (2013). Sexual HIV risk behaviour and associated factors among
    pregnant women in Mpumalanga, South Africa. *BMC pregnancy and childbirth*, *13*(1),
    57.

Pettifor, A., O'Brien, K., MacPhail, C., Miller, W. C., & Rees, H. (2009). Early coital debut and
    associated HIV risk factors among young women and men in South Africa. *International
    perspectives on sexual and reproductive health*, 82-90.

PrEPwatch report: South Africa 2019; https://www.prepwatch.org/country/south-africa/
    New York: AVAC.

Quinn, T. C., & Overbaugh, J. (2005). HIV/AIDS in women: an expanding epidemic. *Science*, *308*(5728), 1582-1583.

Ritchwood TD, Hughes JP, Jennings L, MacPhail C, Williamson B, Selin A, et al. (2016) Characteristics of age-discordant partnerships associated with HIV risk among young South African women *Journal of Acquired Immune Deficiency Syndromes*. 2016; 72(4):423-427.

Schaefer R, Gregson S, Eaton JW, Mugurungi O, Rhead R, Takaruza A, et al. (2017) Age-disparate relationships and HIV incidence in adolescent girls and young women: evidence from Zimbabwe. *AIDS*. 10:1461.

Shamu, S., Shamu, P., Zarowsky, C., Temmerman, M., Shefer, T., & Abrahams, N. (2019). Does a history of sexual and physical childhood abuse contribute to HIV infection risk in adulthood? A study among post-natal women in Harare, Zimbabwe. *PLoS one*, *14*(1), e0198866.

Street, R. A., Reddy, T., & Ramjee, G. (2016). The generational effect on age disparate partnerships and the risk for human immunodeficiency virus and sexually transmitted infections acquisition. *International journal of STD & AIDS*, *27*(9), 746-752.

Sturdevant MS, Belzer M, Weissman G, Friedman LB, Sarr M, Muenz LR, (2001) Adolescent Medicine HIV/AIDS Research Network. The relationship of unsafe sexual behavior and the characteristics of sexual partners of HIV infected and HIV uninfected adolescent females. *Journal of Adolescent Health.* 29(3):64-71.

Thurman, T. R., Brown, L., Richter, L., Maharaj, P., & Magnani, R. (2006). Sexual risk behavior

among South African adolescents: is orphan status a factor?. *AIDS and Behavior*, *10*(6),

627-635.

UNAIDS report, 2017 Geneva, Switzerland

https://www.unaids.org/en/regionscountries/countries/southafrica

UNAIDS: Strive report, 2017 Geneva, Switzerland

https://www.unaids.org/sites/default/files/media_asset/transactional-sex-and-hiv-

risk_en.pdf

UNAIDS (2018) *Transactional sex and HIV risk: from analysis to action.* Geneva, Joint United

Nations Programme on HIV/AIDS and STRIVE.

UNAIDS report, 2019 Geneva, Switzerland

https://www.unaids.org/sites/default/files/media_asset/2019-UNAIDS-data_en.pdf

Wand H, Ramjee G. The relationship between age of coital debut and HIV seroprevalence

among women in Durban, South Africa: a cohort study. (2012) *BMJ Open.* 2012; 2:

Wehler CA, Scott RI, Anderson JJ. (1992) The Community Childhood Hunger Identification

Project: a model of domestic hunger—demonstration project in Seattle, Washington.

Journal of nutrition education. 1:29S-35S.

Watkins, S.C. Back to basics: gender, social norms and the AIDS epidemic in Sub-Saharan

Africa. In Sahn DE (Editor) (2010) *Socioeconomic dimensions of HIV/AIDS in Africa.*

Ithaca, NY: Cornell University Press; 134-162.

Weiser S D, Leiter K, Bangsberg D R, Butler L M, Percy-de Korte F, Hlanze Z, et al. Food

insufficiency is associated with high-risk sexual behavior among women in Botswana
and Swaziland. (2007) *PLoS Medicine*. 4:e260.

Wyrod R, Fritz K, Woelk G, Jain S, Kellogg T, Chirowodza A, et al. (2011) Beyond sugar
daddies: intergenerational sex and AIDS in urban Zimbabwe. *AIDS and Behavior*.
15(6):1275-82.

World Health Organization. (2011) *Adverse Childhood Experiences International Questionnaire*
(ACE-IQ) www.who.int/violence_injury_prevention/violence/activities/adverse_
childhood_experiences/en/

Zembe YZ, Townsend L, Thorson A, Silberschmidt M, Ekstrom AM. (2015) Intimate partner
violence, relationship power inequity and the role of sexual and social risk factors in the
production of violence among young women who have multiple sexual partners in a peri-
urban setting in South Africa. *PloS one*, 10: e0139430.