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 JOURNAL OF
 ADOLESCENT
 HEALTH

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Original article

Associations Between Fathers' and Sons' Sexual Risk in Rural Kenya: The Potential for Intergenerational Transmission

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Article history: Received October 27, 2016; Accepted February 9, 2017

Keywords: Fathers; Adolescents; HIV; Sexual risk behavior; Parenting; Africa

 A B S T R A C T

Purpose: Despite high rates of HIV in areas of Sub-Saharan Africa and men's role in driving the epidemic, little is known about whether or how sexual risk—both behaviors and beliefs—may be passed down through generations of males. This study examined associations between sexual risk behaviors and sex-related beliefs of adolescent males and those of their male caregivers in Kenya, as well as the potential moderating effects of parenting characteristics and father-son relationship quality.

Methods: Cross-sectional linear regression analysis was applied to baseline data from a trial of a family- and church-based intervention for families in rural Kenya that followed a stepped-wedge cluster randomized design. Our subsample consisted of 79 male caregiver and son (aged 10–16 years) dyads.

Results: Results demonstrated a direct relationship between fathers' and sons' sex-related beliefs that was not moderated by parenting or quality of father-son relationship. Parenting/relationship characteristics did moderate the relationship between fathers' and sons' sexual behavior; if fathers did not engage in high-risk sex and exhibited more positive parenting/higher relationship quality, their sons were less likely to be sexually active. Among fathers having high-risk sex, parenting was unrelated to sons' behavior except at very high levels of positive parenting/relationship quality; at these levels, sons were actually more likely to have had sex.

Conclusions: Findings support recommendations to include male caregivers in youth HIV prevention efforts, potentially by targeting fathers' parenting strategies and their individual risk.

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 IMPLICATIONS AND
 CONTRIBUTION

This study examines the influence of fathers—an under-represented group in adolescent research—on male adolescents' sexual beliefs and behavior. Engaging fathers in parenting- and family-based HIV prevention programs is likely important. Targeting men's own HIV risk behaviors, before or in tandem with youth interventions, may represent a promising strategy in HIV risk prevention.

Sub-Saharan Africa bears the burden of the highest rates of HIV in the world, accounting for approximately 70% of new HIV infections worldwide [1]. Of these, approximately 30% occur among young people aged 15–24 years [1]. In Sub-Saharan Africa, men are considered important drivers of the HIV

epidemic, as heterosexual sex is the primary mode of HIV transmission [1], and patriarchal norms, present in many societies, increase men's power in sexual decision-making [2]. For young males, such cultural norms can place reputational value on sexual activity, contributing to early sexual debut [3,4]. The cultural and behavioral patterns that impact male youths' sexual risk are perpetuated in many ways, including parental influence. Parents may teach and shape beliefs and behaviors that promote sons' risky behavior. Fathers likely play an especially important role, as they are uniquely positioned to pass down masculine gender norms [5]. Despite the relevance of examining fathers'

Conflicts of Interest: The authors have no conflicts of interest to disclose.

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influence on sons' sexual risk, little is known about this association, in part because fathers are generally under-represented in research on adolescent development [6]. Understanding how fathers' and sons' sexual beliefs and behaviors are related and how parenting might influence that relationship has the potential to inform strategies for decreasing adolescents' HIV risk.

Ecological systems surrounding youth impact risk and belief development with families and parents emerging as especially impactful [7,8]. Unsurprisingly, children often develop beliefs and behaviors similar to their primary caregivers. This phenomenon, termed intergenerational transmission, refers to the passing down of beliefs, norms, or behaviors from one generation to another [9]. Behaviors, such as parenting styles [10] and criminal behavior [11], as well as beliefs, such as religion [12] and gender roles [13], have been shown to be "transmitted" from parent to child. This transmission can be explained by processes ranging from genetics to cultural climate but is often understood through social cognitive theory that recognizes the potential for behaviors to be learned through observation without explicit instruction [14].

Characteristics of caregiver-child interactions, such as communication quality, warmth, and parental involvement, likely influence the occurrence and nature of transmission [9]. These interaction patterns can guide opportunities for belief-related conversations, observations, and learning of parental behavior [15]. Parenting behaviors may further impact the extent of transmission, with evidence suggesting that positive parenting characteristics—warmth, support—may be associated with increased dyad similarity [16].

In addition, gender, of both parents and children, should be considered given transmission strength can increase within same gender parent-child dyads [17]. The tendency for children to communicate more with their same-gendered parent [5], model same-gendered individuals, and identify most with their same-gendered parent [5,18], likely contribute to transmission. These patterns extend to fathers' and sons' behaviors and beliefs, including early fatherhood [19] and motivations for drinking [20].

Regarding sexual risk behaviors, less is known about which parenting behaviors are most impactful for sons. The extant studies show mixed results with fathers' communication, involvement, and support emerging as risk factors in some studies and as protective in others [21,22]. A study in four African countries found that male adolescents in Malawi who had more communication with either parent were actually more likely to have engaged in sexual risk behavior, although no associations were found for youth in Ghana, Burkina Faso, and Uganda [23].

Cultural and gender norms may help to explain why fathers' communication and involvement with adolescents may not be uniformly protective. For instance, qualitative work conducted in East Africa demonstrated the salience of sexual activity to masculine identity and reputation that the author proposes may become more emphasized in changing global climates that may economically disempower men [24]. This points to one possibility that when risky sexual behaviors are more culturally normative among men, fathers may endorse risky behaviors, either explicitly or implicitly, through their interactions with their sons. In one qualitative study in Tanzania, men were found to speak with boys about sex in a joking/sarcastic manner, perhaps inadvertently encouraging risky practices [17]. This was further emphasized in a separate qualitative study in Tanzania demonstrating that sexual norms, such as the acceptability of concurrent sexual partners, may be passed down through intergenerational communication between fathers and sons [25].

In this study, we aimed to build on previous qualitative findings to quantitatively explore the associations among sexual risk-related beliefs and behaviors from primary male caregivers to their sons in rural Kenya. We first examined whether relationships exist between fathers' and sons' endorsement of risky sexual beliefs and sexual behavior. We hypothesized that fathers' higher endorsement of risky sexual beliefs would be associated with sons' endorsement of those beliefs and that male caregivers' risky sexual activity would be associated with an increased likelihood of sexual activity among sons. We then tested whether father-son relationship quality (i.e., warmth) and parenting behaviors (i.e., involvement) moderated these relationships. We expected the strength of associations to vary by relationship quality and parenting such that higher quality/more involved parenting would increase similarities.

Methods

Setting

This study was conducted in Muhuru Bay, a rural division of Migori County, Kenya, located on Lake Victoria. Like other lake-shore communities in western Kenya, Muhuru is characterized by a high prevalence of HIV with the most recent estimate at 15.1% [26]. This translates into high levels of risk for youth in this area where 22% of boys and 11% of girls are likely to be sexually active before the age of 15 years [27].

Participants and procedures

Data for this study came from a trial of a family- and church-based intervention for families that aimed to strengthen family relationships and prevent HIV risk behavior [28]. The trial followed a stepped-wedge cluster randomized design. A total of 56 churches were identified from diverse denominations (e.g., Protestant, indigenous, and Catholic), and four were randomly selected to participate through lotteries conducted by community leaders. This resulted in the inclusion of three protestant and one indigenous church. Families were eligible if they had at least one adolescent (10–16 years) living at home. They were encouraged to include multiple caregivers and adolescents per household in the intervention and assessments. The subsample for the present study consisted of 79 dyads of male caregivers ($n = 61$) and male youths in their care ($n = 79$) from a larger sample of 211 female and male caregivers and 237 youths from 124 households. All male caregivers were primary caregivers of the target child in that they had direct caregiving involvement. They were not required to be biological fathers, as caregiving arrangements vary widely in this context.

This study used baseline survey data only, which was collected at the same time for all participants before the intervention. Trained Kenyan research volunteers verbally administered surveys to participants one-on-one using handheld computers in private locations near participants' homes. All procedures were approved by the institutional review boards at Duke University and the Kenya Medical Research Institute.

Measures

Surveys assessed sexual behaviors, endorsement of risky sex beliefs, parenting and relationship quality indicators, and

individual- and household-level demographics. Internal consistency reliability was estimated using full sample data.

Sexual behavior

Father sexual risk behavior. The survey assessed indicators of father sexual behavior across all reported partners in the past 3 months. For each partner, participants were asked five questions: (1) whether that partner was their spouse; (2) whether they had any unprotected sex with that partner; (3) the number of unprotected sexual encounters with that partner; (4) whether they knew the partner's HIV status; and (5) whether they thought it was possible that the partner might be HIV positive. They also were asked whether they knew their own HIV status and if they had ever been tested for HIV. These items were used to create a "high-risk sex" composite that accounts for a combination of behaviors placing the caregiver or his partner at risk for HIV: having sex without a condom in cases where the partner or father might be HIV positive or are known to be HIV positive. Thus, respondents were at "high risk" if they reported unprotected sex with any partner and one or more of the following: (1) never having been HIV tested; (2) not knowing their partner's or their own HIV status; and (3) believing their partner is HIV positive.

We used this definition of high risk rather than more typical indicators, such as multiple partners, because the majority of those reporting multiple partners were in polygamous marriages (18 of 26), which are common in this context [29]. Furthermore, since condom use is less normative in marriage relationships, we did not assume that having sex, even unprotected, with multiple people (often all spouses) was itself a clear risk indicator. Therefore, our approach avoids overestimating risk in this context. Secondary analyses were conducted using multiple partners to examine hypotheses with a more standard indicator.

Youth sexual behavior. The primary indicator for sexual behavior among youth was defined as whether the youth had ever had vaginal intercourse (yes/no) given the young mean age of participants. Sexually active youth were also asked about their number of sexual partners and number of sexual encounters without a condom in the past 3 months; the subset of youth reporting unprotected sex with multiple partners was too small for analyses.

Sex beliefs: Endorsement of risky sexual beliefs and behaviors

Fathers completed a seven-item measure assessing level of agreement with statements related to beliefs and behaviors associated with HIV risk on a four-point Likert-type scale (referred to as "sex beliefs"). As an example, one statement was, "It is ok for men to have many sexual partners." Higher scores indicated endorsement of riskier beliefs/behaviors ($\alpha = .60$). Youth completed a parallel eight-item measure with one unique item: "It is okay to have sex when you do not want to if your partner insists on having sex" ($\alpha = .70$).

Parenting and relationship quality

Youth reported on five indicators about parenting and relationship quality described in the following section. The first four were combined to create a composite score calculated by standardizing and summing scores on the individual scales, then

standardizing the resulting score ($M = 0$, standard deviation = 1). Higher composite scores were more positive. The fifth, communication about sex and HIV, was analyzed separately.

Parental involvement. A seven-item subscale of the Alabama Parenting Questionnaire [30] was used to assess level of involvement in youths' daily lives (e.g., helping with homework) during the past 3 months. Items used a five-point Likert-type frequency scale ($\alpha = .71$).

Negative interactions and social support. These were assessed with the Network of Relationships Inventory [31], a youth-report measure of relationship quality using a five-point Likert scale. Nine items assessed negative interactions such as frequency of conflict. Items were reverse scored with higher scores indicating fewer negative interactions ($\alpha = .77$). For social support, 21 items assessed frequency of supportive behaviors, such as sympathy and advice giving ($\alpha = .93$).

Quality of communication. Eight items adapted from the Parent-Adolescent Communication Scale [32] measured how well fathers and sons communicate. Youth used a four-point Likert scale to endorse agreement with statements describing these qualities ($\alpha = .81$).

Quality of communication about sex and HIV. A seven-item Sex and HIV Communication scale with a four-point Likert scale assessed youths' perception of openness and receptiveness while talking with their fathers about these issues [33]; higher scores were more positive ($\alpha = .63$).

Statistical strategy

Participant characteristics and descriptives were computed using basic correlations, means, and proportions. The following ordinary least squares linear regression equation was used to estimate moderation effects:

$$Y_{ihk} = b_0 + b_1X + b_2Z + b_3XZ + b_4C_i + W'_{kh} + \varepsilon_{ihk}$$

where Y_{ihk} represents the outcome of interest for person k in household h from church i (i in 1, ..., $C-1$, where $C = 4$); b_1 represents the coefficient on the caregiver-reported predictor; b_2 represents the proposed moderator coefficient; b_3 is the interaction coefficient; b_4 is a fixed effect of church i ; and W'_{kh} represents person- and household-level controls. Main effects were tested with a specification that excluded the interaction term. Households were nested within churches, and youth were nested within households in the case of siblings. Clustering at the church level was essentially nonexistent; clustering at the household level was more pronounced. As such, standard errors at the household level were clustered for analyses (To account for the nested data, we attempted to fit linear mixed-effects models for the continuous and binary outcomes, but some models failed to converge. For this reason, we addressed nonindependence by clustering standard errors.).

Continuous predictors were standardized ($M = 0$, standard deviation = 1), and covariates included father age, youth age, an indicator of whether the youth's biological mother or father was alive, household income, an indicator for whether the father was working, and fathers' education. Separate models were fit for combinations of youth outcomes, father-level predictors, and

Table 1
Participant characteristics

Variables	N	Mean (SD) or %
Fathers	61	
Age (SD)		45.7 (14.3)
Working (%)		95.1
Luo tribe (%)		20.7
Suba tribe (%)		79.3
Completed primary school (%)		61.7
Caregiver type		
Biological father		74.7
Uncle		9.9
Grandparent		3.8
Brother		2.8
Nonbiological male caregiver		8.8
Male youth	79	
Age		12.0 (2.0)
Attends school (%)		98.7
Biological mother alive (%)		87.3

SD = standard deviation.

potential moderators for main effect and moderation models. By applying ordinary least squares linear regression to binary outcomes, we used the linear probability model to estimate the predicted probability of behavior outcomes. We opted for the linear probability model over logistic regression methods because of our small sample [34].

Moderation effects were plotted as simple regression equations of Y on X at Z_m , Z_H , and Z_L , where Z_m is the moderator mean, Z_H is one standard deviation above the mean, and Z_L is one standard deviation below the mean. Moderation effects were probed using simple slopes analysis conducted with the online interaction tools by Preacher et al. (2006) following Aiken and West's procedures for explication [35,36]. Analyses were performed using R version 3.3.0, a free statistical computing software environment (<https://cran.r-project.org/bin/windows/base>).

Results

Table 1 summarizes demographic data. Male caregivers ranged in age from 18 to 91 years with a median age of 42 years. Male youth ranged in age from 10 to 16 years with a median age of 12 years. Most caregivers reported working (95%) with the majority self-employed as fisherman (68%), and the median reported monthly household income was 5,600 Kenyan shillings (\$54.71 USD). Within the dyads, 74.7% of caregivers were biological fathers; the remainder were uncles or older brothers (12.7%), grandfathers (3.8%), or nonbiologically related caregivers (8.8%).

Table 2
Frequencies of male caregivers HIV risk indicators

	Monogamous (34)		Multiple partners (26)		Total row frequency Total = 60 ^a	Percent of sexually active sample N = 60
	Spouse only (32)	Nonspouse partner (2)	Polygamous: spouses only (18)	Any nonspouse partner (8)		
Any sex without a condom	30	2	18	7	57	95.0%
Unknown HIV status or never tested	14	2	9	4	29	48.3%
Partner possibly HIV positive	28	2	15	7	52	86.7%
High-risk sex	19	2	14	6	41	68.3%

^a One older male caregiver reported no partner; Totals = the sum of rows frequencies; Any sex without a condom = any unprotected sex within the last 3 months of survey; Unknown HIV status or never tested = sum of caregivers who reported not knowing their HIV status and/or reporting that they have never been HIV tested in their lifetime; Partner possibly HIV positive = sum of caregivers reporting their partner may possibly have HIV or reporting not knowing the HIV status of their partner; High-risk sex = unprotected sex when self or partner possibly HIV positive; numbers in parentheses () = frequency of caregivers.

Table 2 presents data on caregivers' HIV risk indicators. Caregiver endorsement of risky sexual beliefs and behaviors was limited in range and variability. Men reported an average of 1.6 partners in the past 3 months. Of the 43% reporting multiple partners, 27% reported having a partner who was not their spouse, and 73% reported multiple spouses. Two thirds (68.3%) were identified as having engaged in "high-risk" behavior. Among youth, 32% reported having had vaginal sex; their sex beliefs scores were also limited in range with mean scores suggesting low-level endorsement of risky beliefs (see Table 3).

Across measures of parenting and relationship quality, mean scores fell in the upper range, reflecting relatively positive responses, with the exception of communication specifically about sex (Table 3).

Correlational analyses

Father and youth sex beliefs were significantly correlated at an alpha level of .05 ($r = .45$), and likelihood of youth sexual intercourse was significantly associated with their sex beliefs ($r = .28$). A significant inverse correlation was seen between social support received from fathers and youth sex beliefs ($r = -.29$).

Main effects

We observed significant relationships between fathers and sons' sex beliefs and parenting/relationship quality (Table 4). Results indicated that as fathers' endorsement of risky sex beliefs increased, sons' endorsement of risky sex beliefs also increased. We observed two direct relationships between parenting/relationship quality and youth sex beliefs: higher scores on the parenting/relationship quality composite and higher levels of paternal social support both had an inverse association with sons' risky sex beliefs. We did not detect any significant relationships between fathers' sexual behavior on sons' sexual behavior or of parenting/relationship factors on sons' behavior in primary or secondary analyses when interaction terms were excluded.

Moderation effects

For sex-related beliefs, none of the parenting/relationship quality variables moderated the relationship between fathers' and sons' endorsement of risky beliefs (Table 4). Parenting/relationship quality did moderate the relationship between fathers' and sons' reported sexual activity. A significant

Table 3
Descriptive statistics for key outcomes and potential moderators

Variables	Scale	Fathers	Male youth
Sexual risk beliefs			
Sex Beliefs scale (SD)	1–4	1.6 (.4)	1.6 (.4)
Sexual risk behavior last 3 months			
Ever vaginal sex (%)	Yes/no	—	31.6
Number of partners (SD)		1.6 (.9)	1.3 (1.2) ^a
Unprotected sex (%)		93.4 ^b	84.2 ^a
High-risk sex (%)		46.3 ^c	89.5 ^a
Potential moderators: fathering			
Frequency of communication about sex (SD)	0–3	1.1 (.8)	.6 (.5)
Quality of communication about sex (SD)	1–4	2.8 (.5)	2.3 (.6)
Parent-adolescent communication (SD)	1–4	3.0 (.4)	3.0 (.4)
Paternal involvement (SD)	1–5	3.4 (.7)	2.8 (.7)
Social support (SD)	1–5	3.7 (.6)	3.3 (.7)
Negative interactions ^d (SD)	1–5	1.6 (.5)	1.7 (.5)

SD = standard deviation; — = not assessed.

^a Among youth who reported ever having vaginal sex.

^b With any partner.

^c High-risk sex refers to unprotected sex when self or partners is possibly HIV positive as indicated by caregiver reporting their sexual partner may be HIV positive or reporting they do not know their partners HIV status.

^d Interactions for this table are reported with higher scores indicating more negative interactions, this indicator was reverse scored in analysis.

association between father sexual behavior and youth sexual behavior emerged at higher levels of positive engaged parenting/relationship quality (Figure 1). If the father did not engage in high-risk sex, high parenting/relationship composite scores were associated with the lowest likelihood of youth sexual activity, and low parenting/relationship composite scores were associated with the highest likelihood of youth sexual activity ($Z = -.26$). When the father did engage in high-risk sex, parenting/relationship quality was less associated with youth behavior. However, at parenting composite scores over 1.6 standard deviations above the mean, father risk behavior became significantly associated with youth likelihood of having engaged in sex. In secondary analyses, fathers' report of multiple sexual partners was also associated with higher likelihood of sons' sexual activity at very high composite scores.

Two significant moderation effects were present when individual indicators of parenting/relationship quality were examined separately. Negative parent-adolescent interactions and quality of father-son general communication each moderated the relationship between father and son sexual behavior. Interaction patterns matched composite results with higher quality communication and fewer negative interactions associated with lower probability of sons' sexual activity if fathers did not engage in risky sexual behavior. Quality of communication about sex and HIV-related topics did not moderate the relationship.

Discussion

This study is the first to our knowledge to quantitatively examine the relationship between fathers' sex-related beliefs and behaviors to their sons in a low- or middle-income country. Results contribute to a better understanding of fathers' influence on male youth sexual risk with potential implications for prevention. For sex-related beliefs, results suggest fathers' endorsement of risky beliefs was related to sons' endorsement of these beliefs—a finding consistent with previous literature documenting belief transmission [9].

Table 4
Regression results for youth "sex beliefs" and sexual behavior

	Moderator 1, parenting composite		Moderator 2, MCG involvement, YR		Moderator 3, social support, YR		Moderator 4, negative interactions, YR (reverse scored)		Moderator 5, quality of communication, YR		Moderator 6, quality of communication about sex, YR	
	No Int. B (SE)	Full B (SE)	No Int. B (SE)	Full B (SE)	No Int. B (SE)	Full B (SE)	No Int. B (SE)	Full B (SE)	No Int. B (SE)	Full B (SE)	No Int. B (SE)	Full B (SE)
Youth sex beliefs												
Sex beliefs, CR	.13 (.03) ^{***}	.13 (.03) ^{***}	.14 (.03) ^{***}	.15 (.03) ^{***}	.11 (.03) ^{***}	.11 (.03) ^{***}	.15 (.03) ^{***}	.14 (.03) ^{***}	.13 (.04) ^{***}	.13 (.04) ^{***}	.15 (.03) ^{***}	.15 (.03) ^{***}
Moderator	-.09 (.04) ^{**}	-.09 (.04) [*]	-.04 (.04)	-.04 (.04)	-.13 (.03) ^{***}	-.13 (.03) ^{***}	-.04 (.03)	-.03 (.03)	-.06 (.04)	-.07 (.04)	.04 (.03)	.02 (.04)
Interaction (moderator × MCG sex beliefs)	—	.00 (.03)	—	.03 (.04)	—	.01 (.02)	—	.04 (.03)	—	-.03 (.04)	—	.03 (.05)
N	77	76	76	75	76	76	76	76	69	69	75	75
Adj. R ²	.21	.31	.32	.30	.38	.37	.28	.27	.23	.34	.29	.28
Youth sex behavior												
MCG risky sex	-.13 (.12)	-.13 (.11)	-.15 (.13)	-.14 (.13)	-.14 (.12)	-.16 (.12)	-.15 (.13)	-.17 (.12)	-.06 (.13)	-.02 (.11)	-.18 (.13)	-.19 (.13)
Moderator	-.07 (.06)	-.34 (.07) ^{***}	-.03 (.05)	-.11 (.13)	-.07 (.06)	-.25 (.14)	-.04 (.05)	-.30 (.11) ^{**}	-.08 (.06)	-.35 (.08) ^{***}	.05 (.05)	.09 (.14)
Interaction (moderator × MCG risky sex)	—	.35 (.09) ^{***}	—	.10 (.14)	—	.25 (.15)	—	.33 (.11) ^{**}	—	.37 (.09) ^{***}	—	-.06 (.15)
N	77	77	75	75	77	77	77	77	69	69	75	75
Adj. R ²	.21	.30	.34	.18	.21	.25	.20	.27	.23	.34	.20	.19

* $p < .05$, ** $p < .01$, *** $p < .001$.

Covariates were excluded.

CR = caregiver report; MCG = male caregiver; SE = standard error; YR = youth report; No Int. = analyses with no interaction term; Full = Analyses with interaction term; Risky sex = unprotected sex and self or other possibly HIV positive.

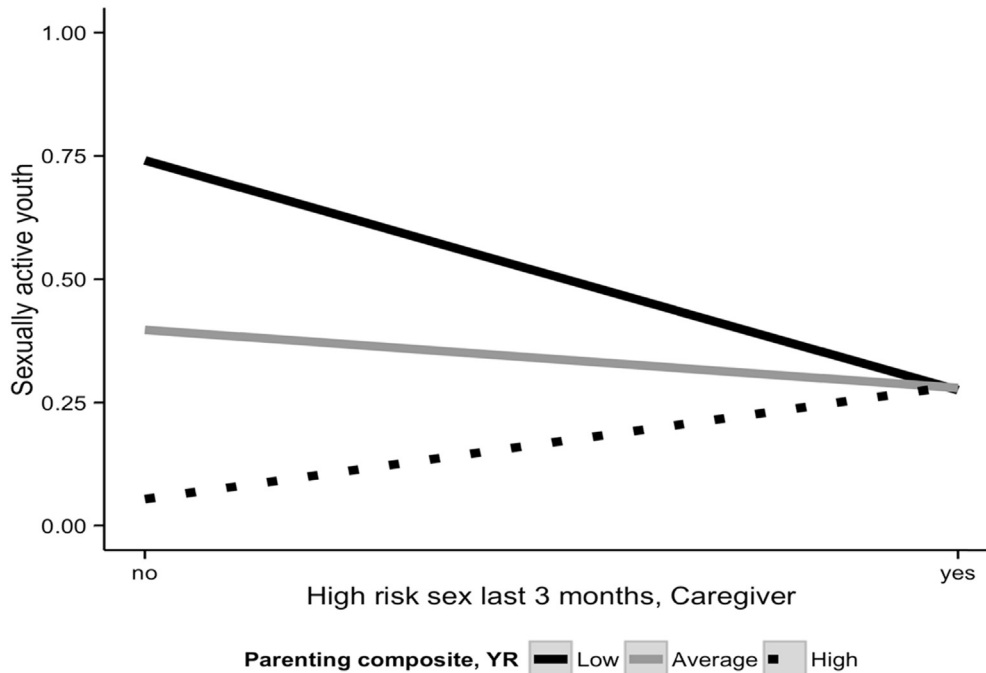


Figure 1. Probability of youth sex activity by MCG sex risk by parenting composite scores. The figure illustrates the moderation effect showing the relationship between whether fathers engage in high-risk sex (yes/no) and sons' engagement in sexual activity at differing levels of the parenting composite: high = 1 SD above the mean, average = mean, and low = 1 SD below the mean. MCG = male caregiver.

However, our second hypothesis was not supported; fathers' parenting/relationship quality did not increase the likelihood of father-to-son belief transmission. This is not to say father-son interactions do not influence sons' sexual belief development but suggests other factors, such as sociocontextual variables, may have stronger influences on sexual norms [25]. This was true in one study in which children's religious beliefs were more associated with their congregation's beliefs than those of their parents [37].

For sexual behavior, results did not show a relationship between fathers and sons sexual behavior when parenting/relationship characteristics were not accounted for. This is inconsistent with studies documenting direct relationships between other risk behaviors independent of parenting variables [18,19]. One potential explanation may be that, unlike behaviors like smoking, sons are unlikely to directly observe parental sexual behavior, precluding clear modeling. Rather, sons are more likely to be indirectly exposed to associated behaviors, such as seeing fathers leave to go places where risky sexual activity is common. In this area of Kenya, modeling may be further complicated by the practice of polygamy that may normalize having multiple partners even in the context of marriage.

Given the indirect nature of caregiver sexual risk behavior to the child observer, we examined whether parent-child interactions that are direct would serve as moderators impacting behavior occurrence or nonoccurrence. Results partially supported this hypothesis. When a father reported not engaging in risky sexual behavior himself, positive parenting and relationship characteristics emerged as protective against sons engaging in early sexual activity. These fathers may "pass on" safer sexual behavior to their sons, in part through positive parental engagement. Perhaps sons observing behavior patterns that suggest safer behaviors, while also having close, positive interactions, results in delayed sexual debut.

For fathers who did engage in risky sexual behavior, parenting and relationship qualities did not emerge clearly as risky or protective; the indirect exposure to fathers' behaviors seemed to have less of an influence in the absence of much direct, positive interaction. However, at very high scores on engagement/relationship quality, sons of "risky" fathers were actually more likely to engage in sex, suggesting that very frequent and close father-son interactions may encourage transmission. Sons of "risky" fathers who are "good" parents may more regularly witness the father's risk-related behaviors, accompany their fathers to risky settings, or discuss sex in warm, but potentially joking ways that encourage or normalize risky sex [17].

Although general parenting/relationship quality moderated the relationship between father-son sexual behavior, father-son quality of communication about sex did not. This was somewhat surprising in light of the other findings, although survey items focused on very direct conversations about sexual topics rather than general openness. It may be that some fathers engage in direct communication of positive messages about HIV and sex, leading to high scores on this measure, but then behave in ways that are inconsistent with those conversations, leading to mixed messages for youth. Future research may benefit from examining this potential "do as I say, but not as I do" dynamic, as previous studies have documented a related phenomenon of mixed messages between cultural endorsements of sexual activity as part of masculinity and messages from AIDS prevention campaigns promoting abstinence among adolescents [38].

This study has several important limitations. First, the sample of youth reporting sexual activity was small, and the subgroup reporting unprotected sex with multiple partners was too small to analyze. Second, the cross-sectional design does not allow for causal inferences related to the directionality of observed relationships. Finally, measures were self-report, which introduces

social desirability bias. This may have limited participants' disclosure of "risky" beliefs that they know are inconsistent with information presented through HIV education efforts common in this area. Most measures were also initially developed in Western contexts, although they were adapted with items evaluated through factor analysis.

This study contributes to our understanding of youth HIV risk by exploring the influence of fathers. Understanding whether and how risky behaviors, and the beliefs that may drive them, are related between generations is one of the first steps toward breaking risk cycles [2]. This is especially important given the small number of programs aimed at engaging men and boys in HIV prevention [39] and the success of programs that target both men and women [40]. Results suggest that parenting programs focused on reducing risk should assess fathers' own HIV risk behaviors and potentially work directly with fathers to reduce risk, either before or in tandem with, parenting or family interventions.

Acknowledgments

The authors acknowledge the Women's Institute for Secondary Education and Research, the Africa Mental Health Foundation for facilitating, hosting, and survey data collection. They give specific thanks to Dr. Sherryl Broverman, Dr. Rose Ogwang-Odhiambo, and Dr. Kathleen Sikkema, members of the research team for related studies; the Egerton University Institute of Women, Gender and Development Studies for providing the venue for training of research assistants; our Kenyan collaborators, Valarie Kosgei and Julius Barasa, for their manuscript consultation and review; and Dr. Krista Ranby and Dr. Rick Hoyle for statistical consultation. They also thank the team of research assistants and the families who participated.

Funding Sources

The original work was supported by the NIH Fogarty International Center, Duke Global Health Institute, Johnson & Johnson Corporation, and the Duke University Center for AIDS Research.

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