

ORIGINAL ARTICLE

Title: From “sugar daddies” to “sugar babies”: exploring a pathway between age-disparate sexual relationships, condom use, and adolescent pregnancy in South Africa

Running header: An exploratory pathway to adolescent pregnancy in South Africa

Authors:

Elona Toska¹, Lucie D Cluver^{1,2,3}, Mark Boyes⁴, Marija Pantelic¹, Caroline Kuo^{2,3,5}

¹ Department of Social Policy and Intervention, University of Oxford

² Department of Psychiatry and Mental Health, University of Cape Town

³ Health Economics and HIV/AIDS Research Division, University of KwaZulu-Natal

⁴ School of Psychology and Speech Pathology, Curtin University

⁵ Department of Behavioral and Social Sciences and Center for Alcohol and Addiction Studies, Brown University

Corresponding author: Elona Toska, MSc elona.toska@spi.ox.ac.uk

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Abstract

Background: Adolescent pregnancy has been linked to adverse outcomes for mothers and children. Most studies proposing potential risk pathways for adolescent pregnancy in South Africa are qualitative, hypothesizing links among age-disparate relationships, reduced condom use and higher pregnancy rates. No known South African studies have quantitatively explored pathways to adolescent pregnancy.

Objectives: This study aimed to: (i) identify which literature-hypothesized factors were associated with adolescent pregnancy and (ii) explore a hypothesized pathway of risk by assessing whether condom use mediated the relationship between age-disparate sexual relationships (defined as having ever had a sexual partner more than 5 years older than participants) and adolescent pregnancy.

Methods: A cross-sectional survey in six urban and rural health districts of three South African provinces. 447 sexually-active girls aged 10-19 were interviewed. Analyses used multivariate logistic regressions controlling for confounders. Mediation tests were conducted using Hayes' bootstrapping methodology.

Results: Consistent condom use ($\beta=-2.148$, $OR=8.566$, $p\leq 0.001$) and school enrolment ($\beta=-1.600$, $OR=0.202$, $p\leq 0.001$) were associated with lower rates of adolescent pregnancy. Engaging in age-disparate sex ($\beta=1.093$, $OR=2.982$, $p\leq 0.001$) and long-term school absences ($\beta=1.402$, $OR=4.061$, $p\leq 0.001$) were associated with higher rates of adolescent pregnancy. The indirect effect of engaging in age-disparate sex on adolescent pregnancy through condom use was significant, irrespective of age, age at sexual initiation, poverty and residential environment ($B=0.4466$, $SE=0.1303$, CI 0.2323-0.7428).

Conclusion: This multi-site cross-sectional survey supports qualitative hypotheses that girls' inability to negotiate their partners' condom use in age-disparate sexual relationships may drive adolescent pregnancy. Interventions addressing these relationships, facilitating condom use and increasing access to sexual and reproductive health services among adolescent girls might avert unwanted and unplanned adolescent pregnancies.

Key words: youth; Africa; condoms; reproductive health; risk behaviours

Introduction

Adolescent pregnancy is a key public health issue in South Africa, where pregnancy rates increase exponentially for girls after the age of 15: 1% of girls under-15 report ever being pregnant but this rate increases to 27% of 15-19 year-olds (1). Although motherhood is valued as an integral part of a woman's life in many communities (2), evidence from South Africa suggests that adolescent pregnancy is associated with poorer access to ante-natal services, post-natal care (1), and other negative socio-economic outcomes for adolescent mothers (3). These are further aggravated by low access to non-health services that may alleviate negative outcomes of early pregnancy (4). For example, only a third of adolescent girls that become pregnant in South Africa return to school, with each year that passes after giving birth decreasing the chances of ever returning to school (5).

Predictors of Adolescent Pregnancy in South Africa

Research and interventions in South Africa have focused on reducing high-risk behaviours that lead to both increased HIV infection and unwanted adolescent pregnancy (6). Potential risk factors associated with adolescent pregnancy among girls in South Africa include: age of first sexual intercourse (7), having an older partner (7-9), disruption in the family structure through parental death (3,10), household size (11), housing type and residential environment (3,11), poverty (12), and male condom use (7,11-13). School dropout and attendance disruptions have been linked to increased risk of unwanted pregnancy in South Africa (3-5), while in other Sub-Saharan countries, staying in school has been linked to reduced rates of adolescent pregnancy (14).

A potential pathway to adolescent pregnancy

While there is evidence that having older sexual partners is associated with increased sexual risk behaviours among South African youth (7), evidence on potential causal models for adolescent pregnancy is limited. A 2010 literature review identified several factors that increased vulnerability to early unwanted pregnancy in South Africa, namely: early sexual debut, gender-

based sexual violence, and having older sexual partners (1). A matched case-control study among 544 young people identified that pregnancy was associated with having an older partner, forced sexual initiation and experiences of physical abuse (9,11). These studies identified predictors of adolescent pregnancy but did not explore potential causal mechanisms.

There is increasing evidence of South African adolescents, primarily girls, engaging in sex with older partners in exchange for material goods, also known as the “sugar daddy” phenomenon (15,16), with particularly high levels of perceived acceptability of these relationships amongst younger girls (7). A qualitative study among 76 adolescents in KwaZulu Natal found that adolescent pregnancy was linked to limited use of condoms, unequal gender relations and poor partner communication (13). Furthermore, two studies examining first-time sexual experiences among adolescent girls linked coercive sex to lack of condom use and unwanted pregnancy (17). These qualitative findings suggest that the inequitable power structure within relationships between younger girls and older partners, may reduce adolescent girls’ ability to negotiate condom use by their partners, putting them under greater pressures to engage in unprotected sex (13,18). However, none of these studies quantitatively explore the relationship between condom use, age-disparate sexual relationships and adolescent pregnancy.

Mediation analysis is a valuable technique in shedding light on causal pathways, which are essential for successful theory-driven, evidence-based interventions (19). Though mediation analysis is usually conducted using longitudinal data, exploratory mediational analysis contributes to hypothesized models that can be tested through future research (20). In light of the dearth of successful interventions to prevent adolescent pregnancy globally (21) and in South Africa (1), hypothesized pathways should be explored.

This study aimed to: (i) identify which literature-informed factors were associated with adolescent pregnancy and (ii) explore a hypothesized pathway of risk by assessing whether condom use mediated the relationship between age-disparate sexual relationships and adolescent pregnancy. Using data from a multi-site survey, we explored a hypothesized pathway of risk of adolescent pregnancy. We extend existing qualitative research, by examining

the direct and indirect effects of age-disparate relationships on increased likelihood of adolescent pregnancy and exploring to what extent this relationship operates through reduced condom use.

Methods

A cross-sectional survey was administered in 2009-2010 to 6,000 adolescents in three provinces in South Africa: Mpumalanga, KwaZulu-Natal and Western Cape. The research (www.youngcarers.org.za) was a partnership between University of Oxford, University of Cape Town, University of KwaZulu-Natal, University of Witwatersrand, Brown University and the South African National Departments of Social Development, Health and Education. Ethical approval was received from Research Ethics Committees at the University of Oxford (SSD/CUREC2/09-52), University of Cape Town (389/2009) and University of KwaZulu-Natal (HSS/0254/09). In addition, ethical approval was granted by the National Department of Social Development, the KwaZulu-Natal Department of Health (HRKM091/09), the KwaZulu-Natal Department of Education (0048/2009), the Mpumalanga Departments of Health and Education, and the Western Cape Department of Education (20100225-0034).

We focused this analysis on the sexually-active girls in our sample. Of the 3,336 girls aged 10-19, n=447 sexually-active girls were included in analyses. Participants lived in deep rural, commercial-farming rural, peri-urban, urban and urban-homeland areas. All girls were residents in six rural and urban health districts of three provinces, each area having an antenatal HIV prevalence equal or higher than 30%. Within each health district, census enumeration areas or designated tribal areas were randomly selected. Consecutive door-to-door household sampling was used to identify participants: in households where more than one eligible adolescent resided, one was randomly selected to participate.

Procedures

Participants were provided with information and consent forms in their chosen language, explaining the nature of the research in accessible wording and emphasizing the option to opt-out at any point. Given limited literacy, all information and consent/assent forms were read aloud (22). Voluntary, written

consent was obtained from every primary caregiver, and voluntary, written assent from every adolescent (refusal rate 2.5%). Following recruitment, participants completed the questionnaire at the place of their choice: primarily homes, secluded outdoor areas, or private rooms in schools. No incentives for participation were provided, apart from refreshments and certificates of appreciation. All data collected was identified by a unique participant number and kept in confidential files. Participants completed self-reported questionnaires through face-to-face interviews lasting 40-60 minutes with the support of trained fieldworkers in their language of choice. The questionnaire was translated and back-translated into Xhosa, Zulu, Swati, Sotho, and Shangaan to ensure conceptual and linguistic equivalence (23,24). All items included in the questionnaire package (modeled on a teen magazine) and the formatting of the data collection tool were developed with our teen advisory group, then independently piloted in adolescent focus groups. Sexual behavior, abuse and highly confidential information were answered in separate anonymous sheets (marked only by participant identification number), which were inserted and sealed into separate envelopes by research participants themselves. Copies of questionnaires, scales and items used in the study are available on <http://www.youngcarers.org.za/about/young-carers/>.

Confidentiality was maintained unless participants reported abuse and requested assistance or were at risk of significant harm. In cases when participants reported on-going abuse, rape or risk of significant harm, referrals were made to child protection services and to HIV testing and treatment services as appropriate. Where prior abuse or rape had occurred, referrals were made to support and counselling services.

Measures

Adolescent pregnancy, defined as ever having been pregnant before or during data collection, was measured as a dichotomous variable using items from the National Survey of HIV and Risk Behaviour Amongst Young South Africans (7).

Age-disparate relationships were measured as a binary variable for having ever had a sexual partner more than 5 years older, cut-off which was determined

based on findings of a nationally representative study among 15-24 year-old South Africans (25).

Condom use was measured as a 5-point scale of condom use during sex over the last year (0=never, 1=less than half the time, 2=half the time, 3=more than half the time, and 4=always), using an item from the South African Demographic Health Survey (26).

Orphan Status was designated as self-reported orphanhood by either parent or both, using the UN definition (27), through a categorical variable: 0=not an orphan; 1=maternal orphan; 2=paternal orphan; and 3=both parents deceased.

Abuse was measured using UNICEF scales for sub-Saharan Africa, with conservative cut-offs for severe abuse: physical, emotional or sexual (28). The full abuse scale had a reliability coefficient $\alpha=.73$ in our overall sample. Any type of abuse was dichotomized with all girls that reported physical or emotional abuse, domestic conflict or domestic violence over the last week or sexual abuse in their lifetime coded as 1, and 0 when the respondent did not report any type of abuse.

Education outcomes were developed in partnership with the South African Department of Education, the National Action Committee for Children Affected by HIV and AIDS (NACCA), and NGOs working in education. Outcomes measured included: school enrolment, type of school, and school attendance disruption. *School enrolment (current)* was dichotomised as: (0=not enrolled, 1=enrolled in a fee paying or free school (fees waived or non-fee schools)), while school attendance disruption was defined as *long-term absence (past)* was measured as school non-attendance for longer than one week in the past-year.

Socio-demographic factors including age, gender, household size and employment were derived from the 2001 South African Census (29). *Informal housing* was defined as living in a shack on its own plot, shack in a back yard, or living on the street, based on 2001 South African Census methodology. A household map was used to better understand household size and employment(30). *Household poverty* was measured using an 8-item scale of access to the eight highest socially-perceived necessities for adolescents in

South Africa, including: 3 meals a day, school uniform and ability to pay for medical care ($\alpha=.79$). The eight items were identified through qualitative interviews (31) and endorsed by over 80% of South Africans in a nationally-representative survey (32). Household deprivation was dichotomized by households lacking 2-8 necessities (1) or lacking 0-1 necessity (0).

Data analysis

Data analysis was conducted in SPSS 18.0. Missing data was minimal for variables included in the multivariate and mediational analysis. This was achieved through qualitative research and piloting during questionnaire development, verbal interviews by fieldworkers during data collection, and return field visits conducted when missing data were identified.

Analysis was conducted in three stages: First, univariate logistic regressions explored risk and protective factors for adolescent pregnancy hypothesized from extant literature, controlling for socio-demographic co-factors. Second, a hierarchical model of all significantly-associated factors ($p<0.01$) was tested through multivariate logistic regression. The final multivariate logistic regression included all factors entered simultaneously, grouped as follows: 1 – covariates and potential confounders, tested in stage 1 multivariate analysis but not significantly associated with adolescent pregnancy, 2 – relationship factors, and 3 – education-related factors, controlling for: age, age of sexual initiation, household poverty, province, and rural/urban communities. Condom use was entered as a dichotomous variable to distinguish consistent use from other levels reported – more than half, half, less than half the time and never – as consistent condom use (always) is the only one which would prevent pregnancy.

Third, to investigate a potential mechanism through which factors might influence each other to result in adolescent pregnancy, an exploratory mediation model was tested using the methodology and SPSS macro developed by Preacher and Hayes (33) which allows for the hypothesized mediating variable to be a categorical variable. This analysis aimed to assess whether condom use mediates the association between age-disparate sexual relationships and adolescent pregnancy (Figure 1). All analyses controlled for girls' age, residential environment (rural/urban) and province. Condom use

was entered as a categorical variable as bootstrapping could not be run with dichotomous variables.

To test mediation, multivariate logistic regressions were conducted using bootstrapping, a non-parametric resampling procedure which does not impose the assumption of normality of the sampling distribution and has higher power to detect mediation while controlling for Type 1 error (34). In recent years, bootstrapping has been extensively applied in testing simple mediation models in behavioural sciences (35,36), including a recent cross-sectional study from South Africa (37). Bootstrapping with 1,000 replications was used to obtain asymptotic 95% confidence intervals (CIs) around the indirect effects. Mediation analyses was conducted using an SPSS macro developed by Hayes (33). For categorical outcomes, bootstrapping produces only unstandardized coefficients of regressions, which cannot be compared to each other, so Odds Ratios (OR) supported by confidence intervals are reported when available.

Results

Socio-demographic characteristics (Tables 1 and 2)

Socio-demographic characteristics of our sample of sexually-active girls are reported in Table 1. The mean age of the sexually active girls (n=447) was 15.9 (SD=1.30), while the mean age of sexual initiation was 14.7 (SD=1.97). One-third of respondents lived in informal housing (34.4%), with an average of 6 people per household (SD=3.52). Around 30% of the sample lived in households where no one was employed, and 51.7% of households benefited from a social grant. Two-thirds of respondents reported missing two or more items in the basic necessities scale. School enrolment rates were 88.6%. One in five respondents reported ever being pregnant (n=91, 20.4%), n=81 (89%) provided information on the number of children: nine girls (15.2%) had no children, 60 girls (74.1%) had one or two children, while 9 (11.1%) were pregnant at the time of data collection. Table 2 presents socio-demographic characteristics for adolescents that reported pregnancy compared to those who had never been pregnant.

Factors associated with adolescent pregnancy

Girls who used condoms never or inconsistently were nearly 7 times more likely to report pregnancy (OR=8.566, $p \leq 0.001$), while girls who engaged in age-disparate sex were over twice as likely to have reported pregnancy (OR=2.982, $p \leq 0.001$). Other determinants included a protective association of being enrolled in school (OR=1.600, $p \leq 0.001$). Orphanhood of any type (single or double), age of sexual initiation, exposure to any type of abuse, poverty, household size, and living in informal housing, were not significantly associated with adolescent pregnancy (see Table 3).

The full model of the determinants of adolescent pregnancy was statistically significant (Nagelkerke $R^2=0.351$, $p \leq 0.001$) (38). Inconsistent condom use and attending school were the only factors that remained significant in the final multivariate logistic regression (Table 4). Engaging in age-disparate sexual relationships became statistically non-significant in the model, when inconsistent condom use was included.

Hypothesized pathway of adolescent pregnancy

Multiple qualitative studies suggest that the relationship between age-disparate relationships and adolescent pregnancy may be mediated by lower condom use amongst girls (9,13). The findings of the above multivariate logistic regression suggest that there may be a relationship between inconsistent condom use and age-disparate relationships, as the latter became non-significant when included in the same model. We proceeded to explore the validity of a hypothesised mediation model, based on qualitative research and our quantitative findings.

Using the bootstrapping tool developed by Hayes (39), this exploratory mediation model was tested with adolescent pregnancy as outcome, engaging in age-disparate sexual relationships as the independent variable and inconsistent condom use as the mediator. Figure 2 shows the results of the exploratory mediational model reporting unstandardized coefficients. Engaging in age-disparate sex predicted low condom use ($B = -1.0740$, $p \leq 0.001$), and adolescent pregnancy ($B = 1.1511$, $p \leq 0.001$). The effect of age-disparate sex on adolescent pregnancy remained statistically significant when the effect of

condom use was included in the model ($B=0.7820$, $p=0.0097$), suggesting a potential mediation effect. As the 95% confidence interval of the indirect effect did not overlap with zero this indirect effect is statistically significant (33). The indirect effect of condom use on adolescent pregnancy was $B=0.4466$ ($SE=0.1303$, $CI\ 0.2323-0.7428$). These results should be interpreted with caution given the exploratory nature of this mediation analysis.

Discussion

This study aimed to identify factors and pathways associated with adolescent pregnancy in girls living in high-deprivation areas of three South African provinces. In addition, this is the first known study to quantitatively explore the hypothesized relationship between age-disparate sex, condom use and adolescent pregnancy.

Factors associated with adolescent pregnancy

Pregnancy rates in our sample ($n=91$, 20.4%) were higher than those in a study among adolescent learners in the Eastern Cape (12.6%) (40), but lower than the South African DHS2003 (27%) (26). Inconsistent condom use was strongly associated with adolescent pregnancy: compared to girls who reported always using condoms, girls who reported inconsistent use were 6.795 times more likely to have been pregnant ($p\leq 0.001$). Nearly a quarter of all sexually active girls had never used condoms in the last year, while another quarter used them inconsistently. These findings are comparable to those of recent studies among 15-24 year-old learners in the Eastern Cape and 14-17 year-olds in KwaZulu-Natal, where girls reported 46.5% condom use at last sex and 54% overall condom use, respectively (40,41). To address these significant levels of risk, more research is needed to better understand contraception access, use and acceptability among adolescent girls in South Africa, particularly in the context of high HIV prevalence and socio-cultural norms regarding early parenthood.

Engaging in age-disparate sexual relationships was the second factor most strongly associated with adolescent pregnancy ($p\leq 0.001$). These findings support those of other studies in South Africa that link reduced condom use

and having an older partner with poor sexual health outcomes including adolescent pregnancy (10, 17). Given the gender dynamics in age-disparate sexual relationships, interventions are needed that explore young women's and their male partners' condom use self-efficacy. Furthermore, effective way to increase access to women-led contraception and women-controlled methods of HIV prevention such as female condoms should be tested.

Staying in school even for an additional year has been shown to decrease adolescent fertility significantly (42). The association between school enrolment and adolescent pregnancy in this sample suggest that school enrolment could play a protective role. It is important for future studies to better understand possible effects of school-level factors on adolescent pregnancy.

Hypothesized pathway of adolescent pregnancy

Our analysis then explored whether age-disparate sexual relationships were linked to adolescent pregnancy via low condom use, a hypothesized model based on previous qualitative evidence from South Africa, which suggests that younger girls experience pressure from older partners to engage in unprotected sex. Mediation analysis showed that condom use mediates the association between adolescent pregnancy and age-disparate sexual relationships. These findings suggest that engaging in age-disparate relationships may result in increased likelihood of adolescent pregnancy through reduced use of condoms. However, as the indirect effect of age-disparate relationships was only partially explained by low levels of condom use, future studies should test additional potential mediators: intentions, attitudes, self-esteem, and access to other types of contraception – variables which were not available in our dataset. Though our mediation analysis findings were statistically significant, they are exploratory and must be interpreted with caution.

Nonetheless, this study's findings suggest several areas for further research. Firstly, qualitative research suggests that gender norms and peer pressures experienced by adolescent girls reduce their agency to negotiate condom use (13). Formative research in rural KwaZulu-Natal highlights that young men and women view condom use and negotiation from different perspectives:

boys see them as necessary only with casual partners, while girls see condoms as a symbol of love and protection (18). Additional research suggests that adolescent girls feel pressure from their older partners who refuse contraception and forbid them from using condoms, in order to prove their love by becoming pregnant (43). Future quantitative research must unpack the extent to which reduced agency to negotiate condom use is affected by perspectives on contraception and fertility of both partners and partners' negotiating condom use.

Secondly, our findings raise questions regarding adolescent girls' access to other forms of contraception, in addition to condoms, and ultimately access to the family planning services that provide these means. Specifically, 15.2% of the girls who had ever been pregnant had no children. Though our data does not allow us to distinguish between causes of this, our findings raise questions regarding rates of and decisions leading to termination of pregnancy, which is estimated at 3% nationally (7) and 6.7% in a recent study among $n=3,123$ young people (12). In light of recent findings from trials in South Africa on the potential effect of injectable hormonal contraception on HIV risk among young women, dual protection with condoms (male or female) remains a priority mode of contraception (44).

Finally, given differentials in the views of young men and women, research that involves both boys and girls must be conducted. Though some studies include both young men and women, research among couples whose relationship has resulted in adolescent pregnancy would allow for more precise comparison and understanding of differences with regards to the intentionality of the pregnancy, as well as condom use self-efficacy and negotiation. Furthermore, as a recent critical analysis suggests, additional research should be conducted among "sugar daddies" (45) to understand the motivations and perceptions regarding relationships with younger women in general, and condom use. Interventions may need to focus not only on improving young girls' self-efficacy but also engage with their older partners.

This study has some key limitations. Firstly, the cross-sectional nature of the data requires that results be interpreted with caution, as causal inferences cannot be made (46). Longitudinal studies are needed to establish causality and rule out reverse causality. Secondly, the mediation analysis conducted is

exploratory and should be interpreted as such for two main reasons: lack of longitudinal data and the bootstrapping methodology used. While the methodology is more rigorous than others and can be applied to categorical mediators, it does so by considering the mediating variable – condom use in our study – as a continuous variable. Thirdly, more specific condom use measures would allow for potential causal relationships to be better elucidated. More recent studies have measured condom use at last sexual intercourse, alongside estimates of condom use over the last 6-months and by type of partner (casual or long-term) (41). Though these measures remain self-reports, more precise condom use measures would strengthen hypothesized models. Lastly, it would be valuable to investigate further whether pregnancies were wanted or not and the nature of the relationship during which pregnancy occurred. Though marital status could be used as a proxy for whether a pregnancy was wanted, the rates among 10-18 year olds South Africans are very low (0.1% among women in 2011) (47). Collecting information on motherhood intention is important to understand the causal mechanisms that lead to adolescent pregnancy.

In conclusion, though our findings are not generalisable to higher-income communities or other ethnic groups, they help to shed light on potential risk and protective factors for adolescent pregnancy among girls living in deprived communities in South Africa, and explore a hypothesized pathway of risk. Improving our understanding of the mechanisms of high-risk sexual behaviours is crucial to ensuring adolescent girls lead healthy lives into adulthood. To date, no known interventions have successfully reduced the rate of adolescent pregnancy in South Africa, though several have had impact on other high-risk sexual behaviours, such as condom use, delayed sexual initiation and reduced number of partners (48,49). Our findings suggest that addressing factors that lead young girls into engaging in unprotected sex with older partners may result in fewer adolescent pregnancies. Stakeholders need to better understand the reproductive health decision-making of young South African women and their partners. More effective interventions are needed to increase the likelihood that adolescent mothers and their children attain better life outcomes.

REFERENCES

1. Macleod CI, Tracey T. A decade later: follow-up review of South African research on the consequences of and contributory factors in teen-aged pregnancy. *South African J Psychol* [Internet]. 2010;40(1):18–31. Available from: <http://proxy.antioch.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=48480774&site=ehost-live&scope=site>
2. Preston-Whyte E. Gender and the lost generation: The dynamics of HIV transmission among black South African teenagers in KwaZulu-Natal. *Health Transit Rev.* 1994;4:241–55.
3. Panday S, Makiwane M, Ranchod C, Letsoalo T. Teenage Pregnancy in South Africa: with a specific focus on school-going learners.
4. Makiwane M, Desmond C, Richter L, Udjo E. Is the Child Support Grant associated with an increase in teenage fertility in South Africa? Evidence from national surveys and administrative data [Internet]. *Methodology.* 2006. Available from: www.hsrc.ac.za/Document-2027.phtml
5. Grant MJ, Hallman KK. Pregnancy-related School Dropout and Prior School Performance in KwaZulu-Natal, South Africa. *Stud Fam Plann.* 2008;39(4):369–82.
6. Scott R, Harrison D. A gauge of HIV prevention in South Africa 2009 [Internet]. 2009. Available from: www.lovelife.org.za/preventionogauge
7. Pettifor AE, Rees H V, Steffenson A, Madikizela-Hlongwa L, Macphail C, Kleinschmidt I. HIV and Sexual Behaviour Among Young South Africans: A national survey of 15-24 year olds. Johannesburg: University of Witwatersrand; 2004.
8. Varga CA. The forgotten fifty per cent-a review of sexual and reproductive health research and programs focused on boys and young men in sub-Saharan Africa. *Afr J Reprod Health.* 1994;5(3):175–95.
9. Jewkes RK, Vundule C, Maforah F. Relationship dynamics and teenage pregnancy in South Africa. *Soc Sci Med.* 2001;52:733–44.
10. Operario D, Underhill K, Chuong C, Cluver LD. HIV infection and sexual risk behaviour among youth who have experienced orphanhood: systematic review and meta-analysis. *J Int AIDS Soc* [Internet]. BioMed Central Ltd; 2011;14(1):25. Available from: <http://www.jiasociety.org/content/14/1/25>

11. Vundule C, Maforah F, Jewkes RK. Risk factors for teenage pregnancy among sexually active black adolescents in Cape Town - a case control study. *S Afr Med J*. 2001;91(1):73–80.
12. Mchunu G, Peltzer K, Tutshana B, Seutlwadi L. Adolescent pregnancy and associated factors in South African youth. *Afr Health Sci [Internet]*. 2012;12:426–34. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3598281&tool=pmcentrez&rendertype=abstract>
13. Varga CA. How Gender Roles Influence Sexual and Reproductive Health Among South African Adolescents. *Stud Fam Plann*. 2003;34(3):160–72.
14. Duflo E, Dupas P, Kremer M. Education, HIV and Early Fertility: Experimental Evidence from Kenya. 2011.
15. Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntyre J a, Harlow SD. Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. *Soc Sci Med [Internet]*. 2004 Oct [cited 2013 Sep 27];59(8):1581–92. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15279917>
16. Dunkle KL, Jewkes R, Nduna M, Jama N, Levin J, Sikweyiya Y, et al. 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. *Soc Sci Med*. 2007;65:1235–48.
17. Manzini N. Sexual initiation and childbearing among adolescent girls in KwaZulu-Natal, South Africa. *Reprod Health Matters*. 2001;4(17):44–52.
18. Harrison A, Xaba N, Kunene P. Understanding safe sex: gender narratives of HIV and pregnancy prevention by rural South African school-going youth.
19. Fraser MW, Richman JM, Galinsky MJ, Day SH. *Intervention Research - Developing Social Programmes [Internet]*. Pocket Gui. Oxford University Press; 2009 [cited 2013 Sep 29]. Available from: <http://global.oup.com/academic/product/intervention-research-9780195325492;jsessionid=A54BF01E01B99976DB97BCDE76FDC81D?cc=gb&lang=en&>
20. Brook DW, Morojele NK, Zhang C, Brook JS. South African adolescents: pathways to risky sexual behavior. *AIDS Educ Prev*. 2006;18:259–72.
21. Harden A, Brunton G, Fletcher A, Oakley A. Teenage pregnancy and social disadvantage: systematic review integrating controlled trials and qualitative studies. *BMJ*. 2009;(339):b4254.

22. Mullis IVS, Martin MO. International achievement in the processes of reading comprehension: Results from PIRLS 2001 in 35 countries. Chestnut Hill, MA; 2001.
23. Widenfelt BM Van, Treffers PDA, Beurs E De, Siebelink BM, Koudijs E. Translation and Cross-Cultural Adaptation of Assessment Instruments Used in Psychological Research With Children and Families. *Clin Child Fam Psychol Rev*. 2005;8(2):135–47.
24. Brislin RW. Back-Translation for Cross-Cultural Research. *J Cross Cult Psychol* [Internet]. 1970 Sep 1 [cited 2013 Sep 27];1(3):185–216. Available from: <http://jcc.sagepub.com/cgi/doi/10.1177/135910457000100301>
25. Pettifor AE, Kleinschmidt I, Levin J, Rees H V, Macphail C, Madikizela-Hlongwa L, et al. A community-based study to examine the effect of a youth HIV prevention intervention on young people aged 15–24 in South Africa: results of the baseline survey. *Trop Med Int Heal*. 2005;10(10):971–80.
26. Department of Health, Medical Research Council, OrcMacro. South Africa Demographic and Health Survey 2003. Pretoria, South Africa: Department of Health; 2007.
27. (UNAIDS) JUNP on H, UNICEF the UNCF, USAID the USA for ID. Children on the Brink 2004 [Internet]. New York; 2004 p. 46. Available from: http://www.unicef.org/publications/cob_layout6-013.pdf
28. Snider LM, Dawes A. Psychosocial Vulnerability and Resilience Measures For National-Level Monitoring of Orphans and Other Vulnerable Children: Recommendations for Revision of the UNICEF Psychological Indicator. 2006.
29. SSA SSA. Census 2001 Concepts and Definitions. Pretoria, South Africa; 2004.
30. Cluver LD, Orkin M, Boyes ME, Gardner F, Meinck F. Transactional Sex Amongst AIDS-Orphaned and AIDS-Affected Adolescents Predicted by Abuse and Extreme Poverty. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2011. p. 336–43.
31. Wright G, Noble M, Magasela W. Towards a democratic definition of poverty - Socially perceived necessities in South Africa. Cape Town, South Africa: HSRC Press; 2007. p. 36.
32. Pillay U, Roberts B, Rule SP. South African Social Attitudes: Changing Times, Diverse Voices [Internet]. Pillay U, Roberts B, Rule SP, editors. Cape Town, South Africa: HSRC Press; 2006 [cited 2013 Oct 3]. Available from: <http://books.google.com/books?hl=en&lr=&id=ag9kMWd4IWkC&pgis=1>

33. Preacher KJ, Hayes AF. SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behav Res Methods, Instruments, Comput* [Internet]. 2004 Nov;36(4):717–31. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15641418>
34. MacKinnon DP, Lockwood CM, Williams J. Confidence Limits for the Indirect Effect: Distribution of the Product and Resampling Methods. *Multivariate Behav Res.* 2004;39:99–128.
35. Shrout PE, Bolger N. Mediation in Experimental and Nonexperimental Studies: New Procedures and Recommendations. *Psychol Methods.* 2002;7(4):422–45.
36. MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. *Psychol Methods.* 2002;7:83–104.
37. Icard LD, Jemmott III JB, Teitelman A, Leary AO, Heeren GA. Mediation effects of problem drinking and marijuana use on HIV sexual risk behaviors among childhood sexually abused South African heterosexual men. *Child Abuse Negl* [Internet]. Elsevier Ltd; 2013;1–9. Available from: <http://dx.doi.org/10.1016/j.chiabu.2013.08.002>
38. Nagelkerke NJD. Miscellanea-A note on a general definition of the coefficient of determination. *Biometrika.* 1991;78(3):691–2.
39. Hayes AF. *SPSS PROCESS Documentation.* 2012. p. 1–90.
40. Bana A, Bhat VG, Godlwana X, Libazi S, Maholwana Y, Marafungana N, et al. Knowledge, attitudes and behaviours of adolescents in relation to STIs, pregnancy, contraceptive utilization and substance abuse in the Mhlakulo region, Eastern Cape. *South African Fam Pract.* 2010;52(2):154–8.
41. Harrison A, Smit J, Hoffman S, Nzama T, Leu C-S, Mantell J, et al. Gender, peer and partner influences on adolescent HIV risk in rural South Africa. *Sex Health.* 2012;9:178–86.
42. Ferré C. Age at first child: does education delay fertility timing? The case of Kenya. [Internet]. *Policy Research Working Papers.* 2009 p. 1–45. Report No.: 4833. Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1344718
43. Wood K, Jewkes RK. Blood Blockages and Scolding Nurses: Barriers to Adolescent Contraceptive Use in South Africa. *Reprod Health Matters.* 2006;14(27):109–18.

44. McCoy SI, Zheng W, Montgomery ET, Blanchard K, van der Straten A, de Bruyn G, et al. Oral and injectable contraception use and risk of HIV acquisition among women in sub-Saharan Africa. *AIDS* [Internet]. 2013;27(6):1001–9. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23698064>
45. Shefer T, Strebel A. Deconstructing the “sugar daddy”: A critical review of the constructions of men in intergenerational sexual relationships in South Africa focus. *Agenda Empower Women Gend Equity*. 2013;(April):37–41.
46. Field AP. *Discovering statistics using SPSS (and sex, drugs and rock’n’roll)* [Internet]. 3rd ed. Book. London, United Kingdom: Sage Publications; 2009. Available from: <http://books.google.com/books?id=a6FLF1YOqtsC&pgis=1>
47. SSA SSA. *Marriages and divorces 2011*. Pretoria, South Africa; 2012.
48. Jewkes RK, Morrell R, Christofides N. Empowering teenagers to prevent pregnancy: lessons from South Africa. *Cult Heal Sex An Int J Res Interv Care*. 2009;11(7):675–88.
49. Jewkes R, Nduna M, Levin J, Jama N, Dunkle KL, Puren A, et al. Impact of stepping stones on incidence of HIV and HSV-2 and sexual behaviour in rural South Africa: cluster randomised controlled trial. *BMJ*. 2008;337:a506.

TABLE 1 – Socio-Demographic Characteristics of Sexually Active Girls

<i>Characteristics[†]</i>	<i>N (%)</i>	<i>Mean (Standard Deviation)</i>
Age		15.86 (1.30)
Age of sexual initiation		14.7 (1.97)
Ever Been Pregnant	91 (20.4%)	
Number of Children (n=81)		
None	12 (15.2%)	
Pregnant (during data collection)	9 (11.4%)	
1 child	58 (73.4%)	
2 children	2 (2.5%)	
Residential Environment		
Urban	205 (45.9%)	
Rural	242 (54.1%)	
Province		
KwaZulu-Natal	90 (20.1%)	
Western Cape	233 (52.2%)	
Mpumalanga	124 (27.7%)	
Type of Housing		
Informal (Shack)	154 (34.4%)	
Formal	293 (65.6%)	
Household Size		5.5 (3.52)
Household Employment (n=445)		
No one employed	133 (29.8%)	
Number of people who have a job		0.94 (0.79)
Household Poverty (n=443)		
Deprivation of 2 or more items	298 (66.7%)	
Orphanhood (n=442)		
Maternal only	44 (9.8%)	
Paternal only	103 (23%)	
Double	20 (4.6%)	
Current School Enrolment (n=440)		
Enrolled in Paying or Free Schooling	390 (88.6%)	
Not enrolled	51 (11.5%)	

[†]n=447 for all variables presented in this table unless otherwise noted.

TABLE 2 – Socio-Economic Outcomes of Pregnant Adolescent Girls

<i>Characteristics[†]</i>	<i>Pregnant Girls</i>	<i>Not pregnant Girls</i>
	<i>N (%) or Mean (Standard Deviation)</i>	<i>N (%) or Mean (Standard Deviation)</i>
Residential Environment (n=446)		
Urban	36 (39.6%)	169 (47.5%)
Rural	55 (60.4%)	187 (52.5%)
Province (n=445)		
KwaZulu-Natal	37 (41.1%)	53 (14.9%)
Western Cape	26 (28.9%)	207 (58%)
Mpumalanga	27 (30%)	96 (27%)
Type of Housing (n=434)		
Informal (Shack)	23 (25.3%)	131 (36.8%)
Formal	68 (74.7%)	225 (63.2%)
Household Employment (n=446)		
No one employed	33 (36.7%)	100 (28.1%)
Household Poverty (n=421)		
Deprivation of 2 or more items	59 (64.8%)	221 (67%)

TABLE 3 – Multivariate Logistic Regression Analyses of Potential Determinants and Adolescent Pregnancy

This table includes the results of a series of multivariate regression analysis with adolescent pregnancy as an outcome and the noted determinant as the independent variable, controlling for current age, province and residential environment (rural/ urban).

Determinants	β	OR	95% CI for OR
Poverty	-0.271	0.763	0.438-1.328
Age of Sexual Initiation	-0.078	0.925	0.804-1.063
Consistent Condom Use	-2.148***	8.556	4.431-16.561
Age-disparate Sexual Relationships	1.093***	2.982	1.701-5.229
Long-term school absences (past)	1.402***	4.061	2.047-8.057
Orphan Status – maternal only ^a	-0.079	0.924	0.491-1.740
Orphan Status – paternal only ^a	-0.043	0.957	0.563-1.629
Orphan Status – double ^a	0.892	2.440	0.893-6.670
Any type of Abuse	-0.475	0.622	0.366-1.057
Household Size	0.050	1.051	0.992-1.113
Living in Informal Housing	-0.215	0.806	0.438-1.482
School Enrolment (current)	-1.600***	0.202	0.104-0.390

* Denotes significance at $p \leq 0.05$ level. ** Denotes significance at $p \leq 0.01$ level. *** Denotes significance at $p \leq 0.001$.

^a Compared to not being an orphan.

TABLE 4 – Model Summary for Multivariate Logistic Regression Analysis for Adolescent Pregnancy

Model	Step χ^2	Overall Model χ^2	Nagelkerke R ²	Change in Nagelkerke R ²
Step 1 –Covariates and Potential Confounders	40.249***	40.249***	0.146	-
Step 2 – Relationship-related factors	51.831***	91.080***	0.310	0.164
Step 3 – Education-related factors	13.496**	104.576***	0.351	0.041
Coefficients for Final Model including all determinants	β	OR	95% CI for OR	
Consistent Condom Use	-1.818***	0.162	0.081-0.324	
Age-disparate Sexual Relationships	0.599	1.820	0.951-3.482	
Long-term school absences (past)	0.608	1.836	0.804-4.193	
School Enrolment (current)	-1.060**	0.346	0.159-0.754	

* Denotes significance at $p \leq 0.05$ level. ** Denotes significance at $p \leq 0.01$ level. *** Denotes significance at $p \leq 0.001$. Controlling for age, age of sexual initiation, household poverty and rural/urban residential location.

FIGURE 1 – Hypothesised model explored through mediation analysis

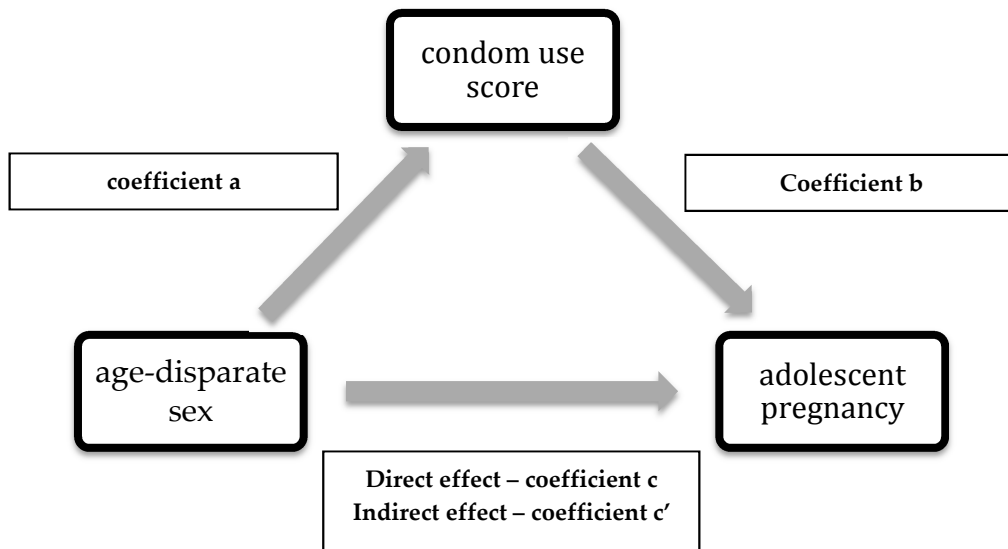


FIGURE 2 – Model for Condom Use Mediating the Relationship between Age-disparate Sexual Partnerships and Adolescent Pregnancy

