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Adolescent pregnancy: risk factors and consequences – a longitudinal study in the Eastern Cape, South Africa

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Adolescent pregnancy: risk factors and consequences – a longitudinal study in the Eastern Cape, South Africa

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in Behavioral Sciences and Health Education
2012

Abstract

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In South Africa adolescents having unprotected heterosexual intercourse risk both HIV infection and unwanted pregnancy, and nearly one-third of women have a teenage pregnancy. Understanding the interface of gender inequity and violence, HIV and unplanned and unwanted adolescent pregnancies is important.

To explore whether young adolescent pregnancy (aged 15 or younger) increases HIV incidence, we analyzed data from a cohort of 1,099 young HIV negative, women participants in a cluster-randomized controlled trial in the predominantly rural Eastern Cape province of South Africa, calculating HIV incidence using multivariate Poisson models. Women who had had a pregnancy when 15 years or younger had an elevated HIV incidence (IRR 3.02, 95%CI 1.50-6.09) compared to those never pregnant, or having later pregnancies.

To explore prospectively risk factors for unwanted and unplanned pregnancies we analyzed a subset of adolescent women aged 15-18 years (n=922), observing 174 pregnancies occurring over two years. Physical partner violence was a risk factor for unwanted pregnancies, but measures of sexual violence and gender inequity were not. Having a higher socio-economic status was protective for both unplanned and unwanted pregnancies.

To investigate prospectively whether perpetrating intimate partner violence is associated with fathering a pregnancy, we analyzed data from men aged 15-26 years

(N=983). Incidence rate ratios were derived from Poisson models, adjusting for past year numbers of sexual partners, time since last sex, and treatment arm. Among the men, 16.5% (n=189) made a girlfriend pregnant and 39.1% had perpetrated intimate partner violence. Men who had perpetrated IPV in the previous year at baseline had an increased incidence of fathering, whereas those who had been violent but not in the past year did not have an elevated incidence.

Interventions that engage with relationship dynamics of teenagers are essential if unwanted and unplanned pregnancies, and the fraction of the HIV epidemic in women attributable to young teenage pregnancy, are to be prevented. Male perpetration of partner violence is an important risk behavior for men and women, largely because hegemonic ideals of masculinity emphasize male control of women, and displays of heterosexuality and virility, in so doing they constrain women's reproductive choices.

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CHAPTER ONE:

Introductory Literature Review

Adolescent pregnancy in South Africa

Some adolescent women get married and desire pregnancy, but others find having a child as an adolescent and a student in school unwelcome (Jewkes, Morrell, & Christofides, 2009). In South Africa, about one-third of women report having had a teenage pregnancy (Department of Health, 1999, 2008). In the context of South Africa where women marry at a mean age of 28 years, most of these pregnancies occur outside the context of marriage (Department of Health, 1999, 2008). Having an adolescent pregnancy is more common in rural areas and among women with lower educational attainment (Department of Health, 1999, 2008).

Yet there is evidence that adolescent fertility declined by 10% between 1996 and 2001 from 79 births per 1000 women to 65 births per 1000 women (Moultrie, McGrath, Moultrie, & McGrath, 2007). This rate is similar to that of the United States which has the highest teenage pregnancy rate in the developed world.

Short and long-term health consequences of adolescent pregnancy

Much has been written about the adverse, short-term health outcomes of teenage pregnancy for women and their infants. Teenage mothers have been found to be at increased risk for anemia, urinary tract infection and pregnancy-induced hypertension (Fraser, Brockert, & Ward, 1995; Lewis, Hickey, Doherty, & Skinner, 2009; Magadi, 2006; Ventura, Abma, Mosher, & Henshaw, 2008). Infants are more likely to suffer

infant and neonatal death, accidents, infections and sudden infant death syndrome (SIDS) (Chen, Wen, Fleming, Demissie, Rhoads, & Walker, 2007). There is also a body of literature that has explored the longer term social and mental health consequences of teenage pregnancy. These consequences include depression and substance use, increased sexual risk behavior, as well as lower educational attainment and socio-economic status (De Genna, Cornelius, & Donovan, 2009; Moore, Florsheim, & Butner, 2007; Ramos-Marcuse, Oberlander, Papas, McNary, Hurley, & Black, 2010). Most of this literature emanates from developed countries in North America, Europe, and Australia. Studies from South Africa have described the relationship between teen pregnancies and poorer educational outcomes (Grant & Hallman, 2008; Marteleto, Lam, & Ranchhod, 2008).

Adolescents having unprotected heterosexual intercourse are not only at risk of unintended pregnancy but also HIV infection. Several observational studies from South Africa have reported that the incidence of HIV is higher among pregnant women than among the general population (Moodley, Esterhuizen, Pather, Chetty, & Ngaleka, 2009; Rehle, Shisana, Pillay, Zuma, Puren, & Parker, 2007). A prospective study conducted in Uganda found that HIV acquisition was higher among pregnant women than among either lactating women, or non-pregnant and non-lactating women (Gray, Li, Kigozi, Serwadda, Brahmbhatt, Wabwire-Mangen, Nalugoda, Kiddugavu, Sewankambo, Quinn, Reynolds, & Wawer, 2005). This study followed women over the immediate post-partum period (up to one year) and controlled for condom use and partner numbers. The authors conclude that the higher incidence among pregnant women is unlikely to be the result of sexual risk behaviors and they attribute their finding to hormonal changes that affect immune responses or the genital tract mucosa (Gray, et al., 2005). Further investigation

on pregnancies among young adolescents and over a longer follow up period beyond the post-partum period would add to our understanding of this phenomenon. There is also a need to better understand possible behavioral risk factors which may increase the risk of HIV acquisition among women who have an early adolescent pregnancy.

Risk factors for adolescent pregnancy

Studies from South Africa have identified lower educational achievement and a shock to the household, defined as death of a household member, job loss, marital disruption, or loss of a grant or remittance, as a risk factors for teenagers becoming pregnant (Grant & Hallman, 2008; Marteleto, et al., 2008). Other studies have found an association between gender inequality and gender-based violence, including child sexual abuse and forced first sex, and teenage pregnancies (Butler & Burton, 1990; Fiscella, Kitzman, Cole, Sidora, & Olds, 1998; R. Jewkes, Vundule, Maforah, & Jordaan, 2001; Kellogg & Hoffman, 1999; Koenig, Zablotska, Lutalo, Nalugoda, Wagman, & Gray, 2004; Roberts, O'Connor, Dunn, Golding, Team, Roberts, O'Connor, Dunn, & Golding, 2004; Roosa, Tein, Reinholtz, & Angelini, 1997; Vundule, Maforah, Jewkes, & Jordaan, 2001).

There are three hypothesized mechanisms that have been proposed that link coerced or forced first sexual intercourse and adolescent pregnancy. This first is a direct biological explanation that suggests that an unintended pregnancy may result directly from coerced or forced sexual intercourse (Heise, Ellsberg, & Gottmoeller, 2002). A second mechanism is that coerced sex disempowers women and affects their ability to negotiate using condoms or other contraceptives with their sexual partners (Dunkle,

Jewkes, Brown, Gray, McIntryre, & Harlow, 2004; Maman, Campbell, Sweat, & Gielen, 2000). The third mechanism is that sexual coercion or forced first sex increases women's own personal risk behavior (Maman, et al., 2000).

Qualitative findings have described some of these phenomena or mechanisms especially those related disempowerment (Hof & Richters, 2001; Wood, Maforah, & Jewkes, 1998). Hof and Richters describe how coercive and violent behavior affected young Zimbabwean women's ability to make and implement free choices about contraceptive use within their relationships (Hof & Richters, 2001).

Wood and colleagues describes that constructions of love which is defined largely by older male partners of adolescent girls, conflate penetrative sexual intercourse as synonymous with love (Wood, et al., 1998). Sexual decision-making in young women, especially during adolescence, is complicated by fear that refusing sex will lead to separation from boyfriends (Hof & Richters, 2001). This combined with partners who are often much older than the young women and economic dependence may result in circumstances where women are less likely to use contraceptives and which may place them at increased risk of unintended pregnancy (Hof & Richters, 2001).

However, this research investigating risk factors for adolescent pregnancy has rarely differentiated on the bases of whether the teenage pregnancy was unplanned or unwanted.

Differentiating between unplanned and unwanted pregnancies

Few studies investigating the risk factors for teenage pregnancies differentiate between desired, unwanted and unplanned pregnancies. In the South African context,

some teenage pregnancies are desired, but most are unplanned or unwanted (R. Jewkes, et al., 2001; Moultrie, et al., 2007). An unplanned pregnancy is described in the literature as a pregnancy that is not desired at that particular time, in other words it is mistimed, while an unwanted pregnancy is not wanted at all (Henshaw, 1998). The adverse consequences for unwanted pregnancies tend to be more severe than those for unplanned pregnancies (D'Angelo, Gilbert, Rochat, Santelli, & Herold, 2004). Literature that differentiates between unplanned and unwanted pregnancies has focused on women of all age groups and not on teenage girls in particular. Differentiating between unplanned and unwanted pregnancies may allow for a more nuanced understanding of the risk factors of teenage pregnancy, and may allow for the development of more closely targeted and more effective prevention strategies.

Intimate partner violence and unplanned and unwanted pregnancy

Unplanned and unwanted pregnancy increases the risk of unsafe abortion, inadequate antenatal care, low birth weight, reduced breastfeeding, and decreased rates of vaccination for children (D'Angelo, et al., 2004; Pallitto, Campbell, & O'Campo, 2005). Intimate partner violence has been associated with reduced fertility control and may therefore be associated with unintended pregnancy (D'Angelo, et al., 2004). One of the consequences of violence in intimate relationships for women is the negative impact on their ability to make free choices about birth control and timing of pregnancy (Pallitto & O'Campo, 2004). In principle, sexually active young women and men have several reproductive choices including using contraceptives to prevent pregnancy or choosing to have a child; however, research in the US has shown that one third to a half of all

pregnancies are unintended, and one study suggests that among young women in South Africa this may be similar (41%) (Finer & Henshaw, 2006; Henshaw, 1998; Jewkes, et al., 2001).

There is a growing body of research suggesting that violence against women is highly prevalent, with an estimated one in three women globally experiencing some form of victimization, including sexual violence, and physical and emotional abuse, in childhood, adolescence, or adulthood (Garcia-Moreno, Heise, Jansen, Ellsberg, & Watts, 2005; Garcia-Moreno, Jansen, Ellsberg, Heise, Watts, & Team, 2006; Hassan, Sadowski, Bangdiwala, Vizcarra, Ramiro, De Paula, Bordin, & Mitra, 2004; Heise, et al., 2002). Intimate partner violence affects 22-55% of women in South Africa (Dunkle, Jewkes, Brown, Yoshihama, Gray, McIntyre, & Harlow, 2004; Jewkes, Levin, & Penn-Kekana, 2003). Young women between the ages of 15 and 24 are at highest risk of victimization by intimate partners (Jewkes & Abrahams, 2002).

Risky Sex and Contraceptive use among women in South Africa

Many young South Africans engage in sexual risk-taking, including early initiation of sexual activity, unprotected sex, and low levels of contraceptive use which could increase their risk of having an unintended pregnancy. In the South African Demographic Health Survey carried out in 2003, 68.5% of sexually active young women between the ages of 15 and 24 nationally reported currently using a contraceptive. Nearly sixty-four percent (63.7%) of sexually active women between the ages of 15 and 49 in the Eastern Cape reported currently using a contraceptive (Department of Health, 1999, 2008). Twelve percent of adolescents in South Africa reported having ever been pregnant

and 9% have given birth (Department of Health, 1999, 2008). It is likely that the difference can be accounted for by spontaneous and induced abortions which may be an indicator of unwanted pregnancies. Many of the pregnancies resulting births are also unintended. It is therefore important to understand more about the context in which contraceptive choices are made or left unmade, in which methods become hard to use consistently and correctly, and in which unintended pregnancy results. A woman's ability to make and implement free choices about contraceptive use within her relationship is important, and likely to be negatively influenced by violent or controlling behavior from her male partner.

Perpetration of IPV and fathering unwanted pregnancies

To date, little information is available on men's role in unwanted pregnancies, especially among adolescents. There are a few US studies that have focused on the demographic characteristics of the fathers in the setting of teenage pregnancy and their subsequent participation in actual childrearing (Dunkle, Jewkes, Nduna, Levin, Jama, Khuzwayo, Koss, & Duvvury, 2006; Gavin, Black, Minor, Abel, Papas, & Bentley, 2002; Singh & Darroch, 1999; Wang & Chou, 2001). These studies report that men involved in teenage pregnancies typically have lower levels of education, have a greater age difference between themselves and the adolescent mother, have higher rates of unemployment, are more financially dependent, lower in socioeconomic status, have more behavioral problems such as smoking, drinking, and illicit drug use, have more simultaneous sexual partners and sexual transmitted infections, engage in more aggressive behavior, and adopt poorer attitudes toward their partner's pregnancy by being

less involved in the postpartum care of the mother and infant (Dunkle, et al., 2006; Gavin, et al., 2002; Singh & Darroch, 1999; Wang & Chou, 2001). There is little research that has investigated whether violence perpetration by a male partner is associated with fathering an unintended pregnancy, but documented association between perpetration of violence and high risk sexual behavior suggest than an association is likely. Analysis of baseline data from the stepping Stones study found that 31.8% of male participants reported perpetrating sexual and / or physical abuse against intimate partners, and that such perpetration was associated with a wide range of risk behaviors (Dunkle, et al., 2006). Interestingly, analysis for risk factors for prevalent HIV infection among these young men at baseline found a significant association with having fathered any pregnancy, suggesting that there may indeed be a link between fatherhood, risky sex and violence (Dunkle, et al., 2006).

One survey of 6632 married men in India found that those who had sexually and/or physically abused their wives were more likely to report an unplanned pregnancy (Martin, Kilgallen, Tsui, Maitra, Singh, & Kupper, 1999). Similarly, men attending a community health service in Boston who reported perpetrating IPV in the past year were more likely to have fathered three or more children (Raj, Reed, Welles, Santana, & Silverman, 2008).

Adolescents' gender-related socialization and power dynamics in sexual relationships are increasingly understood to be linked to risky sexual behavior. Research from Africa suggests that adolescents' relationship dynamics are often characterized by unequal decision-making between partners, poor dyadic communication about sexual matters, lack of preparation for or anticipation of intercourse, fear of rejection if

behavioral ideals are not met, and gender-based differences in the motivation to become sexually involved (Harrison, Xaba, & Kunene, 2001; MacPhail & Campbell, 2001; Varga, 2002, 2003; Vundule, et al., 2001; Wood, et al., 1998).

IPV, men and unintended pregnancy

Most studies of unintended pregnancy have focused on women rather than men. Given gender roles and norms, especially around sexual decision-making, where men may have more power and control over initiating sexual encounters, it makes sense that men should also be a focus of research and potential intervention. One study by Martin et al (1999) in India investigated a range of sexual and reproductive health outcomes in relation to perpetration of wife abuse. They found that men reporting perpetration of intimate partner violence against their wives were more likely to report an unplanned pregnancy among their wives (Martin, et al., 1999). While this is the only study to date which has explicitly examined IPV perpetration and pregnancy, there is a growing literature on male violence and HIV risk behavior. Perpetration of rape has been associated with increased numbers of sexual partner (Dunkle, et al., 2006), however, there is considerably less quantitative research on connections between sexual behavior and perpetration of violence specifically targeting intimate partners. Several studies have found that men who reported perpetrating partner violence were more likely to have concurrent sexual partnerships (Abrahams, Jewkes, Hoffman, & Laubsher, 2004; El-Bassel, Gilbert, Wu, Chang, & Fontdevila, 2007; Martin, et al., 1999). Abusive men were also more likely than non-abusers to self-report symptoms of a sexually transmitted infection, unprotected anal sex and sex with a drug-injecting partner (El-Bassel, et al.,

2007; Martin, et al., 1999). This association between perpetrating partner violence and risky sexual behavior strongly suggests that there may be an association with fathering an unintended pregnancy.

A study by Dunkle and colleagues using the Stepping Stones baseline data found that perpetration of IPV was associated with higher numbers of sexual partners, more recent intercourse, greater likelihood of reporting concurrent and casual partners, higher substance use, and greater likelihood of reporting sexual assault of non-partners, participation in group rape, and transactional sex (Dunkle, et al., 2006). Men who reported both physical and sexual IPV, perpetration both before and within the past 12 months, and/or more than one episode of IPV reported significantly higher levels of HIV risk behavior than men who reported less severe or less frequent perpetration of violence (Dunkle, et al., 2006). Further analysis of the baseline data found that having fathered a pregnancy was associated with increased likelihood of prevalent HIV infection among men, suggesting that pregnancy involvement may be an important marker of high risk sexual activity (Jewkes, Dunkle, Koss, Levin, Nduna, Jama, & Sikweyiya, 2006a).

Conceptual framework: The theory of gender and power

The theory of gender and power is a social structural theory that has emerged from a large body of gender theory. It is made up of three primary structures: the sexual division of labor which examines economic inequities between women and men, the sexual division of power which examines abuses of authority and control in relationships, and cathexis which examines social norms and affective attachments (Connell, 1987). Wingood and DiClemente have articulated in detail how this theory is related to HIV risk

and most of their framework is readily applicable to unintended pregnancy as both outcomes are possible biological consequences of unprotected sex (Wingood & DiClemente, 2000).

The sexual division of labor is defined at a societal level as the different and unequal allocation of women and men to occupations. The nature of the work frequently disadvantages women, and consequently limits earning potential. Women frequently are responsible for unpaid labor such as child care and housework. The inequities resulting from the sexual division of labor result in socioeconomic risk factors for disease and lack of access to preventive services. In relation to HIV and unintended pregnancy these include poverty, limited or no health insurance, being homeless, having limited access to education, being an ethnic minority and having a stressful work environment (Wingood & DiClemente, 2000).

The sexual division of power is defined as the capacity to influence the action of others or having power over others. It operates predominantly at an interpersonal level although can also be evident at an institutional level. The sexual division of power can manifest in behavioral risk factors and increased exposure to unsafe sex. The power inequity favors men thereby constraining women's choices and increasing the risk of HIV transmission. Risk factors related to both HIV and unintended pregnancy include sexual and physical abuse, having concurrent sexual partnerships, having limited access to condoms or drug treatment and perceiving oneself to be powerless (Wingood & DiClemente, 2000).

Cathexis refers to affective attachments and social norms. At a societal level for example, it is the characterized by the heteronormative sexual and emotional attachments

that women are supposed to have towards men, and that most in fact do have. This theoretical construct describes how women's sexuality is attached to social concerns such as immorality and impurity (Connell, 1987). At a societal level, it manifests in cultural and societal norms which enforce strict gender roles and stereotypical beliefs about how women should behave sexually (Connell, 1987). Wingood and DiClemente hypothesize that gendered affective attachments and social norms contribute to women having older partners, having children especially if their partner desires this, mistrust of the medical system, conservative gender norms and limited use of contraception (Wingood & DiClemente, 2000).

The Stepping Stones Study

The Stepping Stones program is a community-based education program developed in Uganda to address gender issues, HIV prevention, and improved communication and relationship skills in rural communities. It is considered UNAIDS best practice for community mobilization, and has been implemented by more than 2000 organizations in over 100 countries (UNAIDS, 1997). Stepping Stones is based on social learning theory and consists of 13 sessions of approximately three hours each. Participants work in same-age and same-gender peer groups to consolidate interpersonal skills and knowledge related to sexual health (Jewkes, Nduna, Levin, Jama, Dunkle, Khuzwayo, Koss, Puren, Wood, & Duvvury, 2006b).

The Stepping Stones study was a cluster randomized controlled trial of the Stepping Stones HIV prevention program that was conducted in the area surrounding Mthatha in the Eastern Cape Province of South Africa (Jewkes, Nduna, Levin, Jama,

Dunkle, Puren, & Duvvury, 2008). Clusters were randomized to receive the Stepping Stones program or a three hour intervention on safer sexual practices and HIV presented on a single occasion. The study was backed by a four-year grant from the United States National Institute for Mental Health (Jewkes, et al., 2006b).

Mthatha is the central town (population ~100,000) in the former Transkei region of the Eastern Cape. The area is predominantly rural, but lacks a sound agricultural base. It has no local industry. There are few job opportunities, and unemployment and poverty are widespread. HIV prevalence in the Eastern Cape for women and men aged 15-49 years was 15.2% in 2008 (Shisana, Rehle, Simbayi, Zuma, Jooste, Pillay-van-Wyk, Mbelle, Van Zyl, Parker, Zungu, Pezi, & Team., 2009).

Villages or residential areas surrounding Mthatha were the unit of randomization. Villages were eligible for inclusion if they were in the study area, located 10 kilometers or more from other study villages, contained a secondary school and were willing to participate. Once villages were randomized, volunteers were recruited primarily from secondary schools. Twenty women and 20 men were recruited per cluster. All participants were normally resident in the village where they were schooling, and mature enough to understand the content of the intervention. The Stepping Stones study included 70 clusters of participants. Participants were recruited through existing groups in villages, predominantly identified through schools. Six clusters were drawn for urban areas; the remainder from rural areas and small villages (Jewkes, et al., 2006b). The questionnaires for the baseline and follow-up waves of data collection were developed over a period of two years through a process of pre-testing, piloting and revision. This process included input from a team of nine researchers local to the Mthata area as well

as local and international consultants (Jewkes, et al., 2006b). This team collaborated together to ensure accuracy of translations into local dialects of isiXhosa.

Face-to-face interviews by trained, gender-matched interviewers using standardised questionnaires and serological surveys were carried out at 12-month intervals over approximately two years of follow up. All data collection for the study was completed in 2007 (Jewkes, et al., 2008).

The questionnaire included detailed items for women about past and current pregnancy history. The intendedness of each pregnancy was measured using an item that asked whether the respondent wanted the pregnancy at all, now or later. A similar question about having made a girlfriend pregnant was asked of the men. The intendedness of this pregnancy was measured by asking whether he wanted the pregnancy to happen at all, now or later. There was an additional question for men asking whether they agree that they were responsible for the pregnancy.

The questionnaire included a highly detailed assessment of women's past and current experience of victimization and men's perpetration of gender-based violence. Past year and lifetime experience of victimization and perpetration of psychological, physical and sexual violence were assessed using a modified subset of the WHO violence against women instrument, supplemented with questions shown to be important in previous South African studies (World Health Organization, 2000). Balance of power and control in participants' current or most recent main partnership was measured by the South African adaptation of the Sexual Relationship Power Scale (Pulerwitz, Gortmaker, & DeJong, 2000).

The questionnaire also covered the following areas: 1) participant's background: age, education, socio-economic status, and childhood trauma (including witnessing abuse of mother and experience physical and sexual abuse in childhood); 2) participant's social environment: peer pressure, community support and social capital; 3) participant's current relationship: social background of main partner, relationship duration, communication in the relationship, and quarrelling, and 4) participant's knowledge, attitude and practices regarding: sexual and reproductive health, attitudes towards gender, condoms, and anticipated reaction to HIV diagnosis.

The Stepping Stones dataset offers a unique opportunity to explore unaddressed questions about the relationship between violence and pregnancy using a longitudinal dataset. These analyses will provide valuable information for use in developing future prevention interventions.

References:

Abrahams, N., Jewkes, R., Hoffman, M., & Laubsher, R. (2004). Sexual violence against intimate partners in Cape Town: prevalence and risk factors reported by men. *Bulletin of the World Health Organization, 82*(5), 330-337.

Butler, J. R., & Burton, L. M. (1990). Rethinking teenage childbearing: Is sexual abuse a missing link? *Family Relations, 39*(1), 73-80.

Chen, X. K., Wen, S. W., Fleming, N., Demissie, K., Rhoads, G. G., & Walker, M. (2007). Teenage pregnancy and adverse birth outcomes: a large population based retrospective cohort study. *International Journal of Epidemiology, 36*(2), 368-373.

Connell, R. W. (1987). *Gender and Power: Society, person and sexual politics*. Stanford: Stanford University Press.

D'Angelo, D. V., Gilbert, B. C., Rochat, R. W., Santelli, J. S., & Herold, J. M. (2004). Differences between mistimed and unwanted pregnancies among women who have live births. *Perspectives on Sexual & Reproductive Health, 36*(5), 192-197.

De Genna, N. M., Cornelius, M. D., & Donovan, J. E. (2009). Risk factors for young adult substance use among women who were teenage mothers. *Addictive Behaviors, 34*(5), 463-470.

Department of Health. (1999). *The 1998 South African Demographic and Health Survey. Full Report*. Pretoria: South African Department of Health.

Department of Health. (2008). *The 2003 South African Demographic & Health Survey* Pretoria: South African Department of Health.

Dunkle, K. L., Jewkes, R. K., Brown, H. C., Gray, G. E., McIntryre, J. A., & Harlow, S. D. (2004). Gender-based violence, relationship power, and risk of HIV infection in women attending antenatal clinics in South Africa.[see comment]. *Lancet, 363*(9419), 1415-1421.

Dunkle, K. L., Jewkes, R. K., Brown, H. C., Yoshihama, M., Gray, G. E., McIntyre, J. A., et al. (2004). Prevalence and patterns of gender-based violence and revictimization among women attending antenatal clinics in Soweto, South Africa. *American Journal of Epidemiology, 160*(3), 230-239.

Dunkle, K. L., Jewkes, R. K., Nduna, M., Levin, J., Jama, N., Khuzwayo, N., et al. (2006). Perpetration of partner violence and HIV risk behaviour among young men in the rural Eastern Cape, South Africa. *AIDS, 20*(16), 2107-2114.

El-Bassel, N., Gilbert, L., Wu, E., Chang, M., & Fontdevila, J. (2007). Perpetration of intimate partner violence among men in methadone treatment programs in New York City. *American Journal of Public Health, 97*(7), 1230-1232.

Finer, L. B., & Henshaw, S. K. (2006). Disparities in rates of unintended pregnancy in the United States, 1994 and 2001. *Perspectives on Sexual & Reproductive Health, 38*(2), 90-96.

Fiscella, K., Kitzman, H. J., Cole, R. E., Sidora, K. J., & Olds, D. (1998). Does child abuse predict adolescent pregnancy? *Pediatrics, 101*(4 Pt 1), 620-624.

Fraser, A. M., Brockert, J. E., & Ward, R. H. (1995). Association of young maternal age with adverse reproductive outcomes. *New England Journal of Medicine, 332*(17), 1113-1117.

Garcia-Moreno, C., Heise, L., Jansen, H. A. F. M., Ellsberg, M., & Watts, C. (2005). Public health. Violence against women. *Science, 310*(5752), 1282-1283.

Garcia-Moreno, C., Jansen, H. A. F. M., Ellsberg, M., Heise, L., Watts, C. H., & Team, W. H. O. M.-c. S. o. W. s. H. a. D. V. a. W. S. (2006). Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. *Lancet, 368*(9543), 1260-1269.

Gavin, L. E., Black, M. M., Minor, S., Abel, Y., Papas, M. A., & Bentley, M. E. (2002). Young, disadvantaged fathers' involvement with their infants: an ecological perspective. *Journal of Adolescent Health, 31*(3), 266-276.

Grant, M. J., & Hallman, K. K. (2008). Pregnancy-related school dropout and prior school performance in KwaZulu-Natal, South Africa. *Studies in Family Planning, 39*(4), 369-382.

Gray, R. H., Li, X., Kigozi, G., Serwadda, D., Brahmbhatt, H., Wabwire-Mangen, F., et al. (2005). Increased risk of incident HIV during pregnancy in Rakai, Uganda: a prospective study.[see comment]. *Lancet, 366*(9492), 1182-1188.

Harrison, A., Xaba, N., & Kunene, P. (2001). Understanding safe sex: gender narratives of HIV and pregnancy prevention by rural South African school-going youth. *Reproductive Health Matters, 9*(17), 63-71.

Hassan, F., Sadowski, L. S., Bangdiwala, S. I., Vizcarra, B., Ramiro, L., De Paula, C. S., et al. (2004). Physical intimate partner violence in Chile, Egypt, India and the Philippines. *Injury Control & Safety Promotion, 11*(2), 111-116.

Heise, L., Ellsberg, M., & Gottmoeller, M. (2002). A global overview of gender-based violence. *International Journal of Gynaecology & Obstetrics, 78 Suppl 1*, S5-14.

Henshaw, S. K. (1998). Unintended pregnancy in the United States. *Family Planning Perspectives, 30*(1), 24-29.

Hof, C., & Richters, A. (2001). Teenage pregnancy as an issue of human rights for women: The case of Zimbabwe. *IFE Psychologia: An International Journal, 9*(1), 1-11.

Jewkes, R., & Abrahams, N. (2002). The epidemiology of rape and sexual coercion in South Africa: an overview. *Social Science & Medicine, 55*(7), 1231-1244.

Jewkes, R., Dunkle, K., Koss, M. P., Levin, J. B., Nduna, M., Jama, N., et al. (2006a). Rape perpetration by young, rural South African men: Prevalence, patterns and risk factors. *Social Science & Medicine, 63*(11), 2949-2961.

Jewkes, R., Morrell, R., & Christofides, N. (2009). Empowering teenagers to prevent pregnancy: lessons from South Africa. *Culture, Health & Sexuality, 11*(7), 675-688.

Jewkes, R., Nduna, M., Levin, J., Jama, N., Dunkle, K., Khuzwayo, N., et al. (2006b). A cluster randomized-controlled trial to determine the effectiveness of Stepping Stones in preventing HIV infections and promoting safer sexual behaviour amongst youth in the rural Eastern Cape, South Africa: trial design, methods and baseline findings. *Tropical Medicine & International Health, 11*(1), 3-16.

Jewkes, R., Nduna, M., Levin, J., Jama, N., Dunkle, K., Puren, A., et al. (2008). Impact of stepping stones on incidence of HIV and HSV-2 and sexual behaviour in rural South Africa: cluster randomised controlled trial.[see comment]. *BMJ, 337*, a506.

Jewkes, R., Vundule, C., Maforah, F., & Jordaan, E. (2001). Relationship dynamics and teenage pregnancy in South Africa. *Social Science & Medicine, 52*(5), 733-744.

Jewkes, R. K., Levin, J. B., & Penn-Kekana, L. A. (2003). Gender inequalities, intimate partner violence and HIV preventive practices: findings of a South African cross-sectional study. *Social Science & Medicine, 56*(1), 125-134.

Kellogg, N. D., & Hoffman, T. J. (1999). Early Sexual Experiences Among Pregnant and Parenting Adolescents. [Article]. *Adolescence, 34*(134), 293.

Koenig, M. A., Zablotska, I., Lutalo, T., Nalugoda, F., Wagman, J., & Gray, R. (2004). Coerced first intercourse and reproductive health among adolescent women in Rakai, Uganda. *International Family Planning Perspectives, 30*(4), 156-163.

Lewis, L. N., Hickey, M., Doherty, D. A., & Skinner, S. R. (2009). How do pregnancy outcomes differ in teenage mothers? A Western Australian study. *Medical Journal of Australia, 190*(10), 537-541.

MacPhail, C., & Campbell, C. (2001). 'I think condoms are good but, aai, I hate those things': condom use among adolescents and young people in a Southern African township. *Social Science & Medicine, 52*(11), 1613-1627.

Magadi, M. (2006). Poor pregnancy outcomes among adolescents in South Nyanza region of Kenya. *African Journal of Reproductive Health, 10*(1), 26-38.

Maman, S., Campbell, J., Sweat, M. D., & Gielen, A. C. (2000). The intersections of HIV and violence: directions for future research and interventions. *Social Science & Medicine, 50*(4), 459-478.

Marteleto, L., Lam, D., & Ranchhod, V. (2008). Sexual behavior, pregnancy, and schooling among young people in urban South Africa. *Studies in Family Planning, 39*(4), 351-368.

Martin, S. L., Kilgallen, B., Tsui, A. O., Maitra, K., Singh, K. K., & Kupper, L. L. (1999). Sexual behaviors and reproductive health outcomes: associations with wife abuse in India. *JAMA, 282*(20), 1967-1972.

Moodley, D., Esterhuizen, T. M., Pather, T., Chetty, V., & Ngaleka, L. (2009). High HIV incidence during pregnancy: compelling reason for repeat HIV testing. *AIDS, 23*(10), 1255-1259.

Moore, D. R., Florsheim, P., & Butner, J. (2007). Interpersonal behavior, psychopathology, and relationship outcomes among adolescent mothers and their partners. *Journal of Clinical Child & Adolescent Psychology, 36*(4), 541-556.

Moultrie, T. A., McGrath, N., Moultrie, T. A., & McGrath, N. (2007). Teenage fertility rates falling in South Africa. *South African Medical Journal Suid-Afrikaanse Tydskrif Vir Geneeskunde, 97*(6), 442-443.

Pallitto, C. C., Campbell, J. C., & O'Campo, P. (2005). Is intimate partner violence associated with unintended pregnancy? A review of the literature. *Trauma Violence & Abuse, 6*(3), 217-235.

Pallitto, C. C., & O'Campo, P. (2004). The relationship between intimate partner violence and unintended pregnancy: analysis of a national sample from Colombia. *International Family Planning Perspectives, 30*(4), 165-173.

Pulerwitz, J., Gortmaker, S. L., & DeJong, W. (2000). Measuring sexual relationship power in HIV/STD research. *Sex Roles, 42*(7-8), 637-660.

Raj, A., Reed, E., Welles, S. L., Santana, M. C., & Silverman, J. G. (2008). Intimate partner violence perpetration, risky sexual behavior, and STI/HIV diagnosis

among heterosexual African American men. [Research Support, U.S. Gov't, P.H.S.]. *American Journal of Mens Health, 2*(3), 291-295.

Ramos-Marcuse, F., Oberlander, S. E., Papas, M. A., McNary, S. W., Hurley, K. M., & Black, M. M. (2010). Stability of maternal depressive symptoms among urban, low-income, African American adolescent mothers. *Journal of Affective Disorders, 122*(1-2), 68-75.

Rehle, T., Shisana, O., Pillay, V., Zuma, K., Puren, A., & Parker, W. (2007). National HIV incidence measures--new insights into the South African epidemic. *South African Medical Journal, 97*(3), Suid-Afrikaanse Tydskrif Vir Geneeskunde.

Roberts, R., O'Connor, T., Dunn, J., Golding, J., Team, A. S., Roberts, R., et al. (2004). The effects of child sexual abuse in later family life; mental health, parenting and adjustment of offspring. [Research Support, Non-U.S. Gov't]. *Child Abuse & Neglect, 28*(5), 525-545.

Roosa, M. W., Tein, J.-Y., Reinholtz, C., & Angelini, P. J. (1997). The relationship of childhood sexual abuse to teenage pregnancy. *Journal of Marriage & the Family, 59*(1), 119-130.

Shisana, O., Rehle, T., Simbayi, L. C., Zuma, K., Jooste, S., Pillay-van-Wyk, V., et al. (2009). *South African national HIV prevalence, incidence, behaviour and communication survey 2008: A turning tide among teenagers?* Cape Town: HSRC.

Singh, S., & Darroch, J. E. (1999). Adolescent pregnancy and childbearing: Levels and trends in developed countries. *Family Planning Perspectives, 32*(1), 14-23.

UNAIDS. (1997). *Community mobilization and AIDS*. Geneva: UNAIDS.

Varga, C. A. (2002). Pregnancy termination among South African adolescents. *Studies in Family Planning, 33*(4), 283-298.

Varga, C. A. (2003). How gender roles influence sexual and reproductive health among South African adolescents. *Studies in Family Planning, 34*(3), 160-172.

Ventura, S. J., Abma, J. C., Mosher, W. D., & Henshaw, S. K. (2008). Estimated pregnancy rates by outcome for the United States, 1990-2004. *National Vital Statistics Reports, 56*(15), 1-25.

Vundule, C., Maforah, F., Jewkes, R., & Jordaan, E. (2001). Risk factors for teenage pregnancy among sexually active black adolescents in Cape Town. A case control study. *South African Medical Journal Suid-Afrikaanse Tydskrif Vir Geneeskunde, 91*(1), 73-80.

Wang, C. S., & Chou, P. (2001). Characteristics of males who father babies born to adolescents versus older adult women in Taiwan. *Journal of Adolescent Health, 28*(6), 509-512.

Wingood, G. M., & DiClemente, R. J. (2000). Application of the theory of gender and power to examine HIV-related exposures, risk factors, and effective interventions for women. *Health Education & Behavior, 27*(5), 539-565.

Wood, K., Maforah, F., & Jewkes, R. (1998). "He forced me to love him": putting violence on adolescent sexual health agendas. *Social Science & Medicine, 47*(2), 233-242.

World Health Organization. (2000). *WHO Multi-Country Study on Women's Health and Domestic Violence: Core Questionnaire and WHO Instrument - Version 9*. Geneva: World Health Organization.

CHAPTER TWO:

Early teen pregnancy increases risk of incident HIV infection in the Eastern Cape, South Africa: a prospective study

ABSTRACT

Background: Adolescents having unprotected heterosexual intercourse are at risk of both HIV infection and unwanted pregnancy. However, there is little evidence to indicate whether having a pregnancy in early adolescence increases the risk of subsequent HIV infection. In this paper, we test the hypothesis that young teenage pregnancy (aged 15 or younger) increases risk of incident HIV infection in young South African women.

Methods: We assessed 1,099 HIV negative women, aged 15–26 years who were volunteer participants in a cluster-randomized controlled HIV prevention trial in the predominantly rural Eastern Cape province of South Africa. All young women had at least one additional HIV test over 2 years of follow-up. Outcomes were HIV incidence rates per 100 person years and HIV incidence rate ratios (IRRs) estimated by Poisson multivariate models. Three pregnancy categories were created for the Poisson model: early teen pregnancy, a first pregnancy at age 15 years or younger; later teen pregnancy were those whose first pregnancy occurred at age 16 to 19 years and the third category were women who did not report a teen pregnancy. Models were adjusted for study design, age, education, time since first sex, socio-economic status, childhood trauma and herpes simplex virus type 2 infection.

Results: HIV incidence rates were 6·0 per 100 person-years over two years of follow up. The adjusted IRR was 3.02 (95% CI 1.50-6.09) for a pregnancy occurring at age 15 or

younger. Women with pregnancies occurring between 16 and 19 years of age did not have a higher incidence of HIV (IRR 1.08; 95% CI 0.64-1.84). Early teen pregnancies were associated with higher partner numbers and a greater age difference with partners. **Conclusion:** Early teen pregnancies increase the incidence of HIV among South African women. The higher risk is associated with sexual risk behaviors such as higher partner numbers and a greater age difference with partners rather than a biological explanation of hormonal changes during pregnancy.

INTRODUCTION

Adolescents having unprotected heterosexual intercourse are at risk of both HIV infection and unwanted pregnancy. Several observational studies from South Africa have reported that the incidence of HIV is higher among pregnant women than among the general population (Moodley, Esterhuizen, Pather, Chetty, & Ngaleka, 2009; Rehle, Shisana, Pillay, Zuma, Puren, & Parker, 2007). A prospective study conducted in Uganda found that HIV acquisition was higher among pregnant women than among either lactating women, or non-pregnant and non-lactating women (Gray, Li, Kigozi, Serwadda, Brahmbhatt, Wabwire-Mangen, Nalugoda, Kiddugavu, Sewankambo, Quinn, Reynolds, & Wawer, 2005). This study followed women over the immediate post-partum period (up to one year) and controlled for condom use and partner numbers. The authors conclude that the higher incidence among pregnant women is unlikely to be the result of sexual risk behaviors and they attribute their finding to hormonal changes that affect immune responses or the genital tract mucosa (Gray, et al., 2005). Further investigation on pregnancies among young adolescents and over a longer follow up period beyond the post-partum period would add to our understanding of this phenomenon. There is also a need to better understand possible behavioral risk factors which may increase the risk of HIV acquisition among women who have an early adolescent pregnancy. Early adolescent pregnancy is defined in the literature as occurring at age 15 or younger (Phipps & Sowers, 2002). A better understanding of early adolescent pregnancy and subsequent HIV infection would have important implications for prevention programs.

Both HIV and pregnancy among adolescents remain high in South Africa. HIV prevalence among young women aged 15-19 is 6.9% and is 21.1% in the age group 20-24

(Shisana, Rehle, Simbayi, Zuma, Jooste, Pillay-van-Wyk, Mbelle, Van Zyl, Parker, Zungu, Pezi, & Team., 2009). The teenage fertility rate (childbirth at age 15-19) was 65 births per 1000 women (Moultrie & McGrath, 2007; Moultrie & Timaeus, 2003). The 2003 Demographic Health Survey reported that 27.3% of women had a pregnancy while they were adolescents (Department of Health, 2008). Most adolescents characterized their pregnancies as unplanned (Jewkes, Vundule, Maforah, & Jordaan, 2001). Pregnancies in adolescence have been associated with a range of short and longer term health and social consequences such as anemia, urinary tract infection, pregnancy-induced hypertension, depression, substance abuse, increased sexual risk behavior, as well as lower educational attainment and socio-economic status (Chen, Wen, Fleming, Demissie, Rhoads, & Walker, 2007; De Genna, Cornelius, & Donovan, 2009; Fraser, Brockert, & Ward, 1995; Grant & Hallman, 2008; Lewis, Hickey, Doherty, & Skinner, 2009; Magadi, 2006; Mahavarkar, Madhu, & Mule, 2008; Marteleto, Lam, & Ranchhod, 2008; Moore, Florsheim, & Butner, 2007; Ramos-Marcuse, Oberlander, Papas, McNary, Hurley, & Black, 2010; Ventura, Abma, Mosher, & Henshaw, 2008). However, HIV infection has yet to be investigated as a possible health consequence of early adolescent pregnancy.

It is against this background that this study aimed to investigate the hypothesis that early teenage pregnancy predicts incident HIV infections over two years of follow up. This unique longitudinal dataset allows us to make an advance in the literature by investigating this research question and exploring the possible behavioral pathways through which this relationship may operate.

METHODOLOGY

Participants

This study is based on 1,416 young South African women who were volunteer participants in a cluster randomized controlled trial of Stepping Stones, an HIV prevention intervention. The young women, aged 15 to 26, were recruited from schools in70 villages near Mthatha in the Eastern Cape, South Africa. Volunteers were eligible for enrolment if they were normally resident in the village where they were at school, and mature enough to understand the study and the consent process. All participants gave written informed consent. The 70 clusters were grouped into seven geographically defined strata. Within each stratum, equal numbers of clusters were randomly allocated to intervention or control. Women clustered in the intervention condition were randomized to receive a 17 session (50 hour) group intervention over a period of 3–12 weeks. Individuals in the control arm communities attended a single session of about 3 hours on HIV and safer sex.

The cohort was maintained using detailed contact information obtained at enrolment. Follow-up was undertaken nationwide to trace young people who had migrated away from the study area over the period of the study. One-thousand and ninety-nine women were successfully traced and provided data for the HIV incidence analyses. Detailed information about all assessments, study recruitment, access, and ethical issues, including support for participants testing HIV positive, is published elsewhere (Jewkes, Nduna, Levin, Jama, Dunkle, Khuzwayo, Koss, Puren, Wood, & Duvvury, 2006). Ethical clearance for the study was granted by the University of Pretoria

ethics committee and the Emory University IRB. Written consent was obtained when participants were recruited onto the study.

Assessments at baseline, 12 months, and 24 months consisted of blood tests for HIV and HSV2, and an interview to ascertain socio-demographic and partner characteristics and sexual risk behavior. All questionnaires were administered by trained, female interviewers. We used data to assess the effects of early (age 15 and younger) and later (age 16-19) adolescent pregnancies on incidence of HIV infection at two years of follow-up. For this longitudinal analysis, we excluded women who had HIV infection at baseline, women with missing data, and those who were lost to follow-up at both 12 months and 24 months.

Laboratory methods

HIV serostatus at baseline was assessed by use of two rapid tests. The Determine (Abbott Diagnostics, Johannesburg, South Africa) test was used for screening and samples with positive results were retested with Uni-Gold (Trinity Biotech, Dublin, Ireland). Indeterminate results were clarified by use of an HIV-1 screen ELISA (Genscreen; Bio-Rad, Steenvoorde, France) followed by two confirmatory ELISAs if the sample was positive for HIV (Vironostika; BioMerieux, Marcy l'Etoile, France and Murex 1.2.0; Murex Biotech, Dartford, UK). Towards the end of the second round of interviews, collection of blood as dried spots was introduced for some participants to ease logistics and improve acceptability. In the third round of interviews, most blood was obtained as dried spots. The samples were tested with a screen and confirmatory ELISA. In this analysis, 745 (68%) of the final HIV outcomes were from dried blood spots, equally distributed among participants who remained HIV negative (n=658, 68%) and

those who seroconverted (n=87, 68%). A glycoprotein G-based HSV2 ELISA was used to test for herpes infection (Kalon; Kalon Biological, Aldershot,UK). A CAPTIA HSV IgG type-specific ELISA was used to resolve discrepant results.

Questionnaire

Detailed data were collected from all participants on socio-demographic characteristics, sexual behavior and pregnancy history at each of three time points. The exposure of interest was a categorical variable based on age at first pregnancy, measured at the baseline assessment. Women were asked if they had ever been pregnant and, if so, in which year they first became pregnant. Age at first pregnancy was calculated by subtracting the date of birth from the date of first pregnancy. Three categories were created: early teen pregnancy included young women who experienced a first pregnancy at age 15 years or younger, later teen pregnancy included those who experienced their first pregnancy aged 16 to 19 years, and the referent group consisted of women who did not report a teen pregnancy.

Items on socio-demographic characteristics included age and completed years of schooling. Educational attainment was dichotomized into those who had completed more than 10 years of schooling and those who had 10 years of schooling or less at baseline. Socioeconomic status was assessed by use of a scale that encompassed household goods ownership, food, and cash scarcity. Items on sexual partners included the age of the most recent partner. Age difference with main partner was calculated by subtracting the age of participant from her partner's age. The age difference was dichotomized into an age difference of less than or 4 years or more.

A modified version of the short form of Childhood Trauma Questionnaire was used (Bernstein, Fink, Handelsman, Foote, Lovejoy, Wenzel, Sapareto, & Ruggiero, 1132; Jewkes, et al., 2006). It included five dimensions of trauma: emotional neglect, physical neglect, emotional abuse, physical abuse and sexual abuse. Participants were asked whether before the age of 18 they had experienced each act never, sometimes, often, or very often. Each dimension of adversity was then categorized as a 3 level variable: the "never" exposure category required no exposure to any item in the dimension, the "some" exposure category was used when a participant responded "sometimes" to one item only, and a "often" exposure category was based on a response of "sometimes" to more than 1 item or any response of "often" or "very often."The subscales were used separately in the analysis. The Cronbach's alpha for the scale was 0.77.

Items on sexual behavior included partner numbers, partner concurrency, condom use and age at first sex. Three questions established past year numbers of main boyfriends, *khwapheni* (hidden partners concurrent with main partners), and men with whom the participant had sex only once. Young women who reported having a *khwapheni* were considered to have a concurrent sexual partner (R. Jewkes, et al., 2006). Condom use was measured by an item that asked participants whether they always, sometimes, seldom or never used a condom. Transactional sex with a casual partner was measured based on questions asking about sex motivated by expectations of receiving one of a range of items (Dunkle, Jewkes, Brown, Gray, McIntryre, & Harlow, 2004).

Experience of intimate partner violence was measured by the World Health Organization (WHO) violence against women instrument (World Health Organization,

2000). The instrument was modified to be culturally appropriate. The instrument included five items measuring single and multiple occurrences of physical abuse occurring within the last 12 months and over a woman's lifetime, and four items measuring single and multiple occurrences of sexual abuse within the past 12 months and over a woman's lifetime.

Statistical analysis:

Since the original study was a stratified, two stage survey with villages sampled from predefined strata based on geographical characteristics and participants clustered within villages, initial data analyses were carried out in Stata 10 using the survey procedures (Stata Corp., College Station, Texas, USA). These procedures allowed us to account for the lack of independence in the observations (non-zero, positive ICC) because of the sampling design.

Descriptive statistics were first calculated for all variables; and two-way associations were determined between incident HIV infection and early and later adolescent pregnancy, childhood trauma, age at first sex, HSV, educational attainment, age, and socio-economic status.

For each participant, we calculated the person years of exposure as the time from baseline to the last negative HIV result if the person remained negative, or as the total time between any negative tests as well as half the time between the last negative and first positive HIV test results. Random effects Poisson models were built to test the hypothesis that adolescent pregnancies occurring at the age of 15 years or younger, or between 16 and 19 years of age, predicted incident HIV infection measured at follow up. Each model included variables for the study treatment arm, stratum, and person years of exposure,

age, socio-economic status, education, child sexual, physical and emotional abuse, childhood emotional neglect, HSV status at baseline, and age at first sex. We tested goodness of fit by use of the Poisson test. We confirmed the findings of associations for the outcome variable by modeling survival time under observation with a Weibull model, with the same set of other variables included. To investigate whether results were robust to missing data, we undertook a sensitivity analysis with inverse probability weighting.

To investigate whether results were robust to missing data we conducted a sensitivity analysis with inverse probability weighting. The results suggest that the potential impact of missing data is minimal.

RESULTS

Of the 1,415 women who were enrolled into the trial, 316 were excluded from this analysis. Women were excluded if they had HIV infection at baseline (N=159), missing data (N=1), or were lost to follow-up at both 12 and 24 months (N=156). The 1,099 women included in this analysis represent 88% of 1256 HIV-negative women in the trial.

Women lost to follow up (Table 2.1) were older, more likely to have had a boyfriend and sex at baseline. The mean age of the young women retained in the cohort was 17.5 years (15.2-18.9). At baseline, 87.3% of participants had had sexual intercourse. By the end of the approximately two years of follow up, 93.6% of the young women had had sexual intercourse. Fifty-two young women had no sexual intercourse before the end of the study period. The median time between early adolescent pregnancy and the baseline assessment was six years with a range from three to 11 years.

The HIV incidence among the cohort of young women was 6.0 per 100 person years (N=128). As shown in Table 2.2, there were no significant differences in age, education or socioeconomic status between those women who acquired HIV and those who did not. Young women who experienced childhood adversity, particularly sexual and emotional abuse were more likely to acquire incident HIV. A significantly greater proportion of women who acquired HIV, compared to those who did not, tested positive for herpes simplex virus type 2 at baseline. Women who acquired HIV were younger when they first had sexual intercourse (15.3 years vs. 15.83; p=0.01) and were more likely to report an early teen pregnancy compared to those who did not seroconvert. Two hundred and fifty-one young women (17.74%) reported that they experienced a pregnancy under the age of 19. Of these, 43 were aged 15 or younger when they had a pregnancy.

The incidence of HIV and IRR derived from the adjusted multivariable Poisson model is shown in Table 2.3. Women who had an early teen pregnancy, aged 15 years or younger, were three times more likely to acquire HIV (IRR=3.02; 95% confidence interval 1.50-6.09). Women who experienced a later teen pregnancy (aged 16-18 years) did not have an increased risk of incident HIV compared with the young women who did not have an adolescent pregnancy. In the model, we adjusted for childhood trauma, age at first sex, HSV2, study design, educational attainment, socioeconomic status and age.

Given the strong link between an early teen pregnancy and subsequent HIV infection, we explored whether adolescents who experienced an early pregnancy had an increased risk of a range of behavioral factors (Table 2.4) and whether the young women had partners with characteristics (Table 2.5) that placed them at a differential risk of

acquiring HIV. Women who had experienced an early teen pregnancy had increased odds of having four or more sexual partners in their lifetime. Although marginally significant they also experienced more physical and sexual violence than women who had a later teen pregnancy or did not have a pregnancy. A greater proportion of women who had an early teen pregnancy reported always using a condom at the baseline assessment than those women who experienced a later teen pregnancy (25.8% vs. 14.0%). Women who had experienced an early teen pregnancy had partners at the start of the study who were much older than them (4 or more years older). However, the women reported less often that their partners were in concurrent relationships than women who had a later teen pregnancy.

DISCUSSION

Results support the hypothesis that young women who have an early, but not later, teen pregnancy are more likely to subsequently become HIV infected. The study provides strong evidence of the temporal aspect of this finding with pregnancies occurring years before the incident HIV infection thus ruling out the possibility that HIV infection occurred simultaneously or preceded the early pregnancies. This finding suggests that behavioural factors may be important in the increased risk of incident HIV, in contrast with an earlier study that suggests that higher transmission in pregnancy is biological and the result of hormonal changes during pregnancy (Gray, et al., 2005).

Early adolescent pregnancy was associated with higher lifetime partner numbers and subsequently having a partner who was four or more years older. While this analysis was exploratory, these findings suggest that early teen pregnancies were followed by in

different risk behaviour than among young women who had a pregnancy between the ages of 16 and 18 years and the younger adolescents. Further research is required to investigate the pathways through which early teen pregnancy increases the risk of subsequent HIV infection.

This paper builds on previous work on this dataset. Jewkes and colleagues found that child sexual abuse increased the risk of subsequent HIV infection among the same group of young women (Jewkes, Dunkle, Nduna, Jama, & Puren, 2010). In our analysis we adjusted for different dimensions of childhood trauma. Adolescents reporting an early pregnancy at the age of 15 or younger would all, by legal definition, have experienced child sexual abuse. However, qualitative data from the participants in this study found that while some of these early relationships were experienced as abusive, others were described as more equitable (Jewkes, Wood, & Duvvury, 1074). There is a complex interplay between adolescents' perceptions of autonomy and ability to consent to sexual intercourse, and the need to have protective measures to prevent child sexual abuse.

Behavioral interventions addressing adolescent sexual risk behavior that aim to reduce both unwanted pregnancies and HIV infection are common (Anderman, Lane, Zimmerman, Cupp, & Phebus, 2009; Fiscian, Obeng, Goldstein, Shea, & Turner, 2009; Mantell, Harrison, Hoffman, Smit, Stein, & Exner, 2006; Roberto, Zimmerman, Carlyle, Abner, Cupp, & Hansen, 2007; Shegog, Markham, Peskin, Dancel, Coton, & Tortolero, 2007). Some studies have investigated teen pregnancy and HIV as co-occurring outcomes and prevention interventions have focused on the simultaneous prevention of these (Grunseit, Kippax, Aggleton, Baldo, & Slutkin, 1997; Kirby, Short, Collins, Rugg, Kolbe, Howard, Miller, Sonenstein, & Zabin, 1994). This study suggests the importance

of preventing early teen pregnancy in subsequent HIV infection. Interventions that focus on gender equality and sexual rights particularly focusing on the delay of first sexual intercourse are critical.

The South African Children's Act 38 of 2005 ensures confidentiality for young women under the age of 18 who obtain condoms, contraceptives or contraceptive advice. Despite the law, teens report experiencing judgemental attitudes from health care providers when they access contraceptive services (Dickson-Tetteh, Pettifor, & Moleko, 2001). They also are afraid that health care providers will not maintain confidentiality and will discuss their contraceptive use with parents or relatives. Another paper from this dataset found that very few teens who reported having had sexual intercourse accessed contraceptives prior to having a teen pregnancy and that most contraceptive use by teens followed a pregnancy (Moodley, Jewkes, & Christofides, unpublished).

This study has several limitations. This study is based on the analysis of data from a cohort of volunteers in an HIV prevention trial, and this may limit the generalizability of the findings. While retention of study participants was high, some were lost to follow up and there were a few significant differences in the socio-demographic characteristics. We tested for robustness to missing data and our results suggested that the potential effect was small. Pregnancies were self-reported and it is possible that pregnancies which were terminated or miscarried were under-reported. Significant strengths of the study include the use of prospectively collected data, HIV testing protocol and the coherence and strength of our findings across different modeling procedures.

CONCLUSION

This study found that women who experienced an early teen pregnancy had an increased incidence of HIV infection. The higher risk may lead to sexual risk behaviors such as higher partner numbers and a greater age difference with partners rather than a biological explanation of hormonal changes during pregnancy. Preventing early teen pregnancies is important in a comprehensive HIV prevention strategy in countries with high HIV prevalence like South Africa.

REFERENCES

Anderman, E. M., Lane, D. R., Zimmerman, R., Cupp, P. K., & Phebus, V. (2009). Comparing the efficacy of permanent classroom teachers to temporary health educators for pregnancy and HIV prevention instruction. *Health Promotion Practice, 10*(4), 597-605.

Bernstein, D. P., Fink, L., Handelsman, L., Foote, J., Lovejoy, M., Wenzel, K., et al. (1132). Initial reliability and validity of a new retrospective measure of child abuse and neglect. *American Journal of Psychiatry, 151*(8), 1132-1136.

Chen, X. K., Wen, S. W., Fleming, N., Demissie, K., Rhoads, G. G., & Walker, M. (2007). Teenage pregnancy and adverse birth outcomes: a large population based retrospective cohort study. *International Journal of Epidemiology, 36*(2), 368-373.

De Genna, N. M., Cornelius, M. D., & Donovan, J. E. (2009). Risk factors for young adult substance use among women who were teenage mothers. *Addictive Behaviors, 34*(5), 463-470.

Department of Health. (2008). *The 2003 South African Demographic & Health Survey* Pretoria: South African Department of Health.

Dickson-Tetteh, K., Pettifor, A., & Moleko, W. (2001). Working with public sector clinics to provide adolescent-friendly services in South Africa. *Reproductive Health Matters, 9*(17), 160-169.

Dunkle, K. L., Jewkes, R. K., Brown, H. C., Gray, G. E., McIntryre, J. A., & Harlow, S. D. (2004). Transactional sex among women in Soweto, South Africa: prevalence,

risk factors and association with HIV infection. *Social Science & Medicine, 59*(8), 1581-1592.

Fiscian, V. S., Obeng, E. K., Goldstein, K., Shea, J. A., & Turner, B. J. (2009). Adapting a multifaceted U.S. HIV prevention education program for girls in Ghana. *AIDS Education & Prevention, 21*(1), 67-79.

Fraser, A. M., Brockert, J. E., & Ward, R. H. (1995). Association of young maternal age with adverse reproductive outcomes. *New England Journal of Medicine, 332*(17), 1113-1117.

Grant, M. J., & Hallman, K. K. (2008). Pregnancy-related school dropout and prior school performance in KwaZulu-Natal, South Africa. *Studies in Family Planning, 39*(4), 369-382.

Gray, R. H., Li, X., Kigozi, G., Serwadda, D., Brahmbhatt, H., Wabwire-Mangen, F., et al. (2005). Increased risk of incident HIV during pregnancy in Rakai, Uganda: a prospective study.[see comment]. *Lancet, 366*(9492), 1182-1188.

Grunseit, A., Kippax, S., Aggleton, P., Baldo, M., & Slutkin, G. (1997). Sexuality education and young people's sexual behavior: a review of studies. *Journal of Adolescent Research, 12*(4), 421-453.

Jewkes, R., Nduna, M., Levin, J., Jama, N., Dunkle, K., Khuzwayo, N., et al. (2006). A cluster randomized-controlled trial to determine the effectiveness of Stepping Stones in preventing HIV infections and promoting safer sexual behaviour amongst youth in the rural Eastern Cape, South Africa: trial design, methods and baseline findings. *Tropical Medicine & International Health, 11*(1), 3-16.

Jewkes, R., Vundule, C., Maforah, F., & Jordaan, E. (2001). Relationship dynamics and teenage pregnancy in South Africa. *Social Science & Medicine, 52*(5), 733-744.

Jewkes, R., Wood, K., & Duvvury, N. (1074). 'I woke up after I joined Stepping Stones': meanings of an HIV behavioural intervention in rural South African young people's lives. *Health Education Research, 25*(6), 1074-1084.

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*(11), 833-841.

Kirby, D., Short, L., Collins, J., Rugg, D., Kolbe, L., Howard, M., et al. (1994). School-based programs to reduce sexual risk behaviors: a review of effectiveness. [Review] [60 refs]. *Public Health Reports, 109*(3), 339-360.

Lewis, L. N., Hickey, M., Doherty, D. A., & Skinner, S. R. (2009). How do pregnancy outcomes differ in teenage mothers? A Western Australian study. *Medical Journal of Australia, 190*(10), 537-541.

Magadi, M. (2006). Poor pregnancy outcomes among adolescents in South Nyanza region of Kenya. *African Journal of Reproductive Health, 10*(1), 26-38.

Mahavarkar, S. H., Madhu, C. K., & Mule, V. D. (2008). A comparative study of teenage pregnancy. *Journal of Obstetrics & Gynaecology, 28*(6), 604-607.

Mantell, J. E., Harrison, A., Hoffman, S., Smit, J. A., Stein, Z. A., & Exner, T. M. (2006). The Mpondombili Project: preventing HIV/AIDS and unintended pregnancy among rural South African school-going adolescents. *Reproductive Health Matters, 14*(28), 113-122.

Marteleto, L., Lam, D., & Ranchhod, V. (2008). Sexual behavior, pregnancy, and schooling among young people in urban South Africa. *Studies in Family Planning, 39*(4), 351-368.

Moodley, D., Esterhuizen, T. M., Pather, T., Chetty, V., & Ngaleka, L. (2009). High HIV incidence during pregnancy: compelling reason for repeat HIV testing. *AIDS, 23*(10), 1255-1259.

Moodley, N., Jewkes, R., & Christofides, N. Unpublished. Determinants of contraception use among young women in the rural Eastern Cape, South Africa. South African College of Medicine.

Moore, D. R., Florsheim, P., & Butner, J. (2007). Interpersonal behavior, psychopathology, and relationship outcomes among adolescent mothers and their partners. *Journal of Clinical Child & Adolescent Psychology, 36*(4), 541-556.

Moultrie, T. A., & McGrath, N. (2007). Teenage fertility rates falling in South Africa. *South African Medical Journal*(2007 Jun), Suid-Afrikaanse Tydskrif Vir Geneeskunde.

Moultrie, T. A., & Timaeus, I. M. (2003). The South African fertility decline: Evidence from two censuses and a Demographic and Health Survey. *Population Studies, 57*(3), 265-283.

Phipps, M. G., & Sowers, M. (2002). Defining early adolescent childbearing. *American Journal of Public Health, 92*(1), 125-128.

Ramos-Marcuse, F., Oberlander, S. E., Papas, M. A., McNary, S. W., Hurley, K. M., & Black, M. M. (2010). Stability of maternal depressive symptoms among urban,

low-income, African American adolescent mothers. *Journal of Affective Disorders, 122*(1-2), 68-75.

Rehle, T., Shisana, O., Pillay, V., Zuma, K., Puren, A., & Parker, W. (2007). National HIV incidence measures--new insights into the South African epidemic. *South African Medical Journal, 97*(3), Suid-Afrikaanse Tydskrif Vir Geneeskunde.

Roberto, A. J., Zimmerman, R. S., Carlyle, K. E., Abner, E. L., Cupp, P. K., & Hansen, G. L. (2007). The effects of a computer-based pregnancy, STD, and HIV prevention intervention: a nine-school trial. *Health Communication, 21*(2), 115-124.

Shegog, R., Markham, C., Peskin, M., Dancel, M., Coton, C., & Tortolero, S. (2007). "It's your game": an innovative multimedia virtual world to prevent HIV/STI and pregnancy in middle school youth. *Studies in Health Technology & Informatics, 129*(Pt 2), 983-987.

Shisana, O., Rehle, T., Simbayi, L. C., Zuma, K., Jooste, S., Pillay-van-Wyk, V., et al. (2009). *South African national HIV prevalence, incidence, behaviour and communication survey 2008:A turning tide among teenagers?* Cape Town: HSRC.

Ventura, S. J., Abma, J. C., Mosher, W. D., & Henshaw, S. K. (2008). Estimated pregnancy rates by outcome for the United States, 1990-2004. *National Vital Statistics Reports, 56*(15), 1-25.

World Health Organization. (2000). *WHO Multi-Country Study on Women's Health and Domestic Violence: Core Questionnaire and WHO Instrument - Version 9*. Geneva: World Health Organization.

Table 2.1: Socio-demographic and behavioral characteristics of HIV-negative women who were followed up and lost to follow-up

	Followed-up (N=1099)	**Lost to follow up (N=156)**	**P-value**
Age	18.40 (18.24 to 18.56)	18.78 (18.50 to 19.06)	0.013
Education (to grade 10)	956 (87%)	133 (85%)	0.594
Socioeconomic status	0.0055 (–0.12 to 0.13)	–0.014 (–0.221 to 0.194)	0.853
Ever had a boyfriend	1059 (96%)	155 (99%)	0.053
Ever had sex	980 (89%)	148 (95%)	0.037
Ever had a pregnancy	197 (18%)	29 (19%)	0.855
Herpes Simplex Type 2 virus infection at baseline	245 (22%)	39 (26%)	0.374

Table 2.2: Socio-demographic and behavioral characteristics of women associated with HIV incidence over two years of follow up

	Incident HIV		**No incident HIV**		**p-value**
	N (%) or mean	**95% CI**	**N (%) or mean**	**95% CI**	
Age (years)	18.51	18.24-18.79	18.38	18.28-18.48	0.38
Education to grade 10	109/128 (87.24)	81.79-91.24	847/971(85.04)	75.44-91.32	0.51
SES	0.001	-0.23-0.23	0.009	-0.08-0.09	0.95
Age at first sex	15.30	14.95-15.66	15.85	15.74-15.96	0.001
Childhood trauma					
Child sexual abuse					
None	68/684 (53.54)	44.07-62.76	616/684 (63.37)	59.87-66.74	0.05
Some	34/257 (26.77)	20.44-34.22	223/257 (22.94)	20.46-25.63	
Often	25/158 (19.69)	13.73-27.40	133/158 (13.68)	11.65-16.0	
Emotional abuse					
None	41/496 (32.28)	23.92-41.96	455/496 (46.81)	43.14-50.52	0.007
Some	49/365 (38.58)	30.91-46.87	316/365 (32.51)	29.82-35.32	
Often	37/238 (29.13)	22.41-36.92	201/238 (20.68)	17.99-23.65	
Physical abuse					
None	8/124 (6.3)	10.19-13.93	116/124 (11.93)	3.21-11.98	0.08
Some	16/171 (12.6)	13.44-18.81	155/171 (15.95)	7.68-19.98	
Often	103/804 (81.1)	72.95-87.23	701/804 (72.12)	68.85-75.17	
Emotional Neglect					
None	73/651 (57.94)	49.51-65.92	578/651 (59.47)	56.2-62.65	0.44
Some	33/247 (26.19)	19.55-34.13	214/247 (22.02)	19.49-24.77	
Often	20/200 (15.87)	10.84-22.65	180/200 (18.52)	15.99-21.35	
Teen pregnancy	96/127 (75.59)	67.55-82.17	823/972 (84.67)	81.87-87.11	0.0007
None	10/127 (7.87)	4.11-14.55	21/972 (2.16)	1.41-3.3	
≤ 15 years	21/127 (16.54)	10.92-24.24	128/972 (13.17)	10.95-15.75	
16-19 years					
HSV2 infection at baseline	52/128 (40.6)	31.3-50.0	193/971 (19.9)	17.2-19.6	<0.001

Table 2.3: Relative HIV incidence with exposure to early and later teen pregnancy

	IRR	P	95% Confidence Interval	
Pregnancy ≤ 15 years	3.02	0.002	1.50	6.09
Pregnancy >=16 & <19	1.08	0.766	0.64	1.84

Controlled for treatment, age, socio-economic status, education, child sexual abuse, child emotional abuse, child physical abuse, emotional neglect, HSV, age at first sex

Table 2.4: Early and later teen pregnancy and behavioral outcomes

	No pregnancy	95% CI	Pregnancy ≤15	95% CI	Pregnancy 16 -19	95% CI	P value
Condom use	**(N=799)**		**(N=31)**		**(N=150)**		0.01
Always	24.16	20.74-27.93	25.81	13.92-428	14.00	8.9-21.34	
	193/799		8/31		21/150		
Sometimes/often	30.66	26.66-34.99	29.03	17.55-44.01	30.67	23.35-39.10	
	245/799		9/31		46/150		
Never	45.18	40.27-50.19	45.16	31.37-59.74	55.33	46.97-63.41	
	361/799		14/31		83/150		
Partner Numbers	**N=812**		**N=31**		**N=151**		0.01
1	68.97	65.60-72.15	64.52	47.85-78.28	72.19	63.23-79.66	
	560/812		20		109		
2 to 3	28.45	25.54-31.54	22.58	11.91-38.62	24.5	18.00-32.43	
	231		7		37		
4+	2.59	1.75-3.81	12.9	5.15-28.80	3.31	1.37-7.80	
	21		4		5		
Type of IPV	N=887		N=31		N=151		0.11
None	67.42	63.88-70.77	58.06	38.91-75.06	72.85	65.58-79.07	
	598/887		18/31		110/151		
Physical only	20.07	17.39-23.05	19.35	9.12-36.47	20.53	15.23-27.09	
	178/887		6/31		31/151		
Sexual	5.98	4.32-8.21	6.45	1.66-21.98	1.32	0.33-5.22	
	53/887		2/31		2/151		
Physical &sexual	6.54	4.95-8.59	16.13	6.18-35.95	5.3	2.39-11.32	
	58/887		5/31		8/151		
Any transactional	23.99	20.26-28.15	25.81	12.99-44.77	28.48	21.72-36.36	0.52

sex							
	195/813		8/31		43/151		
Relationship control	796		30		146		0.89
Low equity	33.17	29.18-37.41	30	16.24-48.65	34.93	27.10-43.67	
	264/796		9/30		51/146		
Medium equity	52.64	48.84-56.40	50	30.84-69.16	52.05	43.27-60.71	
	419/796		15/30		76/146		
High equity	14.2	11.48-17.43	20	8.44-40.40	13.01	8.33-19.75	
	113/796		6/30		19/146		
Concurrency	73.99	70.53-77.18	70.97	51.73-84.79	82.78	75.03-88.49	0.09
	606/819		22/31		125/151		

Table 2.5: Partner characteristics at baseline of women who had an early teen pregnancy

	No pregnancy (N=869)	**95% CI**	**Pregnancy ≤ 15 (n=30)**	**95% CI**	**Pregnancy 16 - 19 (N=146)**	**95% CI**	**P value**
Age difference of 4+ years	31.21 270/865	27.87-34.77	63.33 19/30	43.26-79.65	49.32 72/146	40.62-58.06	0.000
Partner probably or definitely has another partner	63.52 552/869	59.78-67.11	66.67 20/30	49.71-80.18	78.08 114/146	70.49-84.16	0.003

CHAPTER THREE:

Risk factors for unplanned and unwanted teenage pregnancies occurring over two years of follow up among a cohort of young South African women

ABSTRACT

Background: This longitudinal study aimed to describe the range of risk and protective factors for incident unwanted and unplanned pregnancies occurring among the cohort over two years of follow up. It also aimed to investigate the relationship between gender inequality and gender-based violence and subsequent unplanned and unwanted pregnancies among a cohort of teenage women in the Eastern Cape, South Africa.

Methods: Teenage girls aged 15 to 18 years (n=922) who had data from at least one follow up time were included in this analysis. The teenagers were volunteer participants in a cluster randomized controlled trial. To assess risk and protective factors for incident unwanted or unplanned pregnancies, we constructed multivariate multinomial regression models adjusting for clusters as latent variables. Covariates included age, having a pregnancy prior to baseline, education, time between interviews, study intervention arm, contraceptive use, experience of intimate partner violence, belief that the teenage girl and her boyfriend are mutual main partners and socioeconomic status.

Results: Overall, 174 pregnancies occurred over two years of follow up. Beliefs about relationship control were not associated with unwanted and unplanned pregnancies, nor were experiences of forced first sex or coerced sex under the age of 15. Hormonal contraception was protective against unplanned pregnancies (OR 0.40; 95% CI 0.21-0.79) however, using condoms was not protective. Physical abuse was a risk factor for

unwanted pregnancies (OR 1.69; 95% CI 1.05-2.72). Having a pregnancy prior to baseline was protective against an unwanted pregnancy (OR 0.25; 95% CI 0.07-0.80). Higher socio-economic status was protective for both unplanned and unwanted pregnancies (OR 0.69; 95% CI 0.58-0.83 & OR 0.78; 95% CI 0.64-0.96). Believing that the teenage girl and her boyfriend were mutual main partners doubled the odds of reporting both an unplanned and unwanted pregnancy (OR 2.58 95% CI 1.07-6.25, & OR 2.21 95% CI 1.13-4.29).

Conclusion: While some of the measures of gender inequity were not associated with unplanned and unwanted pregnancies, there is evidence of the role of both gender power and socio-economic status. This was evident in teenage girls who experienced physical violence being more likely to have an unwanted pregnancy. Interventions to prevent teenage pregnancies need to be tailored by socio-economic status as some teenagers may see having a pregnancy as a way to have a more secure future. Interventions that engage with relationship dynamics of teenagers are essential if unwanted and unplanned pregnancies are to be prevented. There is an unmet contraceptive need among the young women in the Eastern Cape.

INTRODUCTION

Much has been written about the adverse, short term, health outcomes of teenage pregnancy for women and their infants. Teenage mothers have been found to be at increased risk for anemia, urinary tract infection and pregnancy-induced hypertension (Fraser, Brockert, & Ward, 1995; Lewis, Hickey, Doherty, & Skinner, 2009; Magadi, 2006; Ventura, Abma, Mosher, & Henshaw, 2008). Infants were more likely to suffer infant and neonatal death, accidents, infections and sudden infant death syndrome (SIDS) (Chen, et al., 2007). There is also a body of literature that has explored the longer term social and mental health consequences of teenage pregnancy. These consequences include depression and substance use, increased sexual risk behavior, as well as lower educational attainment and socio-economic status (De Genna, Cornelius, & Donovan, 2009; Moore, Florsheim, & Butner, 2007; Ramos-Marcuse, et al., 2010). Most of this literature emanates from developed countries in North America, Australia and Europe.

Nearly one-third of South African women report having had a teenage pregnancy (Department of Health, 1999, 2008). There is evidence that teenage fertility declined by 10% between 1996 and 2001 from 79 births per 1000 women to 65 births per 1000 women (Moultrie, McGrath, Moultrie, & McGrath, 2007).

Studies from South Africa have described the relationship between teen pregnancies and poorer educational outcomes (Grant & Hallman, 2008; Marteleto, Lam, & Ranchhod, 2008). A recent study of young women in South Africa found that early teenage pregnancies increased risk of acquiring HIV (Christofides et al., unpublished).

It is against this backdrop of both short and longer term adverse health outcomes that teenage pregnancies are largely viewed as a public health issue. However, few

studies investigating the risk factors for teenage pregnancies differentiate between desired, unwanted and unplanned pregnancies. In the South African context, some teenage pregnancies are desired, but most are unplanned or unwanted (Jewkes, Vundule, Maforah, & Jordaan, 2001; Moultrie, et al., 2007). An unplanned pregnancy is described in the literature as a pregnancy that is not desired at that particular time, in other words it is mistimed, while an unwanted pregnancy is not wanted at all (Henshaw, 1998). The adverse consequences for unwanted pregnancies tend to be more severe than those for unplanned pregnancies (D'Angelo, Gilbert, Rochat, Santelli, & Herold, 2004). Literature that differentiates between unplanned and unwanted pregnancies has focused on women of all age groups and not on teenage girls in particular. Differentiating between unplanned and unwanted pregnancies may allow for a more nuanced understanding of the risk factors of teenage pregnancy, and may allow for the development of more closely targeted and more effective prevention strategies. In addition, increasing understanding of the difference between unplanned and unwanted pregnancy may assist health care providers in determining not only the unmet need for contraceptive services but also for abortion services.

Studies from South Africa have identified lower educational achievement and a shock to the household, defined as death of a household member, job loss, marital disruption, or loss of a grant or remittance, as a risk factors for teenagers becoming pregnant (Grant & Hallman, 2008; Marteleto, et al., 2008). Other studies have found an association between gender inequality and gender-based violence, including child sexual abuse and forced first sex, and teenage pregnancies (Butler & Burton, 1990; Fiscella, Kitzman, Cole, Sidora, & Olds, 1998; Jewkes, et al., 2001; Kellogg & Hoffman, 1999;

Koenig, et al., 2004; Roberts, et al., 2004; Roosa, Tein, Reinholtz, & Angelini, 1997; Vundule, Maforah, Jewkes, & Jordaan, 2001). However, this research has rarely differentiated on the bases of whether the teenage pregnancy was unplanned or unwanted.

This longitudinal study aimed to describe the range of risk and protective factors for incident unwanted and unplanned pregnancies occurring among a cohort of 922 teenage women aged 15 to 18 over approximately two years of follow up. It also aimed to describe the relationship between gender inequality and gender-based violence and subsequent incident pregnancies among a cohort of teenage girls in the Eastern Cape, South Africa.

DESIGN AND METHODS

A total of 1,416 South African women aged 15 to 26 were recruited from 70 villages and residential areas near Mthatha in the Eastern Cape, South Africa to participate in a cluster randomized controlled trial of the Stepping Stones HIV prevention intervention (Jewkes, et al., 2006; Jewkes, et al., 2008). Villages or residential areas were the unit of randomization. Villages were eligible for inclusion if they were in the study area, located 10 kilometers or more from other study villages, contained a secondary school and were willing to participate. Once villages were randomized, volunteers were recruited primarily from secondary schools. Twenty women were recruited per cluster. All participants were normally resident in the village where they were schooling and mature enough to understand the content of the intervention.

The intervention arm received a 50 hour participatory Stepping Stones programme on sexual and reproductive health and HIV over a six to eight week period. The control arm

received a three hour intervention on safer sexual practices and HIV presented on a single occasion. Apart from the different interventions, the participants in both arms were treated the same (Jewkes, et al., 2006).

Face-to-face interviews by trained, female interviewers using standardised questionnaires and serological surveys were carried out at 12-month intervals over approximately two years of follow up. Detailed data were collected from all participants on reproductive outcomes and sexual behavior at each of three time points: baseline (T_0), first follow-up (T_1) which occurred between one year and 18 months after baseline, and second follow-up (T_2) which occurred between one year and 18 months after the first follow up data collection. The analysis presented here is based on a subset of 922 teenage women aged 15 to 18 years at baseline who had data from at least one follow up time. The amount of time participants were followed up is controlled for in analyses by creating a variable of time since baseline data collection. The date of the baseline interview was subtracted from the final interview.

Ethical clearance for the study was granted by the University of Pretoria ethics committee. Written consent was obtained when participants were recruited into the study.

The questionnaire covered socio-demographic characteristics, sexual behavior and a range of reproductive outcomes including pregnancy. Women who responded in the affirmative to the question “Since the previous interview have you been pregnant?” and/or to the question “Are you currently pregnant” asked at either follow-up were categorized as having an incident pregnancy. An additional question asked when she became pregnant. To eliminate any misclassification of the timing of pregnancies, the reported dates when a woman became pregnant and her baseline interview dates were

compared to ensure that the pregnancy started after the baseline interview. Assessment of pregnancy desire was based on the response to the item: “At the time you became pregnant did you want to become pregnant then, did you want to wait until later, or did you not want to have any children at all?” Women who responded that they “wanted to wait until later” were classified as having an unplanned pregnancy while those who said that they “did not want to have children at all” were classified as having an unwanted pregnancy. Teenage girls who said that they wanted the pregnancy at that time were dropped from further analysis (N=10). Many of the teenage girls had a pregnancy prior to the baseline assessment. For the analysis of the association between child sexual abuse and first pregnancies, all first pregnancies were included in the analysis, including those prior to baseline and those that occurred over the two years of follow up.

The questionnaire included the WHO violence against women instrument which was modified to be culturally appropriate (World Health Organization, 2000). The instrument included five items measuring single and multiple occurrences of physical abuse occurring within the last 12 months and over a woman’s lifetime, and four items measuring single and multiple occurrences of sexual abuse within the past 12 months and over a woman’s lifetime. Three variables measuring intimate partner violence (IPV) were derived. These included a three-level categorical variable of type of abuse which included no abuse, physical only and sexual abuse with or without physical abuse. The frequency of IPV was measure through a categorical variable with no abuse, once only and experiences of IPV more than once. The temporality of IPV was measured using a four level variable: no abuse, abuse occurring before the previous 12 months only, abuse

occurring in the past 12 months only and abuse occurring both before and during the past 12 months.

Coerced first sex was derived from an item that asked "Which of the following statements most closely describes your experiences the first time you had sexual intercourse? I was willing; I was persuaded; I was tricked; I was forced; I was raped." This was dichotomized into those who were willing and those who were coerced.

Child sexual abuse was measured through a response to one or more of four items that asked about the period 'before the age of 18', for example "Someone touched my thighs, buttocks, breasts or genitals when I did not want him to or made me touch his private parts when I did not want to".

For women with current main male partners at baseline, a sexual relationship power scale developed by Pulerwitz and her colleagues (10-items, Cronbach's alpha=0.73), previously shown to be associated with prevalent HIV among South African women, was used to measure gender power equity (Pulerwitz, Gortmaker, & DeJong, 2000). A typical item was "When (NAME OF BOYFRIEND) wants me to sleep over he expects me to agree". Each item was assessed on a four point Likert scale and the measure was scored and categorized into tertiles. For the analyses the tertile with lowest equity was compared to the middle and higher ones.

Contraceptive use was measured by an item that asked "Are you currently doing something or using any method to delay or avoid getting pregnant?" and a follow up questions which asked about which contraceptive method was being used. Contraceptive use was then categorized into a three level variable: no contraceptive use, hormonal contraceptives or condoms only. Contraceptive knowledge was measured using a six item

scale, with items such as: “A woman who is not using contraception and has sex during her period will probably get pregnant”. The continuous variable was later dichotomized into higher and lower knowledge.

Alcohol use was measured using the AUDIT scale (Fleming, Barry, & MacDonald, 1991). A score of 8 or higher was considered to be problematic. Three questions established past year numbers of main boyfriends, *khwapheni* (hidden partners concurrent with main partners), and men with whom the participant had sex only once. Socioeconomic status was assessed by use of a scale that encompassed household goods ownership, food, and cash scarcity.

Statistical analysis

The study was a stratified, two stage survey with villages sampled from predefined strata based on geographical characteristics and participants clustered within villages. Data analysis was carried out in Stata 10 (Stata Corp., College Station, Texas, USA). Descriptive statistics were first calculated for all variables. Potential risk and protective factors and incident unwanted or unplanned pregnancies. Two-way associations were determined between measures of gender power relations including relationship control and IPV variables, sexual risk behavior such as number of sexual partners and demographic variables. For continuous variables the summary took the form of means with 95% confidence intervals (95% CIs), while for binary variables the summary took the form of percentages with 95% CIs.

To assess risk and protective factors for incident unwanted or unplanned pregnancies, we constructed multivariate multinomial regression models using svy: mlogit, which adjusts for clusters as latent variables within the model. Variables were

considered for inclusion in the model if the significance in two-way analyses was less than 0.2 or if they were theoretically important.

Explanatory variables included age at baseline, having a pregnancy prior to baseline, education, time between interviews, study intervention arm, mutual main partners, contraceptive use, experience of intimate partner violence and socioeconomic status. Elimination was used in the modeling to obtain the most parsimonious model. Variables that had a non-significant p-value were systematically eliminated with the least significant variable eliminated first. All IPV variables and relationship control were included in the original model and systematically eliminated, with the exception of experience of IPV by type of violence. All theoretically relevant interaction terms were tested and none were found to be statistically significant.

RESULTS

Of the (n=922) women aged 15-18 years, 11.4% (n=103) were lost to follow up. These women were slightly older and were less likely to have completed ten years of schooling than those who were successfully followed; those lost to follow-up were also more likely to have been sexually active at baseline. The mean age of the teenage girls retained in the cohort was 17.04 years (range 15-18 years). At baseline, 87.3% of participants had had sexual intercourse. By the end of the approximately two years of follow up, 93.6% of the young women had had sexual intercourse. Fifty-two young women had no sexual intercourse before the end of the study period and were dropped from the subsequent analyses.

One hundred and seventy-four pregnancies occurred over the approximately two years of follow up; of these 10 (3.6%) were wanted at that time (and the respondents were dropped from subsequent analyses), 53 (32.3% of the remaining 164 pregnancies) were unplanned and 85 (67.7%) were unwanted. Intention data were missing for 22 young women, and these were also dropped from analyses.

Table 3.2 shows the socio-demographic and select sexual and reproductive behaviors were compared for two groups: women who reported no incident pregnancy and those who had at least one unplanned or unwanted pregnancy over the approximately 24 months of follow up. Those women who reported a pregnancy came from households with lower socio-economic status. Young women who had an incident unplanned or unwanted pregnancies were less likely to have had a pregnancy prior to baseline. They were also less likely to report hormonal contraceptive use at baseline and more likely to report using only condoms as contraceptives. They were more likely to believe that they were their boyfriend's main partner, and have a relationship of shorter duration.

Table 3.3 shows the associations between experiences of gender-based violence and power and control in relationships and incident unwanted and unplanned pregnancies. Young women who had an incident unplanned and unwanted pregnancy were more likely to report experiences of physical abuse at baseline than those women who did not have an incident pregnancy. However, they were less likely to report experiences of sexual abuse. There was no association between power and control in relationship at baseline and subsequent incident unplanned or unwanted pregnancies. Having a non-consensual first sexual experience was also not associated with having a teenage pregnancy. Coerced sex under the age of 15 years was not associated with

incident pregnancies, as shown in Table 3.3. However, child sexual abuse was associated with first pregnancies (some occurred prior to baseline) but not with subsequent pregnancies (44.1% vs. 31.9%; p=0.002) (data not shown in table).

Table 3.4 shows the results from the multinomial regression on unwanted and unplanned pregnancies. Hormonal contraception was significantly protective against unplanned pregnancies; however it showed no impact on unwanted pregnancies. Using condoms as contraceptives was not associated with unplanned pregnancies. Physical abuse was a risk factor for unwanted pregnancies, but not unplanned pregnancies. Lower socio-economic status was a risk factor for both unplanned and unwanted pregnancies. Believing that the teenage girl and her boyfriend were mutual main partners doubled the odds of reporting both an unplanned and unwanted pregnancy. Having a pregnancy prior to baseline was protective against an unwanted pregnancy; however, this was not the case for unplanned pregnancies.

DISCUSSION

The study found that lower socioeconomic status and the teenage girl believing that she was her boyfriend's main partner were risk factors for both incident unwanted and unplanned pregnancies. Using hormonal contraceptives were protective against unplanned but not unwanted pregnancies; while having had a previous pregnancy was protective against unwanted but not unplanned pregnancies. Women who had experienced physical abuse were more likely to have an unwanted pregnancy.

Unlike other studies, contraceptive knowledge and educational attainment were not associated with incident pregnancies over the two years of follow up (Grant &

Hallman, 2008; Marteleto, et al., 2008). This study suggests that the relationship dynamics and access to health services may play a greater role in teenage pregnancies than knowledge and education.

The results of this study do not support the findings of other studies that forced first sex is associated with teenage pregnancies (Jewkes, et al., 2001; Koenig, et al., 2004). We also did not find associations between relationship power and control and incident pregnancies. Child sexual abuse was associated with first pregnancies among teenage girls but not with second or third pregnancies among this cohort of teenage girls.

Lower socio-economic status was a risk factor for both unplanned and unwanted pregnancies. Teenage girls who come from poorer families may perceive pregnancy as a way to ensure greater security for their future, if the paternity of the child is established, and the father of the child's family provides economic support (Kaufman, de Wet, & Stadler, 2001; Wood & Jewkes, 2006). By contrast, teenage girls who come from families who are marginally better off may have a greater fear of becoming pregnant and disappointing their families and negatively impacting on their educational and social status (Kaufman, et al., 2001). However, some teenage pregnancies are embraced by families and viewed as a rite of passage to womanhood (Jewkes, Morrell, & Christofides, 2009).

Young women's beliefs about the nature of their relationship increased the likelihood of having an incident pregnancy over the follow up period. In particular, teenage girls who believed that they and their boyfriends were mutual main partners were more likely to report both unwanted and unplanned pregnancies. In addition, young women who experienced physical abuse were more likely to report an unwanted

pregnancy. The perceived stability of the relationship could lead teenage girls to feel less concerned about the possibility of becoming pregnant. This may lead to inconsistent contraceptive use. Additionally, the association with physical abuse, combined with believing themselves to be in a committed relationship could result in young women acquiescing to pressure to take risks and not use contraceptives (especially condoms) consistently (Wood & Jewkes, 2006).

Use of hormonal contraceptives was protective against unplanned pregnancies, while using only condoms was a risk factor for an unwanted pregnancy. This could be due to condom breakage or lack of commitment to consistent and correct use. We also found that having a prior pregnancy was protective against a future unwanted pregnancy. This is further evidence of a fertility trend in South Africa reported by Garenne and his colleagues (2000) who found that women who give birth as teenagers wait several years before having another child (Garenne, Tollman, & Kahn, 2000). Having a pregnancy also enables young women to interact with health care services. In South Africa over 90% of women attend antenatal care services at least once and most women deliver in hospitals or maternal and obstetric units. This provides an opportunity for women to access contraceptive services after delivery.

There is an unmet contraceptive need among the young women in the Eastern Cape, evident by the high percentage of teenage girls having unplanned and unwanted pregnancies. While these services are provided free of charge at primary health care clinics in South Africa there are problems with access, especially for young women. Health care providers are often judgmental about teenagers seeking contraceptive services (Ehlers, 2003; Kaufman, et al., 2001). Additionally, this study highlighted that

the mean time since last sex was three months indicating that many of the young women are having sex infrequently. This may affect the consistency of contraceptive use, especially the commonly used injectable and oral contraceptives. The two injectables used in primary health care clinics are medroxyprogesterone acetate commonly known as Depo provera and norethisterone enantate. Both are progestin only injectables with Depo providing three months protection and norethisterone eight weeks protection requiring repeat visits to clinics. Since many of the young women in the study were having sexual intercourse less frequently they may not have attended the clinic for their follow up visit and next dose of the injectable. This finding suggests the need for a wider range of contraceptive methods and wider promotion of emergency contraceptives.

This study has several limitations. Pregnancies were self-reported and it is possible that women did not disclose pregnancies that resulted in a termination. This may have resulted in under-reporting of pregnancies. Participants were volunteers, and this may limit the generalizability of the findings. Teenage girls who were lost to follow up were older with lower educational attainment and the effect on the outcomes investigated in this study is unknown.

CONCLUSION

While some of the measures of gender inequity were not associated with unplanned and unwanted pregnancies, there is evidence of the role of gender power that and socio-economic status. This was evident in teenage girls who experienced physical violence being more likely to have an unwanted pregnancy. Interventions to prevent teenage pregnancies need to be tailored by socio-economic status as some teenagers may

see having a pregnancy as a way to have a more secure future. Interventions that engage with relationship dynamics of teenagers are essential if unwanted and unplanned pregnancies are to be prevented. There is also an unmet contraceptive need among the young women in the Eastern Cape.

REFERENCES

Butler, J. R., & Burton, L. M. (1990). Rethinking teenage childbearing: Is sexual abuse a missing link? *Family Relations, 39*(1), 73-80.

Chen, X. K., Wen, S. W., Fleming, N., Demissie, K., Rhoads, G. G., & Walker, M. (2007). Teenage pregnancy and adverse birth outcomes: a large population based retrospective cohort study. *International Journal of Epidemiology, 36*(2), 368-373.

D'Angelo, D. V., Gilbert, B. C., Rochat, R. W., Santelli, J. S., & Herold, J. M. (2004). Differences between mistimed and unwanted pregnancies among women who have live births. *Perspectives on Sexual & Reproductive Health, 36*(5), 192-197.

De Genna, N. M., Cornelius, M. D., & Donovan, J. E. (2009). Risk factors for young adult substance use among women who were teenage mothers. *Addictive Behaviors, 34*(5), 463-470.

Department of Health. (1999). *The 1998 South African Demographic and Health Survey. Full Report*. Pretoria: South African Department of Health.

Department of Health. (2008). *The 2003 South African Demographic & Health Survey* Pretoria: South African Department of Health.

Ehlers, V. J. (2003). Adolescent mothers' utilization of contraceptive services in South Africa. *International Nursing Review, 50*(4), 229-241.

Fiscella, K., Kitzman, H. J., Cole, R. E., Sidora, K. J., & Olds, D. (1998). Does child abuse predict adolescent pregnancy? *Pediatrics, 101*(4 Pt 1), 620-624.

Fleming, M. F., Barry, K. L., & MacDonald, R. (1991). The alcohol use disorders identification test (AUDIT) in a college sample. *International Journal of the Addictions, 26*(11), 1173-1185.

Fraser, A. M., Brockert, J. E., & Ward, R. H. (1995). Association of young maternal age with adverse reproductive outcomes. *New England Journal of Medicine, 332*(17), 1113-1117.

Garenne, M., Tollman, S., & Kahn, K. (2000). Premarital fertility in rural South Africa: a challenge to existing population policy. *Studies in Family Planning, 31*(1), 47-54.

Grant, M. J., & Hallman, K. K. (2008). Pregnancy-related school dropout and prior school performance in KwaZulu-Natal, South Africa. *Studies in Family Planning, 39*(4), 369-382.

Henshaw, S. K. (1998). Unintended pregnancy in the United States. *Family Planning Perspectives, 30*(1), 24-29.

Jewkes, R., Morrell, R., & Christofides, N. (2009). Empowering teenagers to prevent pregnancy: lessons from South Africa. *Culture, Health & Sexuality, 11*(7), 675-688.

Jewkes, R., Nduna, M., Levin, J., Jama, N., Dunkle, K., Khuzwayo, N., et al. (2006). A cluster randomized-controlled trial to determine the effectiveness of Stepping Stones in preventing HIV infections and promoting safer sexual behaviour amongst youth in the rural Eastern Cape, South Africa: trial design, methods and baseline findings. *Tropical Medicine & International Health, 11*(1), 3-16.

Jewkes, R., Nduna, M., Levin, J., Jama, N., Dunkle, K., Puren, A., et al. (2008). Impact of stepping stones on incidence of HIV and HSV-2 and sexual behaviour in rural South Africa: cluster randomised controlled trial.[see comment]. *BMJ, 337*, a506.

Jewkes, R., Vundule, C., Maforah, F., & Jordaan, E. (2001). Relationship dynamics and teenage pregnancy in South Africa. *Social Science & Medicine, 52*(5), 733-744.

Kaufman, C. E., de Wet, T., & Stadler, J. (2001). Adolescent pregnancy and parenthood in South Africa. *Studies in Family Planning, 32*(2), 147-160.

Kellogg, N. D., & Hoffman, T. J. (1999). Early Sexual Experiences Among Pregnant and Parenting Adolescents. [Article]. *Adolescence, 34*(134), 293.

Koenig, M. A., Zablotska, I., Lutalo, T., Nalugoda, F., Wagman, J., & Gray, R. (2004). Coerced first intercourse and reproductive health among adolescent women in Rakai, Uganda. *International Family Planning Perspectives, 30*(4), 156-163.

Lewis, L. N., Hickey, M., Doherty, D. A., & Skinner, S. R. (2009). How do pregnancy outcomes differ in teenage mothers? A Western Australian study. *Medical Journal of Australia, 190*(10), 537-541.

Magadi, M. (2006). Poor pregnancy outcomes among adolescents in South Nyanza region of Kenya. *African Journal of Reproductive Health, 10*(1), 26-38.

Marteleto, L., Lam, D., & Ranchhod, V. (2008). Sexual behavior, pregnancy, and schooling among young people in urban South Africa. *Studies in Family Planning, 39*(4), 351-368.

Moore, D. R., Florsheim, P., & Butner, J. (2007). Interpersonal behavior, psychopathology, and relationship outcomes among adolescent mothers and their partners. *Journal of Clinical Child & Adolescent Psychology, 36*(4), 541-556.

Moultrie, T. A., McGrath, N., Moultrie, T. A., & McGrath, N. (2007). Teenage fertility rates falling in South Africa. [Letter

Research Support, Non-U.S. Gov't]. *South African Medical Journal Suid-Afrikaanse Tydskrif Vir Geneeskunde, 97*(6), 442-443.

Pulerwitz, J., Gortmaker, S. L., & DeJong, W. (2000). Measuring sexual relationship power in HIV/STD research. *Sex Roles, 42*(7-8), 637-660.

Ramos-Marcuse, F., Oberlander, S. E., Papas, M. A., McNary, S. W., Hurley, K. M., & Black, M. M. (2010). Stability of maternal depressive symptoms among urban, low-income, African American adolescent mothers. *Journal of Affective Disorders, 122*(1-2), 68-75.

Roberts, R., O'Connor, T., Dunn, J., Golding, J., Team, A. S., Roberts, R., et al. (2004). The effects of child sexual abuse in later family life; mental health, parenting and adjustment of offspring. [Research Support, Non-U.S. Gov't]. *Child Abuse & Neglect, 28*(5), 525-545.

Roosa, M. W., Tein, J.-Y., Reinholtz, C., & Angelini, P. J. (1997). The relationship of childhood sexual abuse to teenage pregnancy. *Journal of Marriage & the Family, 59*(1), 119-130.

Ventura, S. J., Abma, J. C., Mosher, W. D., & Henshaw, S. K. (2008). Estimated pregnancy rates by outcome for the United States, 1990-2004. *National Vital Statistics Reports, 56*(15), 1-25.

Vundule, C., Maforah, F., Jewkes, R., & Jordaan, E. (2001). Risk factors for teenage pregnancy among sexually active black adolescents in Cape Town. A case control

study. *South African Medical Journal Suid-Afrikaanse Tydskrif Vir Geneeskunde, 91*(1), 73-80.

Wood, K., & Jewkes, R. (2006). Blood blockages and scolding nurses: barriers to adolescent contraceptive use in South Africa. *Reproductive Health Matters, 14*(27), 109-118.

World Health Organization. (2000). *WHO Multi-Country Study on Women's Health and Domestic Violence: Core Questionnaire and WHO Instrument - Version 9*. Geneva: World Health Organization.

Table 3.1: Comparison of the sample followed up and lost to follow up

	Followed up (%) (N=819)	**Lost to follow up (%) (N=103)**	**p value**
Age (Mean years)	17.0	17.3	0.004*
Education: > grade 10	43.5%	30.1%	0.007*
Socio-economic status (score)	0.05	0.03	0.90
Ever had a boyfriend	96.1	98.1	0.32
Ever had sex	87.3	94.2	0.05*
Pregnancy prior to baseline	13.7	12.5	0.73
Mutual main partner	76.6	83.2	0.10
Duration of sexual activity (yrs)	2.24	2.24	0.99
Alcohol problem	3.5	6.8	0.14
Lifetime Number of sexual partners			0.64
<=1	67.5	71.9	
2-5	29.9	25.0	
>5	2.7	3.1	
Contraceptive use – ever	68.3	69.4	0.88
Age difference with partner (years)	3.11	2.77	0.15
Experience of IPV <u>ever</u> by type			
None	68.07	60.0	0.14
Physical abuse only	20.69	27.0	
Physical &/or sexual abuse	11.24	13.0	
Reproductive health knowledge score	23.0	22.4	0.14
Intervention : Stepping Stones	53.0	56.3	0.57

Table 3.2: Socio-demographic and behavioral characteristics of teenage girls (15-18) by whether they reported no pregnancy, or incident unplanned or unwanted over approximately 2 years of follow up

	No incident pregnancy (n=620)			Incident unplanned pregnancies (n=51)			Incident unwanted pregnancies (n=85)			P value
Demographic variables	N	%	95% CI	N	%	95% CI	N	%	95% CI	
Age at baseline										0.67
15	23	3.65	2.3-5.7	1	1.85	0.3-12.5	4	4.55	1.7-11.7	
16	148	23.49	20.4-26.8	12	22.22	12.0-37.4.5	17	19.32	13.1-27.5	
17	251	39.84	35.5-44.4	27	50.0	34.7-65.3	42	47.73	35.7-60.0	
18	208	33.02	28.9-37.4	14	25.22	15.0-40.9	25	28.41	17.7-42.3	
Boyfriend in past 12 months	609	96.67	95.1-97.8	52	96.3	86.1-99.1	87	98.9	92.2-99.8	0.43
Mutual main partners	458	72.70	68.4-76.6	46	85.19	71.8-92.9	71	80.7	68.1-89.1	0.11
10 or more years of education	276	43.81	36.7-51.2	21	38.89	26.4-53.0	35	40.23	27.4-54.6	0.69
Mean socio-economic status score	629	0.11	-3.1- 3.8	54	-0.47	-3.1 – 2.3	88	-0.14	-3.1-3.8	0.007
Mean duration of main relationship	615	23 mo	0-148	53	21 mo	0-68	85	19 mo	0-74	0.04
Mean no of days since last sex	545	107 days	0-1170	51	114 days	1-2100	82	77 days	1-870	0.16
Pregnancy prior to baseline	83	14.72	11.6-18.6	7	13.46	6.3-26.6	3	3.61	1.2-10.5	0.02
Contraception										0.02
None	221	39.89	35.1 - 44.9	29	55.77	43.2-67.7	34	40.96	30.9-51.0	
Hormonal	245	43.44	38.5- 48.6	14	26.92	15.9-41.8	27	32.53	23.2-43.0	
Condoms only	94	16.67	13.3 -20.7	9	17.31	9.0-30.6	22	26.51	19.7-34.0	
Contraceptive knowledge										0.64
Low	262	41.72	38.1-45.5	26	48.15	33.2-63.5	39	42.47	34.9-54.0	
High	366	58.28	54.5-62.0	28	51.85	36.5-66.8	49	55.68	45.8-65.0	
Risky behavior										
Alcohol problem	22	3.49	2.3-5.3	1	1.9	0.02-12.8	4	4.55	1.8-11.0	0.95
Number of sexual partners at baseline										0.86
0	29	5.32	3.6-8.0	3	5.88	2.0-16.2	3	3.66	1.2-10.6	
1	340	62.39	58.0-66.6	30	58.82	42.9-73.1	52	63.41	52.8-72.9	
2 or more	176	32.29	28.5-36.4	18	35.29	22.1-51.3	27	32.93	23.2-44.3	

Table 3.3: Associations between gender-based violence and control and incident unplanned and unwanted pregnancies over approximately 2 years of follow up

	No incident pregnancy (n=620)			Incident unplanned pregnancies (n=51)			Incident unwanted pregnancy (n=85)			P Value
	N	%	95% CI	N	%	95% CI	N	%	95% CI	
Lifetime experience of IPV by a boyfriend by type										0.06
None	437	69.81	65.9-73.5	38	70.37	58.2-80.2	57	64.77	54.9-73.5	
Physical abuse only	116	18.53	15.2-22.4	11	20.37	11.5-33.4	26	29.55	21.2-39.5	
Sexual abuse with/without physical	73	11.66	9.1-14.8	5	9.26	4.2-19.3	5	5.68	2.5-12.4	
Temporality of experience of IPV by a boyfriend										0.82
None	372	62.52	58.1-66.7	32	62.75	49.0-74.7	50	58.82	49.0-68.0	
Before the past12 months only	37	6.22	4.4-8.7	3	5.88	1.9-16.8	4	4.71	1.8-12.0	
Within the past12 months only	117	19.66	16.4-23.4	9	17.65	9.0-31.6	16	18.82	11.6-29.1	
Both before and within the past 12 months	69	11.60	9.2-14.6	7	13.73	6.7-26.1	15	17.65	11.7-25.8	
Experience of IPV by a boyfriend by frequency										0.16
None	407	64.60	60.5-68.5	35	64.81	52.3-75.6	53	60.23	50.4-69.3	
Once only	108	17.14	14.2-20.6	4	7.41	2.7-18.9	18	20.45	13.3-30.1	
More than once	115	18.25	15.3-21.7	15	27.78	17.7-40.8	17	19.32	13.3-30.1	
Relationship control scale										0.90
Low control (more equal)	189	29.0	25.4-35.0	15	27.78	17.2-41.5	29	32.95	22.8-45.0	
Medium control	315	50.0	45.7-54.4	26	48.15	33.7-62.9	44	50.0	38.7-61.3	
High control (less equality)	126	20.0	16.6-24.0	13	24.07	12.7-40.8	15	17.05	16.7-23.7	
Forced first sex (p=0.21)	85	13.49	10.9-16.7	5	9.26	4.3-18.9	8	9.09	4.1-18.9	0.94
Coerced sex before 15 (p=0.61)	20	3.67	2.4-5.6	3	5.88	2.0-16.3	4	4.88	2.0-11.2	0.64

Table 3.4: Multinomial logistic regression model of risk factors for incident unplanned and unwanted teenage pregnancies, adjusted for time between interviews and treatment arm

	OR	95% Confidence Interval		P value
Incident unplanned pregnancies				
Pregnancy prior to baseline	1.01	0.39	2.64	0.98
Age	0.90	0.60	1.35	0.61
Relationship duration	1.00	0.98	1.01	0.58
Contraception – None	Ref.			
Hormonal	0.40	0.21	0.79	<0.01
Condoms only	0.86	0.38	1.99	0.73
Mutual main partners	2.58	1.07	6.25	0.03
Socio-economic status	0.69	0.58	0.83	<0.01
Exposure to intervention	0.96	0.50	1.85	0.89
IPV – None	Ref.			
Physical abuse only	1.06	0.51	2.21	0.88
Sexual abuse with/without Physical	0.74	0.30	1.81	0.51
Incident unwanted pregnancies				
Pregnancy prior to baseline	0.25	0.07	0.80	0.02
Age	1.09	0.82	1.46	0.54
Relationship duration	0.98	0.97	1.00	0.06
Contraception – None	Ref.			
Hormonal	0.74	0.43	1.30	0.29
Condoms only	1.81	0.99	3.30	0.05
Mutual main partners	2.21	1.13	4.29	0.02
Socio-economic status	0.78	0.64	0.96	0.02
Exposure to intervention	1.43	0.85	2.41	0.18
IPV – None	Ref.			
Physical abuse only	1.69	1.05	2.72	0.03
Sexual abuse with or without physical abuse	0.55	0.24	1.27	0.16

CHAPTER FOUR:

Perpetration of physical and sexual abuse and subsequent fathering of pregnancies among a cohort of young South African men

ABSTRACT

Background: Adolescent men's involvement in fathering pregnancies has been substantially neglected in unintended pregnancy research. Gender norms give men substantial power and control over sexual encounters, suggesting that understanding men's role is imperative. We tested the hypothesis that young, unmarried South African men who had perpetrated intimate partner violence (IPV) have a greater incidence of fathering pregnancies.

Methods*:* The data for this study were collected from 983 men aged 15 to 26 who participated in a 2-year community randomized controlled HIV prevention trial in the rural Eastern Cape. Multivariate Poisson models investigated the associations between baseline perpetration of IPV and fathering subsequent pregnancies, while controlling for age, number of sexual partners, exposure to the intervention, socio-economic status, educational attainment, problematic alcohol use, and time between interviews.

Results*:* Of the men in this study, 16.5% (n=189) had made a girlfriend pregnant over two years of follow up. In addition, 39.1% had perpetrated physical or sexual intimate partner violence and 24.3% had done so more than once. Men who at baseline had perpetrated IPV in the previous year had an increased incidence of fathering, for a first perpetration in that year IRR 1.67 (95% CI 1.14-2.44) and among those who had also been previously violent, IRR 1.97 (95% CI 1.31-2.94). Those who had ever been violent,

but not in the past year, did not have an elevated incidence. The incidence among men who had ever perpetrated physical abuse was less elevated than among those who had perpetrated physical and sexual violence IRR 1.64 (95% CI 1.18-2.29) versus IRR 2.59 (95% CI 1.64-4.10) indicating a dose response. Men who were more controlling in their relationships were also more likely to father an incident pregnancy.

Conclusion*:* Young men's perpetration of partner violence is an important predictor of subsequently fathering a pregnancy. The explanation may lie with South African hegemonic masculinity, which valorizes control of women and displays of heterosexuality and virility. This compromises women's reproductive choices. Prevention of unwanted pregnancy must include attention to changing gender norms.

INTRODUCTION

Recent research has highlighted associations between men's perpetration of gender-based violence and several adverse reproductive health outcomes, including sexually transmitted diseases and HIV (Jewkes, Sikweyiya, Morrell, & Dunkle, 2009; Silverman, et al., 2007). There is also evidence that perpetrating gender-based violence is linked to a range of risky sexual behaviors such as transactional sex, higher partner numbers, multiple concurrent sexual partners, and lower condom use, all of which might increase the risk of fathering a pregnancy (Dunkle, et al., 2006; El-Bassel, et al., 2001; Raj, Reed, Welles, Santana, & Silverman, 2008). However, to date only limited research with men has directly explored the question of whether men's perpetration of intimate partner violence might be associated with fathering of pregnancies, whether wanted, unwanted, or unplanned. One survey of 6632 married men in India found that those who had sexually and/or physically abused their wives were more likely to report an unplanned pregnancy (Martin, et al., 1999). Similarly, men attending a community health service in Boston who reported perpetrating IPV in the past year were more likely to have fathered three or more children (Raj, et al., 2008). These limited findings are complemented by a broader body of research with women from a number of different settings, which suggests that women's experience of intimate partner violence from men is associated with unwanted or unplanned pregnancy (Jewkes, Penn-Kekana, Levin, Ratsaka, & Schrieber, 2001; Pallitto, Campbell, & O'Campo, 2005; Varga, 2003).

Most efforts to prevent unplanned and unwanted pregnancies have focused on women and controlling women's fertility through contraceptive services. There has been little attention paid to the role of men who father these pregnancies. Men have a role to

play in reproductive decision-making and often control whether women use contraceptives or not(Gogna, et al., 2008). Excluding or limiting men's involvement in reproductive health programs may limit the potential impact of these programs (Gogna, et al., 2008). Understanding more about the potential role of male violence in predicting unwanted and unplanned pregnancies could help improve prevention efforts and inform multifaceted interventions aimed at preventing both violence and pregnancy.

We drew on data from young, rural South African men who participated in the Stepping Stones HIV prevention trial to test the hypothesis that perpetrating intimate partner violence is associated with incident fathering of a pregnancy over approximately 24 months of follow up.

DESIGN AND METHODS

South African men aged 15 to 26 (n=1,368) were recruited from 70 villages near Mthatha in the Eastern Cape, South Africa to participate in a cluster randomized controlled trial of the Stepping Stones HIV prevention intervention (Jewkes, et al., 2006). Approximately 20 male volunteers per cluster participated and each cluster received either the Stepping Stones intervention or a short control intervention on HIV prevention. The Stepping Stones trial was conducted between March 2003 and April 2006; results have been published elsewhere (Jewkes, et al., 2008).

Detailed data were collected on men's violence perpetration and sexual behavior at each of three time points: baseline (T_0), first follow-up (T_1; N=1,034) which occurred approximately one year after baseline, and second follow-up (T_2; N=983) which occurred approximately two years after baseline. One-thousand one-hundred eighty-seven

participants (85.3%) had data from at least one follow-up time point and were included in this analysis.

At each time point, face-to-face interviews were carried out by trained male interviewers. Fathering a pregnancy after baseline, the outcome of interest, was measured at both first follow-up and second follow-up with the question "Since the previous interview have you been told by a girlfriend that you made her pregnant?" An affirmative response to this question asked at T_1 was categorized as fathering an incident pregnancy during the period between the baseline and first follow up and an affirmative response at T_2 was classified as an incident pregnancy occurring between first and second follow up. To eliminate any misclassification of pregnancies during the follow up period, the dates of when their girlfriend became pregnant and baseline interview dates were compared to ensure that the pregnancy started within the period after the baseline interview and before the first follow up interview and not prior to baseline. Incident T_1 and T_2 reports of fathering a pregnancy were combined to create a dichotomous variable that represented having ever or never fathered a pregnancy over the follow-up period.

Perpetration of intimate partner violence by men was measured using an adaptation of the WHO Violence Against Women instrument (Schraiber, Latorre Mdo, Franca, Segri, & D'Oliveira, 2010). This instrument consists of subscales measuring physical abuse (5 items) and sexual violence (4 items) directed towards an intimate partner. An example from the physical abuse subscale is "Since the first interview, did you hit [name of partner] or any other girlfriend with a fist or with something else which could hurt her? Did this happen many times, a few times, once or did it not happen?" An example item from the sexual violence subscale is "Since the first interview did you

physically force [name of partner] or any other girlfriend to have sex with you when she did not want to? Did this happen many times, a few times, once or did it not happen?" Men who only responded 'once' to all queries about frequency were classified as perpetrating violence only once because even men who endorsed multiple items could have perpetrated only one multifaceted event. All questions were asked both for the past year and 'before the past year'. Several variables were created to categorize type and intensity of intimate partner violence. A four-level variable classified IPV as no abuse, physical abuse only, sexual abuse only, and physical and sexual abuse perpetrated. Frequency of abuse was a three level variable with no abuse, one episode of physical or sexual abuse, and more than one episode of physical and or sexual abuse. Temporality of abuse was a four level categorical variable with no abuse ever, abuse that ceased before 12 months prior to baseline, abuse that first occurred within the 12 months prior to baseline, and abuse perpetrated both before and within the 12 months prior to baseline (ongoing abuse).

An eight item scale assessed relationship control with a man's current or most recent partner (alpha=0.73) (Pulerwitz, Gortmaker, & DeJong, 2000). A typical item was "I have more to say than [NAME OF GIRLFRIEND] does about important decisions that affect us."

Alcohol use was measured using the AUDIT scale (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). A score of 8 or higher was considered to be indicative of problem drinking. We also asked about use of dagga (cannabis), benzene, mandrax, injected drugs, or other drugs and dichotomized responses into ever and never drug users based on a positive response to having used any one of the listed drugs.

Partner numbers were calculated by summing the responses to questions about the number of main partners, *khwapheni* (hidden partners concurrent with main partners) and casual or "once off" partners reported in the past year. Time since last sex, a rough proxy for coital frequency, was calculated based on the response to the question "When was the last time you had sex?" (Collumbien, Gerressu, & Cleland, 2004). Socio-demographic measures included age and completed years of schooling. Socio-economic status was measured on a scale derived for the study encompassing household goods ownership, food scarcity and perceived difficulty accessing a fairly small (but not trivial) sum of money for a medical emergency (R100 which was about $14).

Ethical clearance for the study was granted by the University of Pretoria ethics committee and the Emory University IRB approved this secondary analysis. Written consent was obtained when participants were recruited onto the study.

Statistical analysis

Since the original study was a stratified, two stage survey with villages sampled from predefined strata based on geographical characteristics and participants clustered within villages, initial data analyses were carried out using the survey commands in Stata 10 (Stata Corp., College Station, Texas, USA). These procedures allowed us to account for the lack of independence in the observations (non-zero, positive intra-cluster correlation) because of the sampling design. Descriptive statistics were first calculated for all variables; and two-way associations were determined between categories of IPV perpetration and fathering a pregnancy.

Random effects Poisson models were built to test the hypothesis that baseline perpetration of partner violence and relationship control predicted the incident

pregnancies fathered. Four models were built to investigate the association of type of abuse, frequency of abuse, temporality of abuse, and relationship control with fathering. The perpetration of abuse at the baseline (T0) was used as the primary exposure of interest, while the primary outcome was incident fathering of a pregnancy. Each model included variables for the study treatment arm, partner numbers, time since last sex, stratum, and person years of exposure. We tested for interactions between perpetration of IPV and the intervention treatment arm, and perpetration of IPV and substance use, neither were significant. We also assessed the models for confounding by age, education, SES, having a concurrent partner, substance use and duration of primary relationship, and having fathered a pregnancy prior to baseline. Any variable found to affect the point estimate for the main exposure of interest by more than 10% was included in the final model (Kleinbaum & Klein, 2005). We tested goodness of fit. We confirmed the findings of associations by modeling survival time under observation using a Weibull model, with the same sets of variables.

RESULTS

Participants lost to follow-up were compared to those who were retained in the cohort. The 14.7% (n=205) of men who were lost to follow up were significantly less likely to have ever had a girlfriend at the baseline and those partnered were more controlling (Table 4.1). There were no other significant differences between those retained in the cohort and those lost to follow up.

The mean baseline age of participants retained in the cohort and included in these analyses was 19.1 years (range 15.2-26.8). While most men (96%) reported having a

girlfriend at baseline, none were married at the start of the study or over the two years of follow up. Approximately one in six (16.5%; n=189) men reported that a girlfriend told him that he made her pregnant over the approximately two years of follow up. The total incidence of known pregnancies was 8.67 per 100 person-years of follow up. The majority of men who reported fathering a pregnancy did not want that pregnancy at all (n=131, 69.3%) and an additional 25 men (13.2%) did not want the pregnancy at that time.

Nearly a third of men at baseline (31.2%) reported having ever perpetrated sexual and/or physical IPV; 22.6% reported that they had perpetrated physical abuse only, 3.2% had perpetrated sexual abuse only and 5.5% had perpetrated both physical and sexual abuse in their lifetime.

Table 4.2 shows two-way associations between the demographic and behavioral characteristics of the men at baseline by whether or not they fathered an incident pregnancy over the two years of follow up. Men who reported fathering a child over the follow up period were significantly more likely to report having perpetrated physical and/or sexual violence. They also reported having more sexual partners over their lifetime, were more likely to have had a concurrent sexual partner, and were more likely to have had sex within the past week at the baseline interview. They were also more likely to report problematic alcohol use. Men who reported fathering a child over the follow up period were also more likely to have reported having fathered a pregnancy prior to baseline.

Table 4.3 shows the associations between the type of IPV perpetrated, the temporality of perpetration, the frequency of abuse and incident fathering while

controlling for a range of potential confounders including number of sexual partners in the previous 12 months, time since last sex, and study treatment arm. Men who had last perpetrated IPV over a year before the baseline were not significantly more likely to have fathered an incident pregnancy, while men who perpetrated IPV for the first time in the previous year had an increased incidence rate ratio of 1.67 (95% CI 1.14-2.44) and those who had perpetrated IPV both before and within the year prior to the baseline had an increased incidence rate ratio (IRR) of 1.97 (95% CI 1.31-2.94). Men who had ever perpetrated physical abuse only had an increased IRR of 1.64 (95% CI 1.18-2.29) of fathering a pregnancy over the approximately two years of follow up. Men who perpetrated both physical and sexual abuse had an increased IRR of 2.59 (95% CI 1.64-4.10) of fathering an incident pregnancy. Men who had perpetrated one episode of sexual or physical violence had an IRR of 1.56 (95% CI 1.04-2.35) while men who perpetrated more than one episode of physical or sexual abuse in the previous 12 months had an incidence rate ratio of fathering a pregnancy of 1.97 (95% CI 1.57-2.78) demonstrating a dose response. Men who were more controlling in their relationships were also more likely to father an incident pregnancy. Those who were most controlling of their female partners at baseline had an incidence rate ratio of fathering a pregnancy of 1.79 (95% CI1.00-3.29) compared to men who scored highest for equitable relationships. Men who scored in the mid-range for equity in their relationships were also more likely to have fathered a pregnancy (IRR 1.58; 95% CI 1.05-2.37).

DISCUSSION

We tested the hypothesis that self-reported perpetration of IPV was associated with subsequently fathering a pregnancy among young men participating in the Stepping Stones HIV prevention trial. We assessed severity of abuse along multiple dimensions including type, frequency, and temporality as well as relationship control – we found that all measures of intimate partner violence perpetration and relationship control predicted fathering an incident pregnancy over two years of follow-up, with more severe perpetration consistently associated with higher likelihood of incident pregnancy, suggesting a dose response. Our results strongly support the hypothesis that young men who perpetrate violence are more likely to father an unwanted or mistimed pregnancy.

Men who had ceased perpetrating IPV before the past year were not statistically more likely than men who had not perpetrated IPV to father an incident pregnancy. Men who had perpetrated IPV for the first time in the past 12 months and especially those who had an established pattern of IPV perpetration were more likely to father a pregnancy over the two years of follow up. This suggests that current abuse and established patterns of abuse are associated with fathering a pregnancy and that the effect may diminish when men have a history of violence perpetration that is not recent.

The suggestion that more severe violence is associated with great likelihood of fathering is informed by the finding that multiple episodes of perpetrating sexual and physical violence had a stronger association with fathering a pregnancy.

Notably, men who perpetrated physical violence only, but not men who perpetrated sexual violence only, were more likely to father new pregnancies. This combined with the finding about relationship control suggests that the association may be

more rooted in the broader aspect of power and control in relationships rather than in simple forcing of unprotected sex. Prevention efforts should look beyond sexual violence into the broader context of creating gender equitable relationships.

These findings affirm and extend the small body of literature linking violence perpetration to fathering (Martin, et al., 1999; Raj, et al., 2006), as well as the literature on violence and pregnancy among women. They are further coherent with literature on male violence perpetration and STD/HIV risk and therefore suggest that recently established links between male violence perpetration and adverse sexual health outcomes include unwanted and unplanned pregnancies.

This study is an analysis of data from a cohort of volunteers in an HIV prevention trial, and this may limit the generalizability of the findings. The outcome, fathering a pregnancy, was self-reported and based on when the young men's girlfriends told them they had made them pregnant. It is possible that some of these reports were erroneous and it is impossible to know with certainty when the pregnancies occurred. This may have resulted in errors in time assessment and either under-reporting or over-reporting of pregnancies. It is possible that female partners who had experienced violence from a man would be less likely to disclose an unwanted pregnancy; however, any such differential under-reporting would have biased our results towards the null, suggesting that point estimates reported may underestimate true effect sizes. Significant strengths of the study include the use of prospectively collected data, the coherence of our findings across different measures and modeling procedures, and the evidence of a dose-response effect with increasing severity, frequency and recency of violence more strongly associated with fathering.

CONCLUSION

We have shown that perpetration of physical and sexual abuse and relationship control by young men in South Africa are associated with later fathering of pregnancies. These findings have implications for both pregnancy prevention and violence-prevention and would suggest that joint programming for preventing gender-based violence and unwanted pregnancies is required. Programs that address inequitable gender power relations among men could result in a reduction of unwanted and unplanned pregnancies among young women.

Acknowledgements:

This study was funded by the National Institute of Mental Health (grant numbers MH 64882-01, MH 64882-04S1A1, and 1R03MH085599) and the South African Medical Research Council. We thank all the members of the Stepping Stones study team and members of the community advisory board and data safety and monitoring board.

REFERENCES

Collumbien, M., Gerressu, M., & Cleland, J. (2004). Non-use and use of ineffective methods of contraception. In M. Ezzati, A. Lopez, A. Rodgers & C. J. L. Murray (Eds.), *Comparative quantification of health risks: Global and regional burden of disease attributable to selected major risk factors* (Vol. 2, pp. 1255-1320). Geneva: World Health Organization.

Dunkle, K. L., Jewkes, R. K., Nduna, M., Levin, J., Jama, N., Khuzwayo, N., et al. (2006). Perpetration of partner violence and HIV risk behaviour among young men in the rural Eastern Cape, South Africa. *AIDS, 20*(16), 2107-2114.

El-Bassel, N., Fontdevila, J., Gilbert, L., Voisin, D., Richman, B. L., & Pitchell, P. (2001). HIV risks of men in methadone maintenance programs who abuse their intimate partners: a forgotten issue. *Journal of Substance Abuse, 13*, 29-43.

Gogna, M., Binstock, G., Fern, x00E, ndez, S., Ibarluc, et al. (2008). Adolescent pregnancy in Argentina: evidence-based recommendations for public policies. *Reproductive Health Matters, 16*(31), 192-201.

Jewkes, R., Nduna, M., Levin, J., Jama, N., Dunkle, K., Khuzwayo, N., et al. (2006). A cluster randomized-controlled trial to determine the effectiveness of Stepping Stones in preventing HIV infections and promoting safer sexual behaviour amongst youth in the rural Eastern Cape, South Africa: trial design, methods and baseline findings. *Tropical Medicine & International Health, 11*(1), 3-16.

Jewkes, R., Nduna, M., Levin, J., Jama, N., Dunkle, K., Puren, A., et al. (2008). Impact of stepping stones on incidence of HIV and HSV-2 and sexual behaviour in rural South Africa: cluster randomised controlled trial.[see comment]. *BMJ, 337*, a506.

Jewkes, R., Penn-Kekana, L., Levin, J., Ratsaka, M., & Schrieber, M. (2001). Prevalence of emotional, physical and sexual abuse of women in three South African provinces. *South African Medical Journal Suid-Afrikaanse Tydskrif Vir Geneeskunde, 91*(5), 421-428.

Jewkes, R., Sikweyiya, Y., Morrell, R., & Dunkle, K. (2009). *Understanding Men's Health and Use of Violence: Interface of Rape and HIV In South Africa*. Pretoria: Medical Research Council.

Kleinbaum, D., & Klein, M. (2005). *Logistic Regression: A Self-Learning Text* (3rd ed.): Springer.

Martin, S. L., Kilgallen, B., Tsui, A. O., Maitra, K., Singh, K. K., & Kupper, L. L. (1999). Sexual behaviors and reproductive health outcomes: associations with wife abuse in India. *JAMA, 282*(20), 1967-1972.

Pallitto, C. C., Campbell, J. C., & O'Campo, P. (2005). Is intimate partner violence associated with unintended pregnancy? A review of the literature. *Trauma Violence & Abuse, 6*(3), 217-235.

Pulerwitz, J., Gortmaker, S. L., & DeJong, W. (2000). Measuring sexual relationship power in HIV/STD research. *Sex Roles, 42*(7-8), 637-660.

Raj, A., Reed, E., Welles, S. L., Santana, M. C., & Silverman, J. G. (2008). Intimate partner violence perpetration, risky sexual behavior, and STI/HIV diagnosis

among heterosexual African American men. [Research Support, U.S. Gov't, P.H.S.]. *American Journal of Mens Health, 2*(3), 291-295.

Raj, A., Santana, M. C., La Marche, A., Amaro, H., Cranston, K., & Silverman, J. G. (2006). Perpetration of intimate partner violence associated with sexual risk behaviors among young adult men. *American Journal of Public Health, 96*(10), 1873-1878.

Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption--II. *Addiction, 88*(6), 791-804.

Schraiber, L. B., Latorre Mdo, R., Franca, I., Jr., Segri, N. J., & D'Oliveira, A. F. (2010). Validity of the WHO VAW study instrument for estimating gender-based violence against women. *Revista de Saude Publica, 44*(4), 658-666.

Silverman, J. G., Decker, M. R., Kapur, N. A., Gupta, J., Raj, A., Silverman, J. G., et al. (2007). Violence against wives, sexual risk and sexually transmitted infection among Bangladeshi men.[see comment]. *Sexually Transmitted Infections, 83*(3), 211-215.

Varga, C. A. (2003). How gender roles influence sexual and reproductive health among South African adolescents. *Studies in Family Planning, 34*(3), 160-172.

Table 4.1: Comparison of the sample followed up and lost to follow up

	Followed up n=1187 (%)	**Lost to follow up n=205 (%)**	**p value**
Age (Mean years)	19.12	19.31	0.17
Education: to grade 10	85.6	88.5	0.16
Socio-economic status (score)	0.009	-0.07	0.51
Ever had a girlfriend	98.1	95.0	0.01
Ever had sex	94.4	92.8	0.32
Fathered a pregnancy	12.8	14.6	0.48
Duration of sexual activity (yrs)	4.76	5.04	0.21
Alcohol problem	25.4	24.3	0.78
Drug use	38.1	40.3	0.59
Lifetime Number of sexual partners			0.73
<=1	10.2	8.3	
2—5	48.6	48.2	
>5	41.2	43.5	
Relationship power scale:			0.008
low equity	10.6	19.3	
mid equity	65.8	59.7	
high equity	23.6	21.0	
Perpetration of IPV against a girlfriend <u>ever</u> by type			0.29
None	68.6	68.6	
Physical abuse only	22.8	22.1	
Sexual abuse only	3.2	5.1	
Physical & sexual abuse	5.4	3.5	
Intervention : Stepping Stones	51.1	48.1	0.45

Table 4.2: Socio-demographic and behavioral characteristics of young men by whether they reported fathering an incident pregnancy over approximately 2 years of follow up

	Fathering an incident pregnancy between T0 & T2 (N=191)		**Not fathering an incident pregnancy between T0 & T2 (N=996)**		**P value**
SOCIODEMOGRAPHIC VARIABLES	N %	95% CI	N %	95% CI	
Age					
<18	15 7.9%	4.7-12.8	99 9.9%	7.6-12.8	0.155
18-19	107 56%	47.8-63.9	609 61.1%	57.5-64.7	
>20	69 36.1%	28.8-44.1	288 28.9%	24.7-33.6	
10 or more years of education	87 45.6%	35.8-55.7	437 43.9%	38.4-49.5	0.729
Socio-economic status (score)	-0.002	-0.09-0.08	0.14	-0.07-0.34	0.20
Alcohol problem	63 32.98%	27.0-39.6	238 23.9%	20.6- 27.5	0.004
Drug use	84 44.0%	36.5-51.8	368 37.0%	32.8-41.3	0.09
Sexual and Relationship History					
Girlfriend in past 12 months	187 97.9%	94.8-99.2	922 95.0%	93.5-96.2	0.06
Lifetime Number of sexual partners					0.002
<=1	45 23.5%	17.8-30.6	309 33.4%	30.3-36.6	
2—5	105 55%	48.0-61.8	499 53.9%	50.7-57.1	
>5	41 21.5%	16.7-27.2	118 12.7%	10.6-15.3	
Concurrent partners (ever)	61. 78%	54.8-68.3	48.60%	45.2-52.0	0.001
Time since last sex <7days	110 57.6%	48.5-66.3	322 34.8%	30.9-38.9	<0.001
Fathered a pregnancy prior to baseline	182 31.9%	25.4-39.3	935 13.1%	10.8-15.8	<0.001
Perpetration of IPV against a girlfriend by temporality					<0.001
None	100 52.9%	45.9-59.8	679 71.9%	68.6-75.1	
Before the past 12 months only	15 7.9%	4.9-12.5	59 6.3%	4.8-8.1	
Within the past 12 months only	38 20.1%	15.0-26.5	128 13.6%	11.4-16.0	
Both before and within the past 12 months	36 19.1%	14.0-25.4	78 8.3%	6.2-10.9	
Perpetration of IPV against a girlfriend ever by type					<0.001
None	100 52.9%	45.9-59.8	679 71.9%	68.7-75.1	
Physical abuse only	58 30.7%	23.9-38.4	198 20.8%	18.3-24.0	
Sexual abuse only	6 3.2%	1.4-7.0	30 3.2%	2.2-4.6	
Physical & sexual abuse	25 13.2%	9.2-18.7	37 3.9%	3.0-5.2	
IPV perpetration by frequency (ever)					<0.001
None	100 52.9%	45.9-59.8	690 72.3%	68.9-75.4	
Once only	31 16.4%	11.5-23.0	123 12.9%	11.2-14.8	
More than once	58 30.7%	23.9-38.4	142 14.9%	12.6-17.5	
Relationship control scale α=.61	Mean score=21 (8-29)		20 (11-32)		0.03
Low control	45 24.1%	17.8-31.6	315 34.4%	30.3-38.7	
Medium control	60 32.1%	25.7-39.2	264 28.9%	25.7-32.2	
High control	82 43.9%	36.2-51.9	337 36.8%	32.8-41.0	

Table 4.3: Poisson models of relative incidence fathering a pregnancy over the approximately two years of follow up among young men and having perpetrated intimate partner violence and relationship control

Model 1: Perpetration of IPV against a girlfriend by temporality				
N=1133	**IRR**	**95% CI**		**P**
None	ref			
Before the past 12 months only	1.69	0.98	2.93	0.06
Within the past 12 months only	1.67	1.14	2.44	<0.01
Both before and within the past 12 months	1.97	1.31	2.94	<0.01
Model 2: Perpetration of IPV against a girlfriend by type of IPV				
N=1133	IRR	**95% CI**		P
None	ref			
Physical abuse only	1.64	1.18	2.29	<0.01
Sexual abuse only	1.17	0.51	2.68	0.71
Physical and sexual abuse	2.59	1.64	4.10	<0.01
Model 3: IPV perpetration by frequency of episodes				
N=1144	**IRR**	**95% CI**		**P**
None	ref			
One episode of physical and/ or sexual violence only	1.56	1.04	2.35	0.03
Multiple episodes of physical and / or sexual violence	1.97	1.40	2.78	<0.01
Model 4: Relationship control in current relationship at baseline				
N=1103	**IRR**	**95% CI**		**P**
High equity	ref			
Mid equity	1.58	1.05	2.37	0.03
Low equity	1.79	1.00	3.21	0.05

All models control for: number of sexual partners in past 12 months, time since last sex, and treatment arm

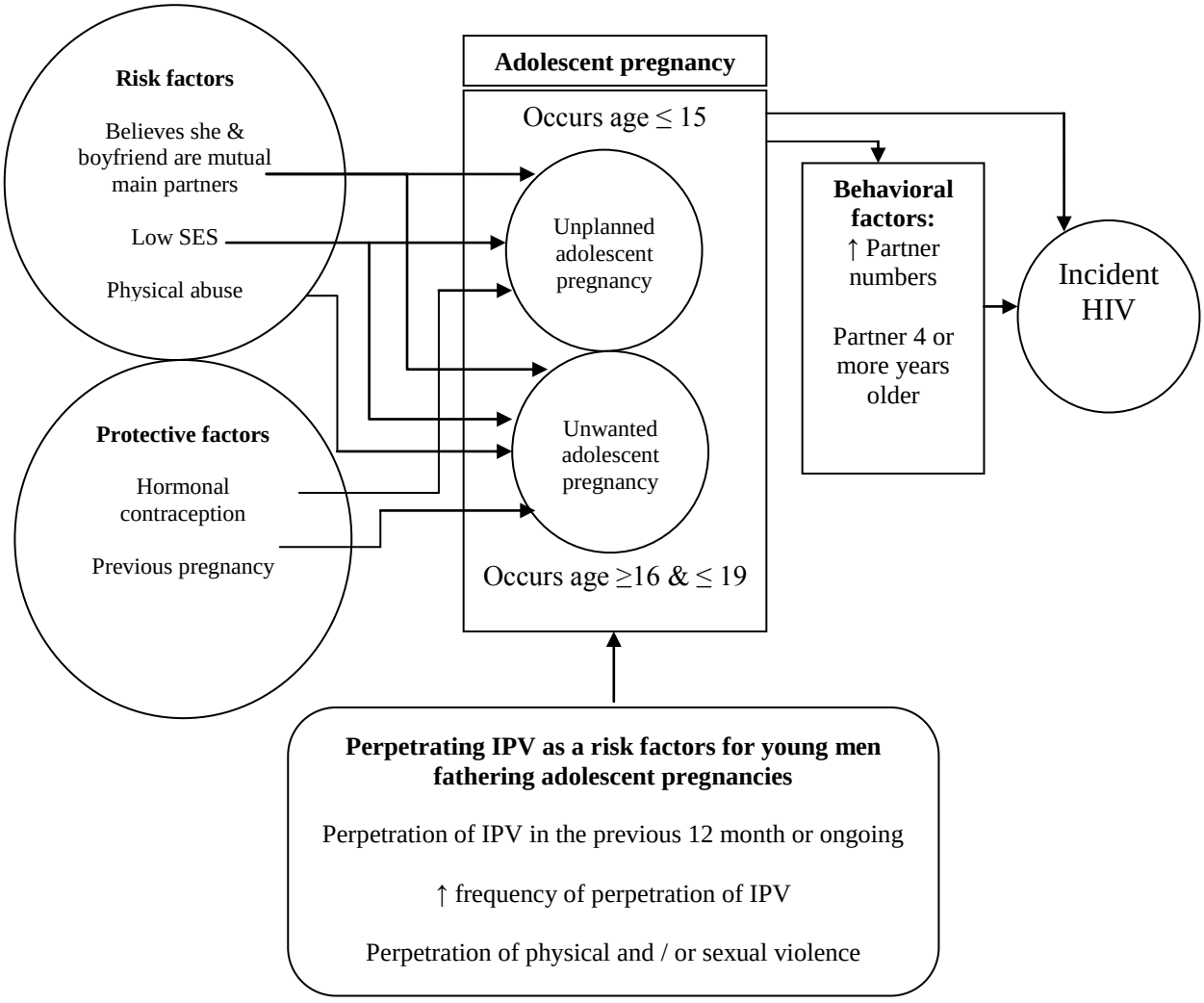
CHAPTER FIVE:

Summary and conclusions

The research undertaken used longitudinal data from South Africa to test the hypothesis that adolescent pregnancies increase incident HIV infection. We found that pregnancies that occurred at age 15 or younger increased incident HIV. This raised a question about whether mechanism for the increased incidence was biological or behavioral. Initial exploration found that early, but not later, adolescent pregnancies were associated with a higher number of sexual partners and a greater likelihood of having a boyfriend who was four or more years older. This indicated that behavioral factors played a role in the relationship between early adolescent pregnancies and subsequent HIV infection, as shown in Figure 1. While some studies have reported a biological relationship between pregnancy and incident HIV (Gray, Li, Kigozi, Serwadda, Brahmbhatt, Wabwire-Mangen, Nalugoda, Kiddugavu, Sewankambo, Quinn, Reynolds, & Wawer, 2005; Moodley, Esterhuizen, Reddy, Moodley, Singh, Ngaleka, & Govender, 2011), it is unlikely to be the mechanism of transmission in this study. The early adolescent pregnancies in this study occurred at least two years before the incident HIV and up to eleven years after. Another possible biological explanation is that the adolescents were close to menarche and going through puberty and that a pregnancy occurring at this age could result in reprogramming of hormones and a sustained biological vulnerability to HIV. This hypothesis requires further exploration.

Given that HIV was found to be a consequence of early adolescent pregnancies among young women in South Africa, understanding the risk and protective factors in

order to prevent adolescent pregnancies was essential. Since gender inequality and gender-based violence are pervasive in South Africa, these were investigated as possible risk factors. Relationship dynamics and socio-economic status were also investigated. A novel contribution of this study was to investigate whether the risk factors varied by pregnancy intention. Research has shown that the health consequences of unwanted pregnancies are more severe than when the pregnancy is unplanned (D'Angelo, Gilbert, Rochat, Santelli, & Herold, 2004). The potential benefit of differentiating between risk



and protective factors by pregnancy intention would allow for tailored behavioral interventions, which could potentially enhance the outcomes and impact of these interventions.

As shown in Figure 1, the study found that lower socioeconomic status and the adolescent believing that she was her boyfriend's main partner were risk factors for both incident unwanted and unplanned pregnancies. Using hormonal contraceptives were protective against unplanned but not unwanted pregnancies; while having had a previous pregnancy was protective against unwanted but not unplanned pregnancies. Women who had experienced physical abuse were more likely to have an unwanted pregnancy. This research shows that, while the risk and protective factors for unplanned and unwanted pregnancies are overlapping, different factors do emerge.

Improving access to contraception for adolescents would go some way towards preventing pregnancies but would not be enough. Addressing the relationship dynamics among adolescent women and their partners is critical. The perceived stability of the relationship appears to lead teenage girls to feel less concerned about the possibility of becoming pregnant and may lead to inconsistent contraceptive use. Young women also may feel more confident that their boyfriends will accept paternity. Acceptance of paternity has been found to provide some security in the adolescent relationship (Hof & Richters, 2001; Jewkes & Morrell, 2011; Kaufman, de Wet, & Stadler, 2001; Varga, 2003). In addition, if a boyfriend accepts that he is the father of the child, he and / or his family will provide financial support to the child. This is especially important in a context of poverty and little hope for the future. This phenomenon combined with the strong link between unintended pregnancy and lower socio-economic status highlights the need for

more structural interventions that address the social determinants of adolescent pregnancy. Teenage girls who come from poorer families may perceive pregnancy as a way to ensure greater security for their future, if the paternity of the child is established, and the father of the child's family provides economic support (Kaufman, et al., 2001; Wood & Jewkes, 2006).

These findings can be understood through the lens of the theory of gender and power (Connell, 1987). Cathexis, one of the structures described by Connell in her seminal work, describes social norms pertaining to sexuality and affective attachments (Connell, 1987). The adolescent women in this study appear to manifest the structure of cathexis through their need to be in a relationship with a young man and to hold onto that relationship. This is supported by the qualitative work that is emerging from the Stepping Stones study (Jewkes & Morrell, 2011; Jewkes, Wood, & Duvvury, 2010)

The analyses presented in Chapter 3, also carefully described the relationship between gender inequality and gender-based violence and subsequent unplanned and unwanted pregnancies. Recent findings from the same dataset found that women who experienced intimate partner violence and had high gender inequity in relationships had increased incidence of HIV infection (Jewkes, Dunkle, Nduna, & Shai, 2010). This finding led to the hypothesis that experiences of intimate partner violence and relationship control would increase the risk of incident adolescent pregnancies. However, we did not find associations between relationship power and control and incident pregnancies. Forced first sex, which had been described in the literature, as associated with teenage pregnancies (Jewkes, Vundule, Maforah, & Jordaan, 2001; Koenig, Zablotska, Lutalo, Nalugoda, Wagman, & Gray, 2004) was not supported by these

analyses. We did find that women who had experienced physical abuse were more likely to have an unwanted pregnancy. If explored through the lens of the theory of gender and power, this typifies the manifestation of the sexual division of power which examines abuses of authority and control in relationships (Connell, 1987).

The evidence suggests that adolescent relationships are gendered in nature; and men's dominance and control of women are important aspects of hegemonic masculinity (Jewkes & Morrell, 2011). In the context of hegemonic masculinities, violent behaviors are justified. If we are to prevent unplanned and unwanted pregnancies, we need to pay attention to the role of men who father these pregnancies. The analyses presented in Chapter 4 tested the hypothesis that perpetrating intimate partner violence is associated with incident fathering of a pregnancy. Our results strongly support the hypothesis that young men who perpetrate violence are more likely to father an unwanted or mistimed pregnancy, as shown in Figure 1.

We found that all measures of intimate partner violence perpetration and relationship control predicted fathering an incident pregnancy over the follow-up period, with more severe perpetration consistently associated with higher likelihood of incident pregnancy. Men who had perpetrated IPV for the first time in the past 12 months and especially those who had an established pattern of IPV perpetration were more likely to father a pregnancy. This suggests that current abuse and established patterns of abuse are associated with fathering a pregnancy and that the effect may diminish when men have a history of violence perpetration that is not recent. Multiple episodes of perpetrating sexual and physical violence had a stronger association with fathering a pregnancy. Men who perpetrated physical violence only, but not men who perpetrated sexual violence

only, were more likely to father new pregnancies. This combined with the finding about relationship control suggests that the association may be more rooted in the broader aspect of power and control in relationships rather than in simple forcing of unprotected sex. Prevention efforts should look beyond sexual violence into the broader context of creating gender equitable relationships.

Implications for policy and practice

In order to prevent teenage pregnancies in South Africa, there is a need for tailored interventions that are sensitive to socio-economic status, as some teenagers who are resident in impoverished, rural areas may see having a pregnancy as a way to have a more secure future. Interventions that engage with relationship dynamics of teenagers are essential if unwanted and unplanned pregnancies are to be prevented. There is also an unmet contraceptive need among the young women in the Eastern Cape. Implementation of the South African National Department of Health's contraceptive policies is essential. This includes ensuring a non-judgmental attitude from health care providers towards adolescents seeking contraception. A wide range of contraceptive methods needs to be available in public health facilities throughout the country.

These findings also suggest that joint programming for preventing gender-based violence and unwanted pregnancies is required. Programs that address inequitable gender power relations among men could result in a reduction of unwanted and unplanned pregnancies among young women.

Finally, preventing early teen pregnancies is important in a comprehensive HIV prevention strategy in countries with high HIV prevalence like South Africa.

In conclusion, policies and programs in South Africa need to address the social determinants of adolescent pregnancy. Particularly, addressing issues such as the poverty and limited employment opportunities, especially in rural areas is critical. Redressing gender inequity in South Africa also needs to be the focus of interventions at multiple levels.

REFERENCES

Connell, R. W. (1987). *Gender and Power: Society, person and sexual politics*. Stanford: Stanford University Press.

D'Angelo, D. V., Gilbert, B. C., Rochat, R. W., Santelli, J. S., & Herold, J. M. (2004). Differences between mistimed and unwanted pregnancies among women who have live births. *Perspectives on Sexual & Reproductive Health, 36*(5), 192-197.

Gray, R. H., Li, X., Kigozi, G., Serwadda, D., Brahmbhatt, H., Wabwire-Mangen, F., et al. (2005). Increased risk of incident HIV during pregnancy in Rakai, Uganda: a prospective study.[see comment]. *Lancet, 366*(9492), 1182-1188.

Hof, C., & Richters, A. (2001). Teenage pregnancy as an issue of human rights for women: The case of Zimbabwe. *IFE Psychologia: An International Journal, 9*(1), 1-11.

Jewkes, R., & Morrell, R. (2011). Sexuality and the limits of agency among South African teenage women: Theorising femininities and their connections to HIV risk practises. *Social Science & Medicine, doi:10.1016/j.socscimed.2011.05.020*.

Jewkes, R., Vundule, C., Maforah, F., & Jordaan, E. (2001). Relationship dynamics and teenage pregnancy in South Africa. *Social Science & Medicine, 52*(5), 733-744.

Jewkes, R., Wood, K., & Duvvury, N. (2010). 'I woke up after I joined Stepping Stones': meanings of an HIV behavioural intervention in rural South African young people's lives. *Health Education Research, 25*(6), 1074-1084.

Jewkes, R. K., Dunkle, K., Nduna, M., & Shai, N. (2010). Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: a cohort study. *Lancet, 376*(9734), 41-48.

Kaufman, C. E., de Wet, T., & Stadler, J. (2001). Adolescent pregnancy and parenthood in South Africa. *Studies in Family Planning, 32*(2), 147-160.

Koenig, M. A., Zablotska, I., Lutalo, T., Nalugoda, F., Wagman, J., & Gray, R. (2004). Coerced first intercourse and reproductive health among adolescent women in Rakai, Uganda. *International Family Planning Perspectives, 30*(4), 156-163.

Moodley, D., Esterhuizen, T., Reddy, L., Moodley, P., Singh, B., Ngaleka, L., et al. (2011). Incident HIV infection in pregnant and lactating women and its effect on mother-to-child transmission in South Africa. *Journal of Infectious Diseases, 203*(9), 1231-1234.

Varga, C. A. (2003). How gender roles influence sexual and reproductive health among South African adolescents. *Studies in Family Planning, 34*(3), 160-172.

Wood, K., & Jewkes, R. (2006). Blood blockages and scolding nurses: barriers to adolescent contraceptive use in South Africa. *Reproductive Health Matters, 14*(27), 109-118.