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HIV positive diagnosis during pregnancy increases risk of IPV postpartum among women with no history of IPV in their relationship

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Abstract

There has been limited study of whether and for whom physical intimate partner violence (IPV) is a consequence of an HIV-positive diagnosis. Per the diathesis stress model, the consequences of HIV infection may be worse for women with a history of IPV. We hypothesize that the positive association between HIV diagnosis in pregnancy and postpartum IPV will be exacerbated for women with a history of IPV. Data come from a prospective cohort study with 1015 participants who completed a baseline antenatal and 9-month postpartum visit. Using logistic regression analyses, we found a statistically significant interaction between HIV diagnosis, history of IPV and postpartum IPV (AOR: .40, 95% CI: .17–.96). The findings were in the opposite direction as expected: HIV-diagnosis was not associated with IPV for women with a history of IPV (AOR: 2.17, 95% CI: 1.06, 4.42). However, HIV-positive women without a history of IPV faced more than two times the risk of incident postpartum IPV than HIV-negative women (AOR: 2.17, 95% CI: 1.06, 4.42). Interventions to reduce incident and ongoing IPV during the perinatal period are needed.

Keywords

intimate partner violence; HIV; women; Africa; prospective study

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Informed consent: Informed consent was obtained from all individual participants included in the study.

Introduction

While much of the extant literature has focused on intimate partner violence (IPV) as a cause of HIV(1–3), it is also possible that IPV is a consequence of HIV diagnosis(4–6). In particular, theoretical models suggest that an HIV diagnosis may spark conflict in a relationship via disclosure, particularly if a partner interprets such a diagnosis as an indication of infidelity(7). An HIV diagnosis may also lead to increased individual and relationship-level stress and negatively affect women's mental health which, in turn, may increase risk for involvement in IPV(8, 9).

Further, theory and empirical evidence suggests there may be heterogeneity in the association between HIV and IPV. For example, the prospective influence of HIV on IPV may be stronger for women who are already experiencing IPV in their current relationship. Partners of these women may be more likely to react violently to disclosure of an HIV diagnosis due to high antisocial propensity. In addition, the ability to adapt/cope with an HIV positive diagnosis may be reduced among women with a history of IPV, making them more vulnerable to future IPV than women who have no such history. Such an effect would be consistent with diathesis-stress models(10, 11), which suggest that the negative effects of stressors, such as diagnosis with HIV, may be exacerbated for those relationships in which there are pre-existing vulnerabilities, like having a history of IPV. In such cases, when an HIV-positive diagnosis is added to an already vulnerable relationship (as indicated by IPV history), the intersection between the two may work synergistically to increase women's IPV risk. On the other hand, relationships without a history of IPV may be more resilient to an HIV-positive diagnosis; as such, women in these relationships may be at lower risk of future IPV.

To date, limited research has examined whether and for whom HIV may increase risk of IPV. Extant studies have primarily been descriptive and/or cross sectional(12–20), with a few notable exceptions(4, 21). The few longitudinal studies that have been conducted control for women's history of IPV in their analyses but do not examine whether IPV history is a pre-existing vulnerability that moderates the linkage between HIV and IPV. This is an important gap in the literature given that IPV can negatively affect HIV-positive women's ability to access clinical HIV care and adhere to HIV medications(22). Further, IPV has significant negative consequences beyond those affecting the course of one's HIV progression, including injury, poor mental health, substance use and even death(1, 23, 24).

In sum, a better understanding of the impact of HIV diagnosis on IPV risk, and for whom these risks are most relevant, is of utmost importance. In the current study, we specifically examine whether HIV diagnosis has a differential impact on IPV risk for women with and without a history of IPV. Such information is critical to informing prevention approaches. If HIV diagnosis increases risk only for women who have pre-existing IPV in the relationship, it suggests the importance of integrating IPV screening into HIV testing and counseling and providing selective IPV secondary prevention interventions to those with a history of IPV. That is, women who test HIV-positive and have pre-existing IPV need access to perinatal interventions that will reduce their risk of future IPV. Yet if HIV diagnosis increases IPV risk for all women, IPV screening and intervention during HIV testing and counselling may

be less important than providing primary IPV prevention interventions to all women diagnosed with HIV during the perinatal period.

Therefore, the purpose of the current study is to assess whether the prospective association between HIV diagnosis in pregnancy and postpartum IPV varies for women with and without a history of IPV in their relationship. In accordance with the diathesis stress model, we hypothesize that the association between HIV diagnosis and postpartum IPV will be exacerbated for women with a history of IPV in their relationship.

Methods

Setting and parent study

The data for the current study come from a larger longitudinal randomized controlled intervention trial, the SAHAPS study. The parent study took place from 2007–2012 and was designed to provide enhanced support during the perinatal period (for more details on recruitment, randomization, intervention content and supporting CONSORT checklist, see Maman 2014). The study took place in an urban township just outside of Durban, South Africa, which is in KwaZuluNatal Province. Of the nine provinces in South Africa, KwaZulu Natal has the highest HIV prevalence in the country, the greatest proportion of individuals living in poverty and the highest infant mortality rate(25).

Women were eligible if: (1) they were unaware of their HIV status (had either never tested or tested HIV-negative more than 3 months ago), (2) they were in a relationship with an intimate partner for 6 months or more (3) they were age 18 or older, (4) they planned to reside in the area for at least one year, (5) they were comfortable communicating in English or Zulu, and (6) they did not need care for a high risk pregnancy. We screened 3,333 women for SAHAPS, half of whom met our eligibility criteria (n=1,636). The most common reasons for ineligibility were that women were not planning to stay in Durban after the birth (n=395) and that they had previously tested HIV-positive (n=447). Of those who met the eligibility criteria, fewer than 10% declined to participate or declined HIV testing as part of the study. At the baseline antenatal visit, 1,480 women were enrolled. Approximately 75% of the sample was retained at the 9 month follow up visit (n=1099). Data for the current study come from the 1,015 women who completed assessments at baseline and 9 month follow up and were not missing data on key variables of interest.

Women were recruited, and if eligible, enrolled at their first antenatal visit. After providing informed consent, women completed a baseline assessment and then received clinical services, including HIV testing and counseling. Women in the intervention arm received additional counseling support sessions that focused on sexual risk reduction, partner testing and disclosure and were delivered by study nurses at 6 weeks and 10 weeks postpartum, and these women in the intervention arm had access to onsite legal services and support groups. Women completed a follow up assessment at 9 months postpartum. All assessments were administered by a trained research assistant, either in English or Zulu, using computer assisted personal interviewing (CAPI). Each interviewer completed training on conducting quantitative interviews, which included sessions on rapport building, asking sensitive questions (i.e., about violence and HIV risk) and good ethical conduct. The research was

approved by the institutional review board at University of North Carolina Chapel Hill and University of KwaZulu Natal.

Measures

Postpartum physical violence—*Postpartum physical violence* was measured at the nine month follow up visit using six questions on physical violence from the World Health Organization's Multicountry Study Instrument(26). This scale has been used in numerous studies set in South Africa(27, 28). A sample question is "how many times has your current partner pushed or shoved you?" We adapted the scale so that the questions asked only about IPV experienced in the postpartum period. Each question had five response categories that ranged from never to more than ten times. Because item distributions were highly skewed and zero-inflated, women who reported violence for at least one or more questions were coded as having experienced physical IPV at 9 months postpartum; women who reported no violence across all six questions were coded as not having experienced physical IPV at 9 months postpartum. We focused on physical violence in our sample given the low prevalence of sexual violence reported during pregnancy and postpartum.

History of physical violence in the current relationship—*History of physical violence in the current relationship* was measured at the baseline antenatal assessment using questions on physical violence from the World Health Organization's modified conflict tactic scale. At the baseline assessment, we asked six questions about physical IPV at any time in the relationship before pregnancy, and we asked six questions about physical IPV in the relationship during pregnancy. Again, because item distributions were highly skewed and zero-inflated, women who reported violence for at least one or more of these questions at either time point (before or during pregnancy) were coded as having a history of physical IPV; women who reported no violence across these questions were coded as not having history of physical IPV in the current relationship.

HIV diagnosis—*HIV diagnosis* was assessed at the woman's first antenatal visit. A participant provided a blood specimen from a finger prick for a rapid HIV test (Determine: Abbott Laboratories, Abbott Park, IL). If a reactive result was obtained with the Determine rapid HIV test, the participant's HIV status was confirmed with a second rapid test (SmartCheck HIV 1&2, World Diagnostic Inc., Miami Lakes, FL, USA). In instances where a specimen was reactive to the Abbott kit, but negative on the SmartCheck, a blood specimen was sent for confirmation by a 4th generation ELISA (HIV Combi, Roche Mannheim, Germany) performed at the Department of Virology, University of KwaZulu-Natal.

Demographic, reproductive and relationship covariates

Demographic characteristics included age, education and assets, which were reported at baseline. Following previous research in South Africa(29) we created a measure of socioeconomic status by using principal components analysis to derive a linear index from a series of asset ownership indicators and then categorized participants as belong to the poorest 40%, middle 40% or wealthiest 20% on the asset index scale(30). Reproductive characteristics included gestational age at first antenatal visit (no. of weeks), parity (never

pregnant, 1 pregnancy, 2 or more pregnancies) and whether the current pregnancy was intended (yes/no). Relationship characteristics included length of the relationship as reported at baseline (years), whether the participant cohabitated with her partner at baseline (yes/no), and whether the participant reported disclosing her HIV status to her partner between the baseline and postpartum visit (yes/no). We also controlled for the amount of time between the completion of the baseline survey and the completion of the 9 month follow up survey (no. of weeks). Sensitivity analysis indicated there were no significant differences in findings across study arms; therefore, study arm was not included as a covariate.

Analysis

We used logistic regression to test our hypothesis that there would be a positive interaction between HIV diagnosis and history of physical IPV in the relationship on physical IPV postpartum. Specifically, we included an interaction term between HIV diagnosis in pregnancy and history of physical IPV in the relationship in our model, and controlled for relevant demographic, reproductive and relationship characteristics. To examine whether our findings were a result of differential retention, we used logistic regression to examine whether HIV diagnosis and physical IPV at baseline were associated with study dropout at 9 months postpartum. While women who were diagnosed with HIV during pregnancy were more likely to drop out at 9 months postpartum, the association between HIV diagnosis and drop out was the same for women with and without a history of physical IPV. We used SAS 9.4 for our analysis(31).

Results

As seen in Table I, more than 1 out of 10 women reported postpartum physical IPV (11.03%). Further, women's mean age was 25.64, they had been in a relationship with their partner for an average of 4.39 years, and one-quarter of them were living with their partner. Over one-third of all women tested HIV-positive in pregnancy and nearly 1 out of 10 reported physical IPV in their relationship before or during pregnancy (9.85%).

As seen in Table II, women who had a history of IPV in the relationship were significantly more likely than those without a history of IPV to report physical IPV postpartum (30.36% vs. 7.31%, $p<.0001$). Younger women were marginally more likely than older women to report physical IPV postpartum (24.78 years vs. 25.75 years, $p=.08$) and women living with their partners were also marginally more likely than those living separate from their partners to report physical IPV postpartum (32.14% vs. 24.59%, $p=.08$). Women who received an HIV-positive diagnosis at pregnancy reported more physical IPV postpartum than those who received an HIV-negative diagnosis at pregnancy, however, there was no statistically significant difference between the two groups (42.86% vs. 36.10%, $p=.16$).

As seen in Table III, there was a statistically significant interaction between HIV diagnosis in pregnancy and history of IPV in their current relationship (AOR: .40, 95% CI: .17, .96), after controlling for demographic, reproductive and relationship characteristics. That is, the association between HIV diagnosis and physical IPV postpartum varied for women who had previously experienced physical IPV and women who had not previously experienced physical IPV in their current relationship. Following standard recommendations, we

conducted post hoc analysis to probe the interaction to determine the simple slopes for the effect of HIV diagnosis on postpartum physical IPV for women with and without a history of IPV in the relationship (Figure 1). These analyses revealed that among women who had a history of physical IPV in their relationship (grey line), an HIV-positive diagnosis in pregnancy was not significantly associated with physical IPV postpartum (AOR: .87, 95% CI: .49–1.55). However, among women who did not have a history of physical IPV in their relationship (dotted black line), the odds of experiencing physical IPV postpartum were 2.17 times higher for HIV-positive as compared to HIV-negative women (AOR: 2.17, 95% CI: 1.06, 4.42).

Discussion

The findings of this study were the opposite of what we hypothesized. We found that HIV diagnosis was *not* significantly associated with physical IPV postpartum for women with a history of physical IPV in their relationship. Yet, a positive HIV diagnosis was prospectively associated with *incident* IPV in the postpartum period. That is, a positive HIV diagnosis was associated with postpartum physical IPV for women who did not have a history of physical IPV in their current relationship.

Our study contributes to existing research on the relationship between HIV and IPV because it provides insight as to which women are most at risk of violence following an HIV-positive diagnosis. Prior prospective studies on IPV following HIV diagnosis have controlled for history of IPV(4, 12, 21) but not tested the diathesis stress hypothesis. Further, in many other cross sectional studies on the association between HIV and IPV, IPV history was not controlled for(17, 32, 33) or was measured across the lifetime(20, 28, 34–36). A single measure of lifetime IPV does not allow us to disentangle those women who have experienced incident IPV from those who experience ongoing victimization. Given that one's history of IPV victimization is a strong correlate of future IPV(37–39), it would be valuable in future prospective studies to measure lifetime prevalence at baseline and incident IPV thereafter.

There are a number of plausible explanations as to why IPV is not exacerbated by an HIV-positive diagnosis for women in relationships characterized by a history of IPV victimization. First, it is possible that HIV diagnosis was not associated with IPV postpartum for women with a history of IPV victimization because the partner already had a sense of the woman's HIV status. That is, these women may have experienced IPV in the past that was sparked by her partner's or her own HIV risk behaviors, including perceived or actual infidelity from the partner or the woman(7). Under such circumstances an HIV-positive diagnosis is not a surprise to either partner and does not result in new anger or in increased relationship stress. Another possibility is that the factors that contribute to the IPV may be so similar to the factors driving the HIV-positive diagnosis that the diagnosis does not add anything new. For example, power imbalances that led to the women getting infected may also have contributed to IPV in the past. As indicated by the dotted black line in the figure, women who had a history of IPV in their relationship had a high probability of IPV regardless of the results of the HIV test. For these women, IPV was already well established

in the relationship, an HIV-positive diagnosis did not contribute additional stress to the already conflicted relationship.

In relationships that do not have a history of IPV, it is possible that the addition of an HIV-positive diagnosis may incite new stress in the relationship. In these relationships, there are a number of different pathways through which the stress of the diagnosis may trigger violence from the male partner. First, as previously observed in a qualitative studies with HIV positive Kenyan women, the woman's HIV-positive diagnosis may reveal or hint at infidelity in the relationship and subsequently lead male partners to perpetrate violence in relationships in which they had not previously perpetrated violence(19). Another potential pathway is that stress of the diagnosis may negatively affect coping skills, which subsequently leads male partners to perpetrate IPV(40, 41). Stressors other than HIV-diagnosis have been associated with IPV in both pregnant and non-pregnant populations. For example, men in relationships where there is an unwanted pregnancy or those men who are first time fathers may have more stressors and subsequently perpetrate more IPV against women than those men in relationships in which the pregnancies are wanted or who than those men who have had prior children(42). Similarly, studies with non-pregnant populations have found that individuals who are unable to adaptively cope with stress then face additional challenges in deterring or resisting perpetration, which in turn makes them more vulnerable to victimization from their male partner(43, 44).

Our study has a number of limitations. One limitation is that our sample was comprised of women who were in relatively stable partnerships based on how we screened for eligibility into the parent study. That is, we recruited women who had been in a relationship with their primary partner for six months or more, and women in the parent study had been with their partners for an average of over 4 years. As such, we may not have captured women who are in the most vulnerable and least stable relationships. Women in more vulnerable relationships may be more likely to have a history of physical IPV, which may attenuate our findings because we would have fewer women in the overall sample without a history of IPV in the relationship. A second limitation is that our sample was comprised of a convenience sample of women older than 18 from an urban antenatal clinic, which may limit the generalizability of results to other contexts in South Africa and to adolescent mothers. Future research should be conducted in rural South African settings and be inclusive of the youngest adolescent mothers and those in newer relationships since they may be especially vulnerable to IPV. A third limitation is that we focused on physical IPV in this analysis. Sensitivity analysis indicated that the findings were the same when examining the relationship between HIV diagnosis and postpartum IPV among women who had experienced at least one act of physical or sexual violence as compared to women who had experienced none. Future research should examine whether an HIV-positive diagnosis also affects psychological risk differentially for women with and without a history of IPV in their relationship.

Conclusions

HIV-positive women who have never experienced IPV in the past are in need of primary IPV prevention interventions; that is programs that will prevent IPV from occurring during the

perinatal period. HIV counselors could implement such strategies in the context of Prevention of Mother-to-Child Transmission programs. Research is needed to determine what the most efficacious strategies would be as very little IPV prevention research has been conducted with HIV-positive pregnant and postpartum women in sub Saharan Africa.

Further, all women who have experienced IPV in the past should also be counselled regarding their ongoing exposure to IPV. Counselors and/or nurses could employ evidence-based secondary prevention strategies; that is, interventions or strategies that mitigate the frequency of the IPV victimization. Such programs could include provision of support, active referral, and development of a safety plan(45, 46). While most of the existing evidence on such interventions is situated in higher resource settings, the “Safe and Sound” intervention is a two-session nurse-led counseling intervention currently being evaluated for efficacy in antenatal clinics in South Africa(47). Another promising intervention strategy in rural Kenya included not only clinic-based identification, support and referral but also community-based activities to increase IPV victim’s accessibility to referrals. Specifically, the pilot study in rural Kenya found their clinic screening and referral intervention to be enhanced through community volunteers who themselves provided concrete emotional and material support ways to help IPV victims to access existing referrals(48). Couples-level interventions may also be appropriate in relationships where there are low levels of violence(49).

A significant proportion of South African women learn their HIV-positive status in the context of pregnancy(50), and a significant proportion of South African women experience either incident or ongoing IPV during the perinatal period(51). Given the negative sequelae of IPV for women *and* their children during this time(52–57), and in particular for HIV-positive women(22, 58), effective perinatal interventions to reduce women’s risk of IPV are sorely needed.

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References

1. Jewkes RK, Dunkle K, Nduna M, Shai N. Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: a cohort study. *The Lancet*. 2010; 376(9734):41–8.
2. Li Y, Marshall CM, Rees HC, Nunez A, Ezeanolue EE, Ehiri JE. Intimate partner violence and HIV infection among women: a systematic review and meta-analysis. *Journal of the international AIDS society*. 2014; 17(1)
3. Kouyoumdjian FG, Calzavara LM, Bondy SJ, O’campo P, Serwadda D, Nalugoda F, et al. Intimate partner violence is associated with incident HIV infection in women in Uganda. *Aids*. 2013; 27(8): 1331–8. [PubMed: 23925380]

4. Kiarie JN, Farquhar C, Richardson BA, Kabura MN, John FN, Nduati RW, et al. Domestic violence and prevention of mother-to-child transmission of HIV-1. *AIDS* (London, England). 2006; 20(13): 1763.
5. Maman S, Campbell J, Sweat MD, Gielen AC. The intersections of HIV and violence: directions for future research and interventions. *Social science & medicine*. 2000; 50(4):459–78. [PubMed: 10641800]
6. Mulrenan C, Colombini M, Howard N, Kikui J, Mayhew SH. Exploring risk of experiencing intimate partner violence after HIV infection: a qualitative study among women with HIV attending postnatal services in Swaziland. *BMJ open*. 2015; 5(5):e006907.
7. Hatcher AM, Woollett N, Pallitto CC, Mokoatle K, Stöckl H, MacPhail C, et al. Bidirectional links between HIV and intimate partner violence in pregnancy: implications for prevention of mother-to-child transmission. *Journal of the International AIDS Society*. 2014; 17(1)
8. Devries KM, Mak JY, Bacchus LJ, Child JC, Falder G, Petzold M, et al. Intimate partner violence and incident depressive symptoms and suicide attempts: a systematic review of longitudinal studies. *PLoS Med*. 2013; 10(5):e1001439. [PubMed: 23671407]
9. Hand G, Phillips K, Dudgeon W. Perceived stress in HIV-infected individuals: physiological and psychological correlates. *AIDS care*. 2006; 18(8):1011–7. [PubMed: 17012093]
10. Zuckerman M. Diathesis-stress models. 1999
11. McKeever VM, Huff ME. A diathesis-stress model of posttraumatic stress disorder: Ecological, biological, and residual stress pathways. *Review of General Psychology*. 2003; 7(3):237.
12. Shamu S, Zarowsky C, Shefer T, Temmerman M, Abrahams N. Intimate partner violence after disclosure of HIV test results among pregnant women in Harare, Zimbabwe. *PLoS One*. 2014; 9(10):e109447. [PubMed: 25350001]
13. Bernstein M, Phillips T, Zerbe A, McIntyre JA, Brittain K, Petro G, et al. Intimate partner violence experienced by HIV-infected pregnant women in South Africa: a cross-sectional study. *BMJ open*. 2016; 6(8):e011999.
14. Ezechi OC, Gab-Okafor C, Onwujekwe DI, Adu RA, Amadi E, Herbertson E. Intimate partner violence and correlates in pregnant HIV positive Nigerians. *Archives of gynecology and obstetrics*. 2009; 280(5):745–52. [PubMed: 19242706]
15. Hatcher A, Stöckl H, Christofides N, Woollett N, Pallitto C, Garcia-Moreno C, et al. Mechanisms linking intimate partner violence and prevention of mother-to-child transmission of HIV: A qualitative study in South Africa. *Social Science & Medicine*. 2016; 168:130–9. [PubMed: 27643847]
16. Hoque ME, Hoque M, Kader SB. Prevalence and experience of domestic violence among rural pregnant women in KwaZulu-Natal, South Africa. *Southern African Journal of Epidemiology and Infection*. 2009; 24(4):34–7.
17. Ntaganira J, Muula AS, Masaisa F, Dusabeyezu F, Siziya S, Rudatsikira E. Intimate partner violence among pregnant women in Rwanda. *BMC women's health*. 2008; 8(1):17. [PubMed: 18847476]
18. Olagbuji B, Ezeanochie M, Ande A, Ekaete E. Trends and determinants of pregnancy-related domestic violence in a referral center in southern Nigeria. *International Journal of Gynecology & Obstetrics*. 2010; 108(2):101–3. [PubMed: 19939379]
19. Colombini M, James C, Ndwiga C. The risks of partner violence following HIV status disclosure, and health service responses: narratives of women attending reproductive health services in Kenya. *Journal of the International AIDS Society*. 2016; 19(1)
20. Fonck K, Els L, Kidula N, Ndinya-Achola J, Temmerman M. Increased risk of HIV in women experiencing physical partner violence in Nairobi, Kenya. *AIDS and Behavior*. 2005; 9(3):335–9. [PubMed: 16133903]
21. Maman S, Groves AK, Reyes HLM, Moodley D. Diagnosis and disclosure of HIV status: implications for women's risk of physical partner violence in the postpartum period. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2016; 72(5):546–51. [PubMed: 27028499]
22. Hatcher AM, Smout EM, Turan JM, Christofides N, Stöckl H. Intimate partner violence and engagement in HIV care and treatment among women: a systematic review and meta-analysis. *AIDS*. 2015; 29(16):2183–94. [PubMed: 26353027]

23. Norman R, Schneider M, Bradshaw D, Jewkes R, Abrahams N, Matzopoulos R, et al. Interpersonal violence: an important risk factor for disease and injury in South Africa. *Population Health Metrics*. 2010; 8(1):32. [PubMed: 21118578]
24. Abrahams N, Jewkes R, Martin LJ, Mathews S, Vetten L, Lombard C. Mortality of women from intimate partner violence in South Africa: a national epidemiological study. *Violence and victims*. 2009; 24(4):546–56. [PubMed: 19694357]
25. Coovadia H, Jewkes R, Barron P, Sanders D, McIntyre D. The health and health system of South Africa: historical roots of current public health challenges. *The Lancet*. 2009; 374(9692):817–34.
26. Organization WH. WHO multi-country study on women's health and domestic violence against women: summary report of initial results on prevalence, health outcomes and women's responses. 2005
27. Abrahams N, Jewkes R, Hoffman M, Laubsher R. Sexual violence against intimate partners in Cape Town: prevalence and risk factors reported by men. *Bulletin of the World Health Organization*. 2004; 82(5):330–7. [PubMed: 15298223]
28. Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntyre JA, Harlow SD. Gender-based violence, relationship power, and risk of HIV infection in women attending antenatal clinics in South Africa. *The lancet*. 2004; 363(9419):1415–21.
29. Van der Berg S, Louw M. Changing patterns of South African income distribution: Towards time series estimates of distribution and poverty. *South African journal of economics*. 2004; 72(3):546–72.
30. Filmer D, Pritchett LH. Estimating wealth effects without expenditure data—or tears: an application to educational enrollments in states of India. *Demography*. 2001; 38(1):115–32. [PubMed: 11227840]
31. SAS. SAS version 9.4. Cary, NC: SAS Institute; 2009.
32. Makayoto LA, Omolo J, Kamweya AM, Harder VS, Mutai J. Prevalence and associated factors of intimate partner violence among pregnant women attending Kisumu District Hospital, Kenya. *Maternal and child health journal*. 2013; 17(3):441–7. [PubMed: 22569943]
33. Shi C-F, Kouyoumdjian FG, Dushoff J. Intimate partner violence is associated with HIV infection in women in Kenya: A cross-sectional analysis. *BMC public health*. 2013; 13(1):512. [PubMed: 23711189]
34. Maman S, Mbwapo JK, Hogan NM, Kilonzo GP, Campbell JC, Weiss E, et al. HIV-positive women report more lifetime partner violence: findings from a voluntary counseling and testing clinic in Dar es Salaam, Tanzania. *American journal of public health*. 2002; 92(8):1331–7. [PubMed: 12144993]
35. Prabhu M, Mchome B, Ostermann J, Itemba D, Njau B, Thielman N, et al. Prevalence and correlates of intimate partner violence among women attending HIV voluntary counseling and testing in northern Tanzania, 2005–2008. *International Journal of Gynecology & Obstetrics*. 2011; 113(1):63–7. [PubMed: 21257168]
36. Sa Z, Larsen U. Gender inequality increases women's risk of HIV infection in Moshi, Tanzania. *Journal of biosocial science*. 2008; 40(04):505–25. [PubMed: 18088449]
37. Bogat GA, Levendosky AA, Theran S, Von Eye A, Davidson WS. Predicting the Psychosocial Effects of Interpersonal Partner Violence (IPV) How much does a Woman's History of IPV Matter? *Journal of Interpersonal Violence*. 2003; 18(11):1271–91. [PubMed: 19774765]
38. Martin SL, Mackie L, Kupper LL, Buescher PA, Moracco KE. Physical abuse of women before, during, and after pregnancy. *Jama*. 2001; 285(12):1581–4. [PubMed: 11268265]
39. Díaz-Olavarrieta C, Paz F, Abuabara K, Ayala HM, Kolstad K, Palermo T. Abuse during pregnancy in Mexico City. *International Journal of Gynecology & Obstetrics*. 2007; 97(1):57–64. [PubMed: 17307181]
40. Lazarus RS. The stress and coping paradigm. Fifty years of the research and theory of RS Lazarus: An analysis of historical and perennial Issues. 1998:182–220.
41. Cohen, S., Kessler, RC., Gordon, LU. Measuring stress: A guide for health and social scientists. Oxford University Press on Demand; 1997.
42. Jasinski JL. Pregnancy and Violence Against Women An Analysis of Longitudinal Data. *Journal of Interpersonal Violence*. 2001; 16(7):712–33.

43. Halpern CT, Spriggs AL, Martin SL, Kupper LL. Patterns of intimate partner violence victimization from adolescence to young adulthood in a nationally representative sample. *Journal of Adolescent Health*. 2009; 45(5):508–16. [PubMed: 19837358]
44. Finkelhor D, Asdigian NL. Risk factors for youth victimization: Beyond a lifestyles/routine activities theory approach. *Violence and victims*. 1996; 11(1):3–19. [PubMed: 8870212]
45. McFarlane JM, Groff JY, O'Brien JA, Watson K. Secondary prevention of intimate partner violence: a randomized controlled trial. *Nursing research*. 2006; 55(1):52–61. [PubMed: 16439929]
46. Nelson HD, Bougatsos C, Blazina I. Screening women for intimate partner violence: a systematic review to update the US Preventive Services Task Force recommendation. *Annals of internal medicine*. 2012; 156(11):796–808. [PubMed: 22565034]
47. Pallitto C, García-Moreno C, Stöckl H, Hatcher A, MacPhail C, Mokoatle K, et al. Testing a counselling intervention in antenatal care for women experiencing partner violence: a study protocol for a randomized controlled trial in Johannesburg, South Africa. *BMC health services research*. 2016; 16(1):630. [PubMed: 27814706]
48. Turan JM, Hatcher AM, Otero M, Onono M, Koder J, Romito P, et al. A community-supported clinic-based program for prevention of violence against pregnant women in rural Kenya. *AIDS research and treatment*. 2013; 2013
49. Karakurt G, Whiting K, Esch C, Bolen SD, Calabrese JR. Couples Therapy for Intimate Partner Violence: A Systematic Review and Meta-Analysis. *Journal of marital and family therapy*. 2016; 42(4):567–83. [PubMed: 27377617]
50. April MD, Walensky RP, Chang Y, Pitt J, Freedberg KA, Losina E, et al. HIV testing rates and outcomes in a South African community, 2001–2006: implications for expanded screening policies. *Journal of acquired immune deficiency syndromes (1999)*. 2009; 51(3):310. [PubMed: 19582895]
51. Groves AK, Moodley D, McNaughton-Reyes L, Martin SL, Foshee V, Maman S. Prevalence, Rates and Correlates of Intimate Partner Violence Among South African Women During Pregnancy and the Postpartum Period. *Maternal and Child Health Journal*. 2014;1–9. [PubMed: 23483413]
52. Sharps PW, Laughon K, Giangrande SK. Intimate partner violence and the childbearing year: maternal and infant health consequences. *Trauma, Violence, & Abuse*. 2007; 8(2):105–16.
53. Silverman JG, Decker MR, Reed E, Raj A. Intimate partner violence victimization prior to and during pregnancy among women residing in 26 US states: associations with maternal and neonatal health. *American journal of obstetrics and gynecology*. 2006; 195(1):140–8. [PubMed: 16813751]
54. Lancaster CA, Gold KJ, Flynn HA, Yoo H, Marcus SM, Davis MM. Risk factors for depressive symptoms during pregnancy: a systematic review. *American journal of obstetrics and gynecology*. 2010; 202(1):5–14. [PubMed: 20096252]
55. Ludermir AB, Lewis G, Valongueiro SA, de Araújo TVB, Araya R. Violence against women by their intimate partner during pregnancy and postnatal depression: a prospective cohort study. *The Lancet*. 2010; 376(9744):903–10.
56. Coker AL, Sanderson M, Dong B. Partner violence during pregnancy and risk of adverse pregnancy outcomes. *Paediatric and perinatal epidemiology*. 2004; 18(4):260–9. [PubMed: 15255879]
57. Murphy CC, Schei B, Myhr TL, Du Mont J. Abuse: a risk factor for low birth weight? A systematic review and meta-analysis. *Canadian Medical Association Journal*. 2001; 164(11):1567–72. [PubMed: 11402794]
58. Hampanda KM. Intimate partner violence and HIV-positive women's non-adherence to antiretroviral medication for the purpose of prevention of mother-to-child transmission in Lusaka, Zambia. *Social Science & Medicine*. 2016; 153:123–30. [PubMed: 26896876]

Figure 1.
Interaction of HIV status and history of IPV on physical IPV postpartum

Table I

Demographic, reproductive and relationship characteristics (n=1015)

	% (n) or mean (SD)
<i>Demographic characteristics</i>	
Age	25.64 (5.58)
SES (ref=high)	
Low	36.55% (371)
Middle	40.10% (407)
Education (ref=HS graduate)	
Grade 7	5.71% (58)
Grades 8–11	41.48% (421)
<i>Reproductive characteristics</i>	
Gestational age (weeks)	24.01 (5.85)
Pregnancy unintended	20.69% (210)
Previous pregnancy (ref=2)	
0	35.96% (365)
1	36.75% (373)
HIV status	36.85% (374)
<i>Relationship characteristics</i>	
Physical IPV prior to or during pregnancy	9.85% (100)
Physical IPV postpartum	11.03% (112)
Length of relationship (years)	4.39 (4.14)
Live together	25.42% (258)
Disclosed HIV status to partner	87.59% (889)

Table II

Demographic, relationship and reproductive characteristics for women with and without physical IPV at 9 months postpartum

	No IPV (n=112) % (n) or mean (SD)	IPV (n=903) % (n) or mean (SD)	p-value
<i>Focal Independent variables</i>			
HIV status	36.10% (326)	42.86% (48)	0.16
History of IPV	7.31% (66)	30.36% (34) ***	<.0001
<i>Demographic characteristics</i>			
Age	25.75 (5.64)	25.75 (5.64)	0.08
SES (ref=high)			
Low	35.88% (324)	35.88% (324)	0.21
Middle	40.97% (370)	40.97% (370)	0.11
Education (ref=HS graduate)			
Grade 7	5.87% (53)	5.87% (5)	0.55
Grades 8–11	40.64% (367)	40.64% (367)	0.13
<i>Reproductive characteristics</i>			
Gestational age (weeks)	24.04 (5.82)	23.79 (6.14)	0.67
Pregnancy unintended	21.26% (192)	16.07% (18)	0.20
Previous pregnancy (ref=2)			
0	34.99% (316)	34.99% (316)	0.07
1	36.99% (334)	36.99% (334)	0.65
<i>Relationship characteristics</i>			
Length of relationship (years)	4.33 (4.14)	4.88 (4.09)	0.18
Live together	24.59% (222)	32.14% (36) ^	0.08
Disclosed HIV status to partner	88.15% (796)	83.04% (93)	0.12

^
p<.10;

*
p<.05;

**
p<.01;

***
p<.001

Table III Odds ratios for the associations between HIV-status, history of IPV and postpartum IPV^a

	AOR, 95% CI	p-value
<i>Focal Independent Variables</i>		
HIV status	2.17 (1.06, 4.42) *	0.03
History of IPV	8.56 (4.65, 15.76) ***	<.0001
<i>Interaction</i>		
HIV status *History of IPV	0.40 (.17, 1.00) *	0.04
<i>Demographic characteristics</i>		
Age	0.97 (.91, 1.02)	0.24
SES (ref=high)		
Low	1.13 (.64, 1.98)	0.68
Middle	0.72 (.41, 1.25)	0.24
Education (ref=HS graduate)		
Grade 7	0.67 (.23, 1.96)	0.47
Grades 8–11	1.08 (.69, 1.68)	0.75
<i>Reproductive characteristics</i>		
Gestational age	1.01 (.96, 1.06)	0.72
Pregnancy intention	0.61 (.34, 1.09) ^	0.10
Previous pregnancy (ref=2)		
0	1.93 (.88, 4.22) ^	0.10
1	2.21 (1.15, 4.24) *	0.02
<i>Relationship characteristics</i>		
Length of relationship (years)	1.07 (1.01, 1.14) *	0.03
Live together	1.75 (1.02, 3.01) *	0.04
HIV disclosure to partner	0.64 (.35, 1.16)	0.14

^a All models controlled for the # of weeks elapsed between baseline and follow up^
p<.10;*
p<.05;**
p<.01;***
p<.001