

Psychosocial variables associated with coping of HIV-positive women diagnosed during pregnancy

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Abstract

To identify psychosocial variables related to the use of coping strategies by HIV-positive South African women diagnosed during pregnancy, structured interviews were conducted with 224 HIV-positive women at antenatal clinics over a period of two years. Two coping styles, active and avoidant coping, were assessed using an adapted version of the Brief

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COPE. Psychosocial variables associated with changes in coping over time were identified with mixed linear analysis. Increases in active coping were associated with decreasing levels of internalized stigma and depression, increasing self-esteem and positive social support, knowing someone who is living with HIV, being physically healthy and living above the poverty line. Increases in avoidant coping were associated with increasing internalized stigma and depression, lower levels of self-esteem, HIV-knowledge and lower levels of education. Recommendations are made for psychological support services to strengthen women's ability to cope and enhance their health and that of their infants.

Keywords: coping styles, HIV/AIDS, women, pregnancy, South Africa

Resumen

Para identificar factores psicosociales relacionados con el uso de estrategias de afrontamiento en mujeres diagnosticadas con sida durante el embarazo se realizaron cuatro entrevistas estructuradas en dos años a 224 mujeres seropositivas en clínicas prenatales de Tshwane, Sudáfrica. Estilos de afrontamiento activo y de evitación fueron evaluados utilizándose una versión adaptada del Brief COPE. El análisis lineal mixto identificó variables psicosociales asociadas con cambios de afrontamiento en el tiempo. El aumento de afrontamiento activo se asoció con disminución del estigma y depresión, alta autoestima y apoyo social positivo, conocer a alguien con sida, estar físicamente saludable y vivir por encima de la pobreza. El aumento del afrontamiento de evitación se asoció con aumento del estigma y depresión, baja autoestima, conocimiento sobre el sida y bajos niveles educativos. Se presentan recomendaciones a los servicios de apoyo psicológico para fortalecer la capacidad de las mujeres de enfrentar y mejorar su salud y la de sus hijos.

INTRODUCTION

Prevention of Mother-to-Child Transmission programs (PMTCT) in South Africa brought about routine HIV testing for pregnant women attending antenatal clinics (1). Many pregnant women discover their HIV-positive status because of these tests. An HIV diagnosis is generally accompanied by high levels of psychological distress, including depression and anxiety (2-8). Receiving an HIV-positive diagnosis is particularly traumatic during pregnancy. The mother fears infecting her infant, is concerned over her own health and doubts whether she will be able to provide for the baby. Social and contextual factors influence women's reaction to such diagnoses. The stigma communities attach to HIV (9), as well as culturally entrenched gender roles, created and still perpetuates a veil of silence and fear regarding the disease. African women of lower socio-economic status are often economically, culturally and socially disadvantaged and may fear abuse or abandonment from their intimate partners and families once their diagnosis is known (10). These factors contribute to women's psychological distress upon discovering their status.

Kwalombota (11) found that Zambian women diagnosed during pregnancy were more likely to experience psychological distress than pregnant women who had prior knowledge of their HIV-positive status. They experienced more loss of interest in life, feelings of worthlessness, suicidal ideation and anxiety and were more inclined to consider terminating their pregnancy. Psychological distress has been found to have a negative effect on the health of HIV-positive women. It reduces antiretroviral (ARV) adherence (12) and the attendance of health care sessions (13), thereby exacerbating disease progression (14). Psychological distress during and after pregnancy can precede adverse outcomes like behavioral problems (15) and impaired cognitive development of the child (16), as well as disruption in the relationship between the mother and her child (17).

It is vital that HIV-positive pregnant and postpartum women develop adaptive ways of coping with their diagnosis in order to limit the level of psychological distress that they experience. This research investigated the demographic and psychosocial variables associated with different coping strategies used by women diagnosed HIV- positive while pregnant. Psychosocial variables that were included in the investigation were depression, self-esteem, HIV-knowledge, violent experiences, stigma, status disclosure, social support and knowing someone who is HIV-positive.

COPING WITH HIV

Coping can be defined as “constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person” (18). Coping is often categorized as either active or avoidant (19).

Active coping refers to behavioral and cognitive attempts to deal with a stressful situation and change it. It includes strategies such as problem-solving, cognitive restructuring and seeking information. Previous research associated active coping with positive psychosocial and health outcomes in people living with HIV, including fewer HIV/AIDS-related symptoms (20), enhanced quality of life (21), high positive affect (22), high self-esteem (23,24), fewer symptoms of psychological distress (25,26), lower frequency of substance use (27) and better adherence to antiretroviral treatment (ART) (28).

Avoidant coping refers to behavioral and cognitive attempts to avoid dealing with a stressful situation by, for instance, disengagement, denial and distraction (18). Avoidant coping has been associated with negative psychosocial and health outcomes, including increase in HIV- and AIDS-related symptoms (20), decreased physical functioning (29), poor quality of life (30), low self-esteem (22), more symptoms of psychological distress (26), more frequent substance use (27) and non-adherence to ART (28).

Despite extensive research on coping with HIV, there is little research on how pregnant women, specifically those who are diagnosed HIV-positive during pregnancy, cope with their diagnoses. One study focusing on coping of pregnant women in the USA (31) found that active coping was the most frequently used coping strategy, and that disengagement, a form of avoidant coping, was significantly associated with higher psychological distress. It should be noted that the USA study had no particular focus on women who discovered their status during pregnancy. Because of cultural differences (32) between the participants of most publicized HIV coping studies conducted in Western countries, and the participants of the present study, the results of these studies may not be comparable with the current population. The majority of South African women diagnosed HIV-positive are black, from a low socio-economic background and often in disempowering relationships (8,33). Due to specific cultural interpretations of HIV, such as ‘social death’ or ‘bewitchment’ (34,35,36), communities are particularly stigmatizing towards people living with HIV in South Africa (37). It must be taken into account that South African HIV-positive women are not a homogeneous group. Diversity with regard to ethnicity, rural and urban origins, sexuality, gender conformity and belief systems exists within this group. This heterogeneity illustrates that culture is a multifaceted construct that influences psychological well-being and behavior in a complex manner. This must be taken into account when studying the coping of HIV-positive women in South Africa, especially those diagnosed during pregnancy.

The present study examined the use of active and avoidant coping strategies of HIV-positive women during the first two years after diagnosis during pregnancy and to identify psychosocial variables associated with coping styles. It was hypothesized that increased active coping within the first two years after being diagnosed during pregnancy, would be associated with positive health outcomes such as enhanced disclosure of HIV-positive status, higher self-esteem, more positive social support, lower depression and less internalized

stigma. On the other hand, we expected that increased avoidant coping over time would be related to negative health outcomes such as non-disclosure of HIV-status, lower self-esteem, more negative social support, higher depression and higher internalized stigma over time.

METHODOLOGY

Sampling

The study was part of a longitudinal research project conducted in two townships in Tshwane, South Africa. HIV counselors at four antenatal clinics in Tshwane recruited newly diagnosed HIV-positive pregnant women. Exclusion criteria included: Being younger than 15 years old, testing HIV-positive prior to the current pregnancy or intending to move out of the area during the study period of two years. Of the HIV-positive women diagnosed in this time period, 438 women were invited to participate in the study and 293 agreed to take part in the baseline interview (67%).

Data collection procedure

Data were collected by means of structured interviews at four assessment points: The first interview was held approximately four weeks after diagnosis during pregnancy and the three subsequent interviews were all held postpartum at six-, 12- and 21-months after the baseline interview (three, nine and 18 months after the infant's birth). These specific follow-up intervals were chosen, because they were the intervals scheduled for routine clinic visits for immunization of the infants.

Measurement instruments

Demographic characteristics

Demographic data included each participant's age, home language, marital status, education level, employment status, monthly household income and whether her partner supported her financially.

Health-related questions

Participants were asked whether they knew others who were HIV-positive, whether they were taking ART and whether they had disclosed their HIV-positive status to at least one other person.

Coping

An adapted version of the Brief COPE (38) was used to measure coping strategies used. The Brief COPE was adapted to include 15 coping strategies measured by 25 items focused specifically on HIV. Participants were asked to indicate how often they used a particular coping strategy, 'most of the time', 'some of the time' and 'almost never'. In an exploratory factor analysis, two factors, namely active and avoidant coping, were identified (39). Active coping consisted of eight coping strategies, namely acceptance, direct action, positive reframing, religion, emotional support, instrumental support, helping others and information seeking. The avoidant coping scale consisted of seven coping strategies, namely distraction, escape, denial, emotional venting, feeling out-of-control, self-blame and substance use. A Cronbach reliability coefficient of the Brief COPE for this sample of HIV-positive pregnant women was found to be 0.63, with active coping 0.75 and avoidant coping a lower 0.54.

HIV-knowledge

The participants' knowledge regarding HIV and AIDS was measured by a general HIV and AIDS knowledge scale adapted from the World Health Organization's Research Package (40). The scale consists of 15 statements on knowledge about the transmission and presentation of HIV. The Cronbach alpha coefficient of the HIV-knowledge scale was 0.64, which is acceptable for a knowledge scale (41), but slightly lower than that of other HIV-knowledge scales (42).

Social support

An adapted version of the Multidimensional Social Support Inventory (MSSI) (43) was used to assess the participant's perceived level of social support. In a factor analysis two distinct factors were identified, namely positive support and negative support. Cronbach's alpha coefficient for the positive support was found to be 0.87, and 0.56 for the negative support scale (39).

Stigma

Two parallel scales assessed internalized stigma and attributed stigma, each consisting of 12 items (41). The internalized stigma scale assesses the extent to which the participant feels or anticipates being stigmatized because of her diagnosis, for example: 'Getting HIV is a punishment for bad behavior'. The attributed stigma scale assesses the extent to which she views the community as holding stigmatizing views towards people who are HIV-positive, for example: 'Most people think that getting HIV is a punishment for bad behavior'. Cronbach alpha coefficients of the internalized and attributed stigma scales were found to be 0.70 and 0.77 respectively.

Self-esteem

The Rosenberg Self-Esteem (RSE) scale (44) was used to measure self-esteem. The 10-item scale consists of statements about the individual's values and feelings towards the self. Small changes in the wording of some items were made to improve cultural appropriateness. A Cronbach alpha coefficient of 0.75 was recorded.

Depression

The Centre for Epidemiologic Studies Depression scale (CES-D) (45) was used to measure the presence and extent of depressive symptoms among participants. Participants were required to indicate how they experienced the emotions and/or behavior described in each statement. Somatic symptoms of depression, similar to those of HIV-infection and pregnancy

(46), were excluded from the scale used in the analysis. A fifteen item scale was used. The CES-D was found to have a satisfactory reliability coefficient of 0.88.

Decision-making power

To assess women's empowerment in relationships (8), a seven-item scale was used to measure the extent to which participants had power to make important decisions in the household (related to financial matters, health care, use of contraceptives, etc.). The decision-making power score was calculated by giving a score of '1' for women who made decisions alone or jointly with other household members and '0' if she did not contribute to decisions. The internal consistency of the scale was found to be 0.62 which is satisfactory (39).

Experience of violence

Information on women's prior experience of violence in the household (emotional, physical, sexually or through financial withholding) was obtained using questions from a survey of women's experiences of violence (47).

Data analysis

A descriptive analysis of the data was used to report participant demographic characteristics and health-related variables. Mixed linear analysis (MLA) was used to determine the psychosocial variables (which can change over time) associated with changes in the use of active and avoidant coping over the two-year study period. MLA was chosen, because it is a repeated measures analysis used to analyze longitudinal data sets which keep within-subject dependence of repeated variables into account. It allows for unequal number of repetitions in that it does not require all participants to have attended all interviews. It only requires that each participant attends at least the baseline interview and at least one follow-up interview (48).

In order to identify variables that were associated with changes in active and avoidant coping over time (the dependent variables), all variables that had the theoretical potential to be associated with coping were selected as independent variables. Each variable was entered into a mixed linear model. These variables were also treated as varying over time. Only the variables that had an associated p value of less than 0.25 were then entered into the full model (48). Two separate MLA models were created, one for active coping and one for avoidant coping.

Every interview carried, in each model, an interval length variable calculated by subtracting the date of the follow-up interviews from the date of the baseline interview. The fact that women may have attended their interviews at different gestational ages and at slightly different follow-up times was taken into consideration.

To obtain the most stream-lined models for active and avoidant coping, a backward stepwise procedure was performed. Variables with p values >0.25 were removed one at a time and the effect of removal on the models were assessed by the likelihood ratio test. If this was >0.05 the independent variable was removed. This process was repeated until any further removal of a variable resulted in a p value of the likelihood ratio test of <0.05 . Once all non-significant variables were removed, the final models for active and avoidant coping were created.

Ethical approval

The study obtained ethical approval from the Faculty of Health Sciences Research Ethics Committee of the University of Pretoria, as well as from the Human Investigation Committee of Yale University School of Medicine.

RESULTS

Interview Attendance

Baseline interviews were conducted with 293 HIV-positive pregnant women. A total of 69 women who participated in the baseline interview failed to participate in any further follow-up interviews and were subsequently excluded from the data analysis. Despite slight demographic differences between the women who attended further interviews and the women who only attended the baseline interview, there were no significant differences found between the women in the two groups' use of coping strategies. A total of 198 women who participated in the baseline interview took part in the six-month follow-up interview, 175 in the 12-months follow-up and 166 in the 21-month follow-up interview. The total sample thus consisted of 224 women (who attended the baseline interview and at least one follow-up interview).

Socio-demographic and health-related variables

Table I presents the socio-demographic characteristics and health-related variables of the women at baseline. The mean age of the women was 26.5 years. Most women had secondary school education (76%) and 29% of women lived below the poverty line of less than R200.00 (approximately US\$25.00) per month. Only 23% of the women were employed but 71% reported that their partners provided for them financially. About one quarter of the women (24.6%) reported experiences of emotional abuse. In initial analyses, the experience of multiple different types of violence appeared to be related more to psychosocial variables than the experience of any single category of violence. Close to 22% of the women experienced two or more different types of violence. At baseline, 62% had disclosed their HIV-status to at least one other person, 40% knew someone living with HIV and 10% were using ART.

Change in coping strategies over time

HIV-positive women reported more active coping strategies, than avoidant coping strategies (Table II). The use of both active and avoidant coping strategies increased over time, although the use of avoidant coping decreased at first. The results of pair-wise comparisons (after performing a Bonferroni adjustment for the multiple comparisons) showed that the estimated mean of active coping was significantly lower at baseline than at each of the follow-up interviews ($p < 0.05$). Pair-wise comparison on the estimated mean scores for avoidant coping showed that avoidant coping decreased slightly (non-significantly) between baseline and 6 months follow-up and then increased significantly ($p < 0.05$) from 6- to 21-months follow-up (Table III).

Variables related to active and avoidant coping

Independent variables entered into the MLA models included demographic and psychosocial variables. All the variables had the potential to change over time and were treated as such in the setting up of the analysis. Variables with a p value of less than 0.25 (Table IV) were then entered into the full model.

A backward stepwise procedure was followed to identify the final MLA model for active and avoidant coping respectively (Table V). The variables that were associated with increased active coping over time includes decreased internalized stigma and depression, increased self-esteem and positive support as well as knowing someone who is HIV-positive, living above the poverty line, not taking ART (being healthy) and the time interval from baseline. Variables associated with increased avoidant coping over time includes increased internalized stigma and depression, decreased self-esteem as well as low HIV-knowledge, lower educational level (less than tertiary) and the time interval since baseline.

DISCUSSION

Women diagnosed with HIV during pregnancy increasingly used active and avoidant coping as time progressed. They therefore increasingly used a greater variety of coping strategies to deal with difficult situations. The results indicate that the increasing use of active or avoidant coping is associated with differing levels of psychosocial outcomes. Changes over time in both active and avoidant coping are associated with internalized stigma, depression and self-esteem, albeit in opposite directions. Additionally, increase in active coping over time is associated with knowing someone with HIV, receiving positive social support, living above the poverty line and being healthier (no need for ART). In contrast, increase in avoidant coping over time is associated with lower educational levels and less HIV-knowledge. The difference between the two coping styles is thus complex and context dependent. These findings suggest an interesting contrast between active and avoidant coping that has not been observed in previous research.

In interpreting the results it should be noted that an increase or decrease in psychosocial variables are related to the increase in coping, however it does not indicate to what extent the variables *cause* the coping responses. As suggested by Lazarus (49), the possibility exists that the dynamic between coping and psychosocial and demographic variables is circular. For example, having low self-esteem may cause a person to use avoidant coping strategies. Yet at the same time, the use of avoidant coping strategies such as self-blame, may contribute to the further decrease in a person's self-esteem, setting off the further use of avoidant coping strategies.

In accordance with previous research, (23-27) the results of the study revealed that newly diagnosed women who are coping more actively over time are more likely to report low depression and high self-esteem, whereas high depression and low self-esteem are more

likely to be associated with avoidant coping. There is thus a relationship between coping style and psychological health.

Decreasing internalized stigma was related to increased active coping, whereas increased internalized stigma was related to avoidant coping. Although very little research has focused on the connection between coping and internalized stigma, it has been suggested that internalized stigma is associated with psychological distress, less social support and not knowing others living with HIV (41,50,51). Consequently, it can be suggested that newly diagnosed HIV-positive women who struggle less between personal identity and HIV-positive status (51), are more likely to use predominantly active coping strategies, compared to women who use predominantly more avoidant coping strategies.

Women who reported receiving high levels of positive social support were more likely to use active coping strategies. It must be noted that seeking support is one of the active coping strategies – the relationship is thus expected. This association is confirmed by numerous studies that revealed the important role social support plays in improving the psychological well-being of people living with HIV (22,53,54).

Knowing someone who is HIV-positive was associated with more active coping, possibly because they share similar difficulties and can support each other, which allows them to accept their HIV-positive status (55). Knowing others living with HIV can therefore facilitate better adjustment.

Living above the poverty line was associated with active coping, whereas having an education level lower than tertiary level was related to avoidant coping. These findings correspond with previous research that has revealed that people living with HIV, who have more resources in the form of income and education, are more able to give positive meaning to their HIV-positive status, use problem-focused coping strategies and report a higher quality of life (56,57). In contrast, people with fewer resources have been found to be more

prone to psychological distress and the use of avoidant coping (34,58). This observation highlights the value of socio-economic and educational resources in the well-being of newly diagnosed women living with HIV.

Although no research was found which specifically connected coping and HIV-knowledge, previous research suggested that, as HIV-positive women become more informed about HIV, they develop a more positive attitude towards their future (7), lower levels of internalized stigma (59) and improved health behaviors such as ART adherence (28). These findings suggest that HIV-positive women with low levels of HIV-knowledge may have certain negative misconceptions about their illness which may induce more avoidant coping. The improvement of newly diagnosed HIV-positive women's HIV-knowledge could therefore play a critical role in helping them cope with their status and improve their physical and psychological well-being. Thus efforts to increase their knowledge could play a critical role in helping them cope with their status and improve their physical and psychological well-being.

During the time of the study, people living with HIV had to have a very low CD4 count (200 or less), before being enrolled on the Government's ART program (60). It is likely that women who were receiving ART at the time were on average severely ill compared to women who were not on ART. Advanced HIV disease progression is associated with psychological distress (22). The relationship between not receiving ART and active coping is thus explained in that women who did not receive ART at the time were healthier and not needing ART. This confirms that the severity of illness plays a role in coping with HIV (20).

It is interesting to note that contrary to the expectation, there was no association between coping style and disclosure of HIV-status in this data. This finding appears to contrast previous research that suggests that disclosure is associated with positive psychosocial outcomes (61). This means that there may be many additional factors that

influence whether women disclose their HIV status or not (39). Disclosure may even be unrelated to women's positive or negative ways of coping. Attributed stigma was related to avoidant coping in the initial analysis but was not part of the final model. The stigma attributed to the community was thus not associated significantly with women's coping strategies.

The increase in avoidant coping over time is particularly noteworthy in this research. Avoidant coping increased after women knew their status for more than six months. This could be a sample-specific finding. It is possible that the women focused on their pregnancy and motherhood during the first few months after diagnosis. The reality and implications of the HIV infection may only become apparent to them after three months post-partum (about 6 months after diagnosis). It was also found that more women started on ART from 12 months follow-up onwards. This means that women's health may have deteriorated during this time which contributed to the increase in avoidant coping as described above (20).

In summary, the findings suggest that changes in active and avoidant coping over the first two years subsequent to the HIV-positive diagnosis are related to a number of psychosocial variables. These results confirm the findings of various previous studies despite the different cultural context in which the present study was conducted. The study contributes to greater understanding of the way HIV-positive women, who were diagnosed during pregnancy and exposed to unique challenges, cope with their diagnosis.

RECOMMENDATIONS

The findings should be of value to mental health professionals in addressing the psychological well-being of newly diagnosed HIV-positive women. The findings suggest that coping strategies can change over time in reaction to contextual changes and other variables. Coping strategies can therefore be influenced (18). Consequently, it is suggested that interventions should promote HIV-positive women's ability to be flexible and to adapt

their coping style in order for them to cope with the changing demands of their environments. Interventions should also focus on providing support, increasing women's self-esteem and decreasing depression and feelings of being stigmatized. Increasing knowledge and understanding about HIV could decrease more avoidant strategies. Financial and educational empowerment of women can also contribute to improved coping.

LIMITATIONS

Despite numerous methodological strengths of the study, a few shortcomings need to be taken into account. Care should be taken not to assume any direct causality between the psychosocial variables and coping, since the connections cannot be interpreted as causal. At best, one can conclude that these variables share a unique connection with coping, which warrants further investigation. It should be further noted that the avoidant coping and negative social support scales had particularly low reliability coefficients. The possibility therefore exists that there may have been a high degree of random error present, which could negatively affect the reliability and validity of these measures.

CONCLUSION

To conclude, it is clear that women living with HIV, and particularly women diagnosed during pregnancy, face numerous difficulties and are at an increased risk of experiencing psychological distress symptoms. The findings illustrate that coping with HIV does not occur in a social vacuum, but is embedded in a variety of societal problems and that numerous psychosocial variables can be associated with the use of active and avoidant coping. Ultimately, the findings of the present study underscore the importance of good psychological health for newly diagnosed mothers who are living with HIV.

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References

1. Department of Health. National antenatal sentinel HIV and syphilis prevalence survey in South Africa 2009. Pretoria: Department of Health; 2010. Available from <http://www.health-e.org.za/documents/85d3dad6136e8ca9d02cceb7f4a36145.pdf>.
2. Eller LS, Bunch EH, Wantland DJ, Portillo CJ, Reynolds NR, Nokes KM, et al. Prevalence, correlates, and self-management of HIV-related depressive symptoms. *AIDS Care*. 2010;22(9):1159-1170.
3. Kagee A, Martin L. Symptoms of depression and anxiety among a sample of South African patients living with HIV. *AIDS Care*. 2010;22(2):195-156.
4. Lazarus R, Struthers H, Violari A. Hopes, fears, knowledge and misunderstandings: Responses of HIV-positive mothers to early knowledge of the status of their baby. *AIDS Care*. 2009;21(3):329-334.
5. Mello VA, Segurado AA, Malbergier A. Depression in women living with HIV: Clinical and psychosocial correlates. *Arch. Women Ment. Health*. 2010;13:193-199.
6. Olley BO. Psychological distress in the first year after diagnosis of HIV infection among women in South Africa. *AJAR*. 2006;5(3):207-215.
7. Pittiglio L, Hough E. Coping with HIV: Perspectives of mothers. *JANAC*. 2009;20(3):184-192.
8. Sanders LB. Women's voices: The lived experience of pregnancy and motherhood

- after diagnosis. *JANAC*.2008;19(1):47-57.
9. Visser MJ, Makin JD, Vandormael A, Sikkema, KJ, Forsyth BWC. HIV/AIDS stigma in a South African community. *AIDS Care*. 2009;21(2):197-206.
 10. Visser MJ, Neufeld, S, De Villiers A, Makin JD, Forsyth BWC. To tell or not to tell: South African women's disclosure of HIV status during pregnancy. *AIDS Care*. 2008;20(9):1138-1145.
 11. Kwalombota M. The effect of pregnancy in HIV-infected women. *AIDS Care*. 2002;14(3): 431-433.
 12. Do NT, Phiri K, Bussmann H, Gaolathe T, Marlink RG, Wester CW. Psychosocial factors affecting medication adherence among HIV-1 infected adults receiving combination antiretroviral therapy (cART) in Botswana. *AIDS Res. Hum. Retroviruses*. 2010;26(6):685-691.
 13. Bhatia R, Hartman C, Kallen MA, Graham J, Giordano TP. Persons newly diagnosed with HIV infection are at high risk for depression and poor linkage to care: Results from the Steps study. *AIDS Behav*. 2010;15(6):1161-1170.
 14. Antelman G, Kaaya S, Wei R, Mbwambo J. Msamanga GI. Fawzi WW, et al. Depressive symptoms increase risk of HIV disease progression and mortality among women in Tanzania. *J. Acquir. Immune Defic. Syndr*. 2007;44(4):470-477.
 15. Chronis AM, Lahey BB, Pelham WE, Williams SH, Baumann BL, Kipp H, et al. Maternal depression and early positive parenting predict future conduct problems in young children with attention-deficit/hyperactivity disorder. *Dev. Psychol*. 2007;43(1):70-82.
 16. Pearson RM, Cooper RM, Penton-Voak IS, Lightman LS, Evans J. Depressive symptoms in early pregnancy disrupt attentional processing in infant emotion. *Psychol. Med*. 2010;40:621-631.

17. Oswalt KL, Biasini FJ. Characteristics of HIV-infected mothers associated with increased risk of poor mother-infant interactions and infant outcomes. *J Pediatr Health Care.* 2012;26(2):83-91.
18. Lazarus RS, Folkman S. *Stress, appraisal and coping.* New York: Springer; 1984.
19. Smith, L, Feaster DJ, Prado G, Kamin M, Blaney N, Szapocznik J. The psychosocial functioning of HIV-positive and HIV-negative African American recent mothers. *AIDS Behav.* 2001;5(3):219-231.
20. Chida Y, Vedhara K. Adverse psychosocial factors predict poorer prognosis in HIV disease: A meta-analytic review of prospective investigations. *Brain Behav Immun.* 2009;23:434-445.
21. Vyavaharkar M, Moneyham L, Murdaugh C, Tavakoli A. Factors associated with quality of life among rural women with HIV disease. *AIDS Behav.* 2012;16(2):295-303.
22. Deichert NT, Fekete EM, Boarts JM, Druley JA, Delahanty DL. Emotional support and affect: Associations with health behaviours and active coping efforts in men living with HIV. *AIDS Behav.* 2008;12:139-145.
23. Stein JA, Rotheram-Borus M. Cross-sectional and longitudinal associations in coping strategies and physical health outcomes among HIV-positive youth. *Psychol Health.* 2004;19(3):321-336.
24. Trevino KM, Pargament KI, Cotton S, Leonard AC, Hahn J, Caprini-Faigin CA, et al. Religious coping and physiological, psychological, social, and spiritual outcomes in patients with HIV/AIDS: Cross-sectional and longitudinal findings. *AIDS Behav.* 2007;14(2):379-389.
25. Chan I, Au A, Li P, Chung R, Lee MP, Yu P. Illness-related factors, stress and coping strategies in relation to psychological distress in HIV-infected persons in Hong Kong. *AIDS Care.* 2006;18(8):977-982.

26. Kraaij V, Van der Veen SMC, Garnefski N, Schroevers M, Witlox R, Maes S. Coping, goal adjustment, and psychological well-being in HIV-infected men who have sex with men. *AIDS Patient Care STDs*. 2008;22(5):395-402.
27. Pence BW, Thielman NM, Whetten K, Ostermann J, Kumar V, Mugavero MJ. Coping strategies and patterns of alcohol and drug use among HIV-infected patients in the United States southeast. *AIDS Patient Care STDs*. 2008;22(11):869-877.
28. Vervoort SCJM, Grypdonck MHF, de Grauwe A, Hoepelman AIM., Borleffs JCC. Adherence to HAART: Processes explaining adherence behaviour in acceptors and non-acceptors. *AIDS Care*. 2009;21(4):431-438.
29. Griswold GA, Evans S, Spielman L, Fishman B. Coping strategies of HIV patients with peripheral neuropathy. *AIDS Care*. 2005;17(6):711-720.
30. Weaver KE, Antoni MH, Lechner SC, Durán REF, Penendo F, Fernandez MI, et al. Perceived stress mediates the effects of coping on the quality of life in HIV-positive women on highly active antiretroviral therapy. *AIDS Behav*. 2004;8(2):175-183.
31. Blaney NT, Fernandez MI, Ethier KA, Wilson TE, Walter E, Koenig LJ. Psychosocial and behavioural correlates of depression among HIV-infected pregnant women. *AIDS patient care STDs*. 2004;18(7):405-415.
32. McNeill FG. *AIDS, politics and music in South Africa*. London: Cambridge University Press; 2012.
33. Rehle T, Shisana O, Pillay V, Zuma K, Puren A, Parker W. National incidence measure - new insights into the South African epidemic. *SAMJ*. 2007;97(3):194-199.
34. Dageid W, Duckert F. Balancing between normality and social death: Black, rural, South African women coping with HIV/AIDS. *Qual Health Res*. 2008;18(2):182-195.
35. McNeill FG, Niehaus I. *Magic! AIDS Review 2009*. Pretoria: Center for Study of AIDS, University of Pretoria; 2010.

36. Niehaus I. *Leprosy of a deadlier kind: Conceptions of AIDS, sex and death in the South African lowveld*. Paper presented at: The Institute for Social and Economic Research, Rhodes University; 2006 October; Grahamstown, South Africa.
37. Campbell C, Nair Y, Maimane S, Nicholson J. "Dying twice": A multi-level model of the roots of AIDS stigma in two South African communities. *J Health Psychol*. 2007;12(3):403-416.
38. Carver CS. You want to measure coping but your protocol's too long: Consider the Brief COPE. *Int J Behav Med*. 1997;4:92-100.
39. Makin JD, Forsyth BWC, Visser MJ, Sikkema KJ, Neufeld S, Jeffery B. Factors affecting disclosure in South African HIV-positive pregnant women. *AIDS Patient Care STDs*. 2008;22(11):907-916.
40. World Health Organisation. Research package: Knowledge, attitudes, beliefs and practices on AIDS, phase 1: The questionnaire. The global programme on AIDS, Social and Behavioural Research Unit. Geneva: World Health Organisation; 1990.
41. Visser MJ, Kershaw T, Makin JD, Forsyth BWC. Development of parallel scales to measure HIV-related stigma. *AIDS Behav*. 2008;12:759-771.
42. Carey MP, Schroder KEE. Development and psychometric evaluation of the brief HIV knowledge questionnaire. *AIDS Educ Prev*. 2002;14(2):172-182.
43. Bauman LJ, Weiss E. *Multidimensional social support inventory: Revised*. New York: Albert Einstein College of Medicine; 1995.
44. Rosenberg M. *Society and the adolescent self image*. New York: Princeton University; 1965.
45. Radloff LS. The CES-D scale: A self-report depression scale for research on the general population. *Appl Psychol Meas*. 1977;1:385-401.

46. Kalichman S C, Rompa D, Cage M. Distinguishing between overlapping somatic symptoms of depression and HIV disease in people living with HIV-AIDS. *J Nerv Ment Dis.* 2000;188:662-70.
47. Dunkle KL, Jewkes RK, Brown HC, Yoshihama M, Gray GE, McIntyre JA, et al. Prevalence and patterns of gender-based violence and revictimisation among women attending antenatal clinics in Soweto, South Africa. *Am J Epidemiol.* 2004;160:230-239.
48. Hox JJ. *Multilevel analysis: Techniques and applications.* 2nd ed. New York: Routledge; 2010.
49. Lazarus RS. *Stress and emotion.* New York: Springer; 1999.
50. Lee RS, Kochman A, Sikkema K. Internalized stigma among people living with HIV/AIDS. *AIDS Behav.* 2002;6(4):309-319.
51. Simbayi LC, Kalichman S, Strebel A, Cloete A, Henda N, Mqeketo A. Internalized stigma, discrimination, and depression among men and women living with HIV/AIDS in Cape Town, South Africa. *Soc Sci Med.* 2007;64:1823-1831.
52. Rohleder P, Gibson K. 'We are not fresh': HIV-positive women talk of their experience of living with their 'spoiled identity'. *SAJP.* 2006;36(1):25-44.
53. Mellins CA, Ehrhardt AA, Rapkin B, Havens JF. Psychosocial factors associated with adaptation in HIV-infected mothers. *AIDS Behav.* 2000;4(4):317-328.
54. Prado G, Feaster DJ, Schwartz SJ, Pratt IA, Smith L, Szapocznik J. Religious involvement, coping, social support, and psychological distress in HIV-seropositive African American Mothers. *AIDS Behav.* 2004;8(3):221-235.
55. Medley AM, Kennedy CE, Lunyolo S, Sweat MD. Disclosure outcomes, coping strategies, and life changes among women living with HIV in Uganda. *Qual Health Res.* 2009;19(2):1744-1754.

56. Blalock AC, McDaniel JS, Farber EW. Effect of employment on quality of life and psychological functioning in patients with HIV/AIDS. *Psychosomatics*. 2002;43:400-404.
57. Updegraff JA, Taylor SE, Kemeny ME, Wyatt GE. Positive and negative effects of HIV infection in women with low socioeconomic resources. *Pers Soc Psychol Bull*. 2002;28(3):382-394.
58. Reece M, Shacham E, Monahan P, Yebei V, Ong'or WO, Omollo O, et al. Psychological distress symptoms of individuals seeking HIV-related psychosocial support in western Kenya. *AIDS Care*. 2007;19(10):1194-1200.
59. Visser MJ, Sipsma H. The experience of HIV-related stigma in South Africa. In: Liamputtong P, editor. *Stigma, Discrimination and HIV/AIDS: A Cross-Cultural Perspective*. New York: Springer; in press.
60. Department of Health. National antiretroviral treatment guidelines. Pretoria: Department of Health; 2004. Available from <http://www.doh.gov.za/docs/misc/2004/sec1.pdf>.
61. Simoni JM, Demas P, Mason HRC, Drossman JA, Davis ML. HIV disclosure among women of African descent: Associations with coping, social support, and psychological adaptation. *AIDS Behav*. 2000;4(2),147-158.

Table I: Socio-demographics and health-related characteristics at baseline

Age [mean(sd)]	26.5 (5.1) years
Gestational age [mean (sd)]	27.6 (7.0) weeks
Marital status N (%)	
• Married	43 (19.1)
• Single with partner	152 (67.9)
• No partner	29 (12.9)
Education level N (%)	
• None/primary	21 (9.3)
• Secondary	171 (76.3)
• Some tertiary	32 (14.3)
Household income monthly per-capita [median]	R320 (US\$ 40)
Below poverty line <R200 (US\$ 25) N (%)	64 (28.6)
Regular income employment N (%)	
• Participant	52 (23.2)
• Partner	151 (67.4)
Partner providing financial support	160 (71.4)
Prior experience of violence N(%)	
• Emotional	55 (24.6)
• Financial withholding/control	36 (16.1)
• Physical	26 (11.6)
• Sexual	12 (5.4)
• >2 types of violence	49 (21.9)
CD4 [mean (sd)]	433 (232.5)

<ul style="list-style-type: none"> • <200 N(%) 	27 (12.2)
Using ART	19 (10.6)
Disclosure N (%)	138(61.6)
<ul style="list-style-type: none"> • Partner 	102(45.5)
<ul style="list-style-type: none"> • Others 	72(32.1)
Know someone with HIV N (%)	89 (39.7)
<ul style="list-style-type: none"> • Relative 	44 (19.6)
<ul style="list-style-type: none"> • Non-relative 	65 (29.0)

Note. N = Number; sd = standard deviation.

Table II: Changes in active and avoidant coping over time

Interview Time	Active coping (range 0-39)		Avoidant coping (range 0-24)	
	Mean	Std. Error	Mean	Std. Error
Baseline	32.492	0.372	14.188	0.181
6-months	33.164	0.388	13.874	0.186
12-months	33.803	0.338	14.056	0.191
21-months	33.565	0.336	14.575	0.172

Note: Estimated mean scores based on the MLA model

Table III: Pair-wise comparisons of estimated mean coping scores over time

ACTIVE COPING				AVOIDANT COPING		
(I) interview	(J) interview time	Mean Difference (I-J)	Std. Error	(J) interview time	Mean Difference (I-J)	Std. Error
Baseline	6-months	-1.305*	.299	6-months	.314	.204
	12-months	-2.064*	.309	12-months	.132	.221
	21-months	-1.930*	.317	21-months	-.387	.198
6-months	baseline	1.305*	.299	baseline	-.314	.204
	12-months	-.760	.320	12-months	-.183	.205
	21-months	-.626	.328	21-months	-.701*	.197
12-months	baseline	2.064*	.309	baseline	-.132	.221
	6-months	.760	.320	6-months	.183	.205
	21-months	.134	.333	21-months	-.519	.221
21-months	baseline	1.930*	.317	baseline	.387	.198
	6-months	.626	.328	6-months	.701*	.197
	12-months	-.134	.333	12-months	.519	.221

Note. Based on estimated marginal means.

* $p < 0.05$

Table IV: Independent variables related to active and avoidant coping to be entered into MLA models

Active Coping		Avoidant Coping	
Independent variable	<i>p</i> value*	Independent variable	<i>p</i> value*
Violence >2 ^a	0.064	Violence >2 ^a	0.009
Depression	<0.0001	Depression	<0.001
HIV-knowledge	0.001	HIV-knowledge	<0.0001
Self-esteem	<0.0001	Self-esteem	<0.0001
Time to interview	<0.0001	Time to interview	0.001
Internalized stigma	<0.0001	Internalized stigma	<0.001
Disclosure of status	<0.001	Disclosure of status	0.028
Positive support	<0.001	Negative support	0.024
Marital status	0.056	Partner support	0.130
Know someone with HIV	0.001	Attributed stigma	0.054
Below poverty line	0.005	Level of education	0.014
Decision-making power	0.067		

* $p < 0.25$, two-tailed.

^aExperiencing two or more types of violence.

Table V: MLA models for active and avoidant coping respectively

<u>Active Coping</u>				<u>Avoidant Coping</u>			
Parameter	Estimate	Std. Error	<i>p</i> value*	Parameter	Estimate	Std. Error	<i>p</i> value*
Intercept	29.67	1.36	<0.0001	Intercept	18.44	0.92	<0.0001
Time to interview	0.05	0.014	<0.0001	Time to interview	0.02	0.01	0.027
Internalized Stigma	-0.15	0.05	0.006	Internalized Stigma	0.15	0.03	<0.0001
Depression	-0.05	0.01	0.001	Depression	0.02	0.01	0.006
Self-Esteem	0.07	0.03	0.047	Self-Esteem	-0.12	0.02	<0.0001
Positive Support	0.18	0.021	<0.0001				
Living below the poverty line	-0.61	0.29	0.040	Level of Education - below tertiary	0.54	0.26	0.039
Knowing someone with HIV	0.87	0.34	0.014	HIV-Knowledge	-0.14	0.05	0.006
Receiving ART	-1.47	0.55	0.008				

^a = Reference category, Std. Error = Standard Error.

**p* < 0.05, two-tailed.