## Title

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**Relationship Power, Antiretroviral Adherence, and Physical and Mental Health Among Women living with HIV in Rural Kenya**

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**Abstract**

Little is known about its association of gender-based power imbalances and health and health behaviors among women with HIV (WWH). We examined cross-sectional baseline data among WWH in a cluster-randomized control trial (NCT02815579) in rural Kenya. We assessed associations between Sexual Relationship Power Scale (SRPS) and ART adherence, physical and mental health, adjusting for sociodemographic and social factors. SRPS consists of two subscales: relationship control (RC) and decision-making dominance (DMD). Women with the highest and middle tertiles for RC had a 7.49 point and 8.88 point greater Medical Outcomes Study (MOS)-HIV mental health score, and a 0.27 and 0.29 lower odds of depression, respectively, compared to women in the lowest tertile. Low sexual relationship power, specifically low RC, may be associated with poor mental health among WWH. Longitudinal studies aimed to improve RC among WWH should be studied to determine their effect on improving mental health.

**Resumen**

Poco se sabe acerca de su asociación con los desequilibrios de poder basados en el género y los comportamientos de salud y salud entre las mujeres con Virus de Inmunodeficiencia Humana (VIH). Examinamos los datos de referencia transversales entre mujeres con VIH en un ensayo de control aleatorizado por grupos (NCT02815579) en las zonas rurales de Kenia. Evaluamos las asociaciones entre la Escala de poder de relación sexual y la adherencia al Terapia Antirretroviral (TAR), la salud física y mental, ajustando por factores sociodemográficos y sociales. La Escala de poder de relación sexual consiste de dos subescalas: control de relaciones

y dominio en la toma de decisiones. Las mujeres con los terciles más alto y medio para control de relaciones tenían una puntuación de salud mental de 7,49 puntos y 8,88 puntos mayor en el Medical Outcomes Study HIV Health Survey (MOS)-HIV, y una puntuación de salud mental de 0,27 y 0,29 menores probabilidades de depresión, respectivamente, en comparación con las mujeres en el tercil más bajo. El bajo poder de relación sexual, específicamente el control de relaciones bajo, puede estar asociado con una salud mental deficiente entre las mujeres con VIH. Se deben estudiar estudios longitudinales destinados a mejorar la control de relaciones entre mujeres con VIH para determinar su efecto en la mejora de la salud mental.

**Keywords**: sexual relationship power; mental health; human immunodeficiency virus; AIDS; Kenya

## INTRODUCTION

Studies have shown that power inequality within heterosexually-active relationships is linked to poor sexual and reproductive health outcomes for women.(1-3) In the application of the Sexual Relationship Power Scale (SRPS) to HIV prevention research,(4, 5) lower SRPS scores have been associated with higher sexual risk for HIV infection.(1, 6) Furthermore, gender-based power imbalance is a known risk factor for intimate partner violence.(1, 3, 4, 7-9)Among HIV positive women with low sexual relationship power, there is increased risk of malnutrition, specifically low Body Mass Index and low Mid-Upper Arm Circumference.(7) A recent study in rural Uganda that showed that low sexual relationship power contributed to depression among HIV-infected women.(10) Among women with HIV/AIDS (WWH), however, less is known about the effects of sexual relationship power on

other health behaviors such as adherence to antiretroviral therapy (ART) and physical and mental health quality of life.

Adherence to ART is a critical determinant of HIV-1 RNA viral suppression and health outcomes,(11-13) and an emerging literature shows that relationship factors may both interfere with and support adherence.(14-16) Partners may provide support for medication adherence by providing reminders and social support (instrumental, informational and emotional).(14-16) Male partners are not always supportive of their partner's medication adherence, particularly when there is a power imbalance within the relationship.(14) Sexual relationship power may also contribute to poor mental and physical health among WWH, which could further undermine ART adherence.(10)

To understand the associations of sexual relationship power with ART adherence and physical and mental health among WWH in rural Kenya, we conducted a cross-sectional analysis of data collected in *Shamba Maisha, a* cluster randomized controlled trial. *Shamba Maisha* is a multisectoral agricultural and financial intervention trial to improve health outcomes among HIV-infected farmers in western Kenya (NCT02815579).

## METHODS

### *Participants*

The study took place in Kenya within Kisumu, Migori, and Homa Bay counties and used baseline data collected between June 2016 and December 2017 as part of *Shamba Maisha.* Sixteen health facilities were randomized 1:1 to intervention or control arms. Inclusion criteria for the larger study included adults living with HIV between the ages of 18–60 years old who were receiving ART, who experienced food insecurity and/or malnutrition (BMI $< 18.5$) with access to farming land and

surface water, and who agreed to save the down payment for a loan. All participants gave written informed consent prior to enrollment. Participants in the intervention facilities received trainings on sustainable farming practices and financial literacy, as well as an asset loan (~$150 USD) to purchase a water pump, seeds, fertilizer, and other farming inputs after making a down payment of approximately $9 USD.

***Data Collection***

Interviewer-administered instruments were used to collect data on sexual relationship power, ART adherence, HIV disclosure, stigma, mental and physical health, economic and agriculture data, and other socio-demographic factors. Surveys and written consent forms were translated and administered by a Dholuo or Kiswahili speaker. Clinical data were abstracted from the medical records. We received ethical approval from the Kenya Medical Research Institute Scientific and Ethical Review Unit and the University of California San Francisco Institutional Review Board.

**Measurements**

Our primary explanatory variable, relationship power, was measured using the sexual relationship power scale (SPRS),(5) a 22-item validated scale that has been used in research conducted in black African populations.(1, 4, 10, 17) Questions were asked about participants' current intimate relationship or the last one if they were not in a relationship. The SRPS contains two subscales: Relationship Control and Decision-Making Dominance. The Relationship Control subscale has fourteen questions rated on a 4-point Likert-type scale ranging from Strongly Agree (1) to Strongly Disagree (4) to assess the extent to which women can exert sexual and emotional autonomy (e.g., ''My partner tells me who I can spend time with."). The

Decision-Making Dominance sub-scale measures the balance of decision-making power (1 = Your partner has more power; 2 = Both of you have equal power; 3 = You have more power). For example, one Decision-Making Dominance item asks "Who usually has more say about what you do together?" Responses are summed and normalized to a range of 1 to 4, with higher scores indicating greater relationship power. As suggested by Pulerwitz et al,(5) scale scores were split into tertiles representing 'low', 'medium' and 'high' power. Both subscales had good internal reliability (Relationship Control Cronbach's alpha = 0.84, Decision-Making Dominance alpha= 0.78), as did the SRPS scale as a whole (Cronbach's alpha = 0.86). Previous research on the SRPS subscales have also been mixed, with many authors omitting Decision-Making Dominance, and others showing that only the Relationship Control sub-scale influenced outcomes.(1, 6) A Systematic Review of the Psychometric Properties of the SRPS in HIV/AIDS Research found that the SRPS and Relationship Control subscale exhibited sound psychometric properties across multiple study populations and research settings. The Decision-Making Dominance subscale had relatively weak psychometric properties, especially when used with specific populations (i.e. younger age) and research settings.(18)

Primary outcomes: ART adherence was measured with a visual analogue scale (VAS), a simple psychometric measurement tool using a continuous scale that has concordance with 3-day recall and unannounced pill counts.(19-21) We dichotomized adherence as ≥95% of prescribed doses taken in the prior 30 days compared to <95% using the VAS, (21) based on literature linking 95% self-reported adherence to virologic outcome for patients with HIV.(11) Physical and mental health status were assessed with the Medical Outcomes Study (MOS)-HIV health-related quality-of-life subscales, physical health summary score (PHS) and

mental health summary score (MHS). Both subscales are continuous with a range of 0 to 100. The MOS-HIV reliability and validity has been well documented,(22, 23) and adapted for use in East Africa.(24) Depression symptom severity was measured with the Hopkins Symptom Checklist Depression Scale (HSCL-D).(25, 26) A value of ≥ 1.75 on the HSCL-D is consistent with screening positive for symptoms of depression, thus we created a dichotomous variable using that cut-off.

*Covariates*: We chose potential socioeconomic and clinical confounders based on literature and theory including age, any secondary education, marital status (single, married, widowed, and separated), household wealth (quintiles), hazardous drinking as measured by the AUDIT-C,(27) and duration of ART.(28, 29)

**Statistical Analysis**

We performed a cross-sectional baseline analysis among women participants to determine the association of sexual relationship power with ART adherence and physical and mental health status. We fitted multivariable logistic regression models to test for associations between the full scale and two subscales and excellent self-reported ART adherence and depression symptom severity. We split the scales because the Decision-Making Dominance has consistently lower reliability, as described above. We ran multivariable linear regression models to assess associations between relationship power and PHS and MHS scales. For each outcome, we fit one model using overall SRPS as the primary predictor and a separate model that contained the Relationship Control and Decision-Making Dominance subscales, to evaluate whether the two domains were differentially associated with the outcomes of interest. We evaluated the associations between all candidate covariates and our primary independent and dependent variables. We adjusted all models for continuous age and years on ART, marital status (married

vs. not), educational attainment (secondary or higher vs. primary or lower), wealth index (quintiles), and hazardous drinking. All models accounted for clustering at the health facility level using a mixed model with health facility as the random effect. Analyses were performed using SAS 9.4 (SAS Institute Inc., Cary, NC).

**RESULTS**

Three hundred and eighty two WWH were analyzed. From the larger study, 14 were excluded due to incomplete SRPS data. The median age was 38 years (IQR 31-44 years), 60.7% were married, and 20.4% had some secondary education (Table 1). The median Relationship Control score was 2.6 with a range of 1.1 to 4.0. In the bivariate model (Table 3), women with the highest and middle tertiles for Relationship Control had an 8.35 point ($p<0.001$) and 6.83 point ($p<0.001$) higher mental health score (range 0-100), respectively, compared to women in the lowest tertile. Women with the highest and middle tertiles for Relationship Control also had a 0.38 ($p=0.001$) and 0.32 ($p<0.001$) lower odds of screening positive for depression, respectively, compared to women in the lowest tertile. Relationship Control was also associated with depression and MOS-HIV mental health in the multivariable models (Table 2). Women in the highest and middle tertiles for Relationship Control had an 8.88 point ($p<0.001$) and 7.49 point ($p<0.001$) greater mental health score (range 0-100), respectively, compared to women in the lowest tertile. Women in the highest and middle tertiles for Relationship Control had a 0.29 ($p<0.001$) and 0.27 ($p<0.001$) lower odds of depression, respectively, compared to women in the lowest tertile. Women in the highest tertile of Relationship Control had 4.11 higher points physical health status sub-scale of the MOS-HIV when compared with women with the lowest tertile, that was not significant ($p=0.098$). Relationship Control was not associated with ART

adherence. The proportion of WWH achieving ≥95% ART adherence was similar across Relationship Control tertiles (from 0.69-0.74). Decision-Making Dominance was not associated with any of the outcomes (Table 2).

Of the 382 women analyzed at baseline, 280 (73%) were in a relationship and 102 (27%) were not, with 83% of the latter being widows. Women who were not in a relationship were asked about their last relationship. We ran a sensitivity analysis restricted to women who reported being in a current relationship to assess whether relationship recency had a differential effect on our outcomes of interest. We found no differences in the direction, magnitude, or significance of the associations we reported for the full analytic sample. Results not shown.

## DISCUSSION

We found that women with higher sexual relationship power were less likely to meet criteria for probable depression compared to women with low relationship power. These results were supported by a study in rural Uganda that showed that low sexual relationship power contributed to depression among HIV-infected women. (10) We found higher levels of probable depression among this population (44.8%) compared to the Ugandan WWH (23.7%).(10)

This study also examined the effect of relationship power on ART adherence, physical health, and mental health among WWH. Quality of life and wellbeing, as measured by the MOS-HIV scores (range 0-100) were higher in this population compared to a mixed-gender HIV outpatients study in East Africa (mental health score 59.2 in our sample compared to 46.2, and physical health 83.1 in our sample

compared to 44.9).(30) Women with higher sexual relationship power had better mental health status and tended to have better physical health compared to women with low relationship power. However, cross-sectional data preclude making causal conclusions. Relationship power was not associated with ART adherence in the current study. This could be due to a relatively high percentage (71.7%) of participants that achieved ≥95% adherence. This also could also be due to the reliance on self-reported adherence, which is an imperfect measure(31) and may mask underlying associations between Relationship Control and adherence.

The association between physical health and sexual relationship power was stronger with the Relationship Control sub-scale compared to the Decision-Making Dominance sub-scale, though effects were not statistically significant. These results are consistent with previous literature.(18) and together suggest that Relationship Control may be a more sensitive predictor of poor physical and mental health risk in this population.

Our study had several limitations. First, our sample consisted of HIV-positive women on ART who mainly resided in rural Kenya and were food insecure; therefore, our findings may not be generalizable. Second, our measure of probable depression does not provide a diagnosis of major depressive disorder and the relationship of mental health and sexual relationship power is likely bi-directional. Previous theory and literature have suggested several plausible mechanisms through which low sexual relationship power could lead to depression(10). At the same time, it is certainly possible that people who are depressed are more likely to over report low sexual power. In-depth, qualitative research could further delineate the mechanisms through which sexual power may affect mental health. Our findings could imply that low Relationship Control among WWH may increase their risk of

poor mental health, or that poor mental health among WWH may lead to reduced Relationship Control. Longitudinal studies are needed to confirm the direction of these associations.

Interventions to improve mental health among HIV-positive women should consider strategies that improve women's Relationship Control and improve partner relationship equality. A multi-level intervention may be required to address factors such as access to HIV treatment, social support, stigma and discrimination, disclosure, poverty, food security, and land security. Structural strategies such as economic empowerment and gender transformative interventions(32) could be adapted or intensified for WWH. Interventions focused on men and gender transformative interventions have also shown promises and limitations.(33, 34) At the relationship level, couples-based interventions may provide opportunities to address gendered power and relationship dynamics from both partners' perspectives.(35)

## CONCLUSION

In conclusion, Relationship Control in a sample of WWH in Kenya was strongly associated with symptoms of depression and worse mental health status. Longitudinal studies are needed to assess the direction of these associations. Interventions designed to enhance the intimate relationships that shape women's overall health and well-being may have the potential to improve outcomes of women suffering from the syndemic of HIV/AIDS and poor mental health.

## References


1. Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntryre 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.

2. Blanc AK. The effect of power in sexual relationships on sexual and reproductive health: an examination of the evidence. Studies in family planning. 2001;32(3):189-213.

3. Closson K, Ndungu, J., Beksinska, M., Ogilvie, G., Dietrich, J.J., Gadermann, A., Gibbs, A., Nduna, M., Smit, J., Gray, G. and Kaida, A. Gender, power, and health: measuring and assessing sexual relationship power equity among young sub-Saharan African women and men, a systematic review. Trauma, Violence, & Abuse. 2020:1524838020979676.

4. Conroy AA, Tsai AC, Clark GM, Boum Y, Hatcher AM, Kawuma A, et al. Relationship power and sexual violence among HIV-positive women in rural Uganda. AIDS and Behavior. 2016;20(9):2045-53.

5. Pulerwitz J, Gortmaker SL, DeJong W. Measuring sexual relationship power in HIV/STD research. Sex roles. 2000;42(7-8):637-60.

6. Pettifor AE, Measham DM, Rees HV, Padian NS. Sexual power and HIV risk, South Africa. Emerging infectious diseases. 2004;10(11):1996.

7. Siedner MJ, Tsai AC, Dworkin S, Mukiibi NF, Emenyonu NI, Hunt PW, et al. Sexual relationship power and malnutrition among HIV-positive women in rural Uganda. AIDS and Behavior. 2012;16(6):1542-8.

8. Weiser S, Tsai A, Senkugu J, Hatcher A, Emenyonu N, Kawuma A, et al. Sexual relationship power and intimate partner violence among HIV-infected women in rural Uganda. International AIDS Society; Rome, Italy 2011.

9. Zembe YZ TL, Thorson A, Silberschmidt M, Ekstrom AM. Intimate Partner Violence, Relationship Power Inequity and the Role of Sexual and Social Risk Factors in the Production of Violence among Young Women Who Have Multiple Sexual Partners in a Peri-Urban Setting in South Africa. PLoS One. 2015;10.
10. Hatcher AM, Tsai AC, Kumbakumba E, Dworkin SL, Hunt PW, Martin JN, et al. Sexual relationship power and depression among HIV-infected women in Rural Uganda. PLoS One. 2012;7(12):e49821.
11. Paterson DL, Swindells S, Mohr J, Brester M, Vergis EN, Squier C, et al. Adherence to protease inhibitor therapy and outcomes in patients with HIV infection. Annals of internal medicine. 2000;133(1):21-30.
12. Bangsberg DR, Hecht FM, Charlebois ED, Zolopa AR, Holodniy M, Sheiner L, et al. Adherence to protease inhibitors, HIV-1 viral load, and development of drug resistance in an indigent population. AIDS. 2000;14(4):357-66.
13. Bangsberg DR, Perry S, Charlebois ED, Clark RA, Roberston M, Zolopa AR, et al. Non-adherence to highly active antiretroviral therapy predicts progression to AIDS. AIDS. 2001;15(9):1181-3.
14. Conroy A, Leddy A, Johnson M, Ngubane T, van Rooyen H, Darbes L. 'I told her this is your life': relationship dynamics, partner support and adherence to antiretroviral therapy among South African couples. Culture, health & sexuality. 2017;19(11):1239-53.
15. Rogers AJ, Achiro L, Bukusi EA, Hatcher AM, Kwena Z, Musoke PL, et al. Couple interdependence impacts HIV-related health behaviours among pregnant couples in southwestern Kenya: a qualitative analysis. Journal of the International AIDS Society. 2016;19(1):21224.

16. Conroy AA, McKenna SA, Ruark A. Couple interdependence impacts alcohol use and adherence to antiretroviral therapy in Malawi. AIDS and Behavior. 2019;23(1):201-10.
17. Ketchen B, Armistead L, Cook S. HIV infection, stressful life events, and intimate relationship power: the moderating role of community resources for black South African women. Women & health. 2009;49(2-3):197-214.
18. McMahon JM, Volpe EM, Klostermann K, Trabold N, Xue Y. A systematic review of the psychometric properties of the Sexual Relationship Power Scale in HIV/AIDS research. Archives of Sexual Behavior. 2015;44(2):267-94.
19. Giordano TP, Guzman D, Clark R, Charlebois ED, Bangsberg DR. Measuring adherence to antiretroviral therapy in a diverse population using a visual analogue scale. HIV Clin Trials. 2004 Mar-Apr;5(2):74-9.
20. Oyugi JH, Byakika-Tusiime J, Charlebois ED, Kityo C, Mugerwa R, Mugyenyi P, et al. Multiple validated measures of adherence indicate high levels of adherence to generic HIV antiretroviral therapy in a resource-limited setting. JAIDS Journal of Acquired Immune Deficiency Syndromes. 2004;36(5):1100-2.
21. Finitsis DJ, Pellowski JA, Huedo-Medina TB, Fox MC, Kalichman SC. Visual analogue scale (VAS) measurement of antiretroviral adherence in people living with HIV (PLWH): a meta-analysis. Journal of behavioral medicine. 2016;39(6):1043-55.
22. Wu AW, Revicki D, Jacobson D, Malitz F. Evidence for reliability, validity and usefulness of the Medical Outcomes Study HIV Health Survey (MOS-HIV). Quality of Life Research. 1997;6(6):481-93.
23. Stangl AL, Bunnell R, Wamai N, Masaba H, Mermin J. Measuring quality of life in rural Uganda: reliability and validity of summary scores from the medical

outcomes study HIV health survey (MOS-HIV). Quality of Life Research. 2012;21(9):1655-63.

24. C. Mast T, Kigozi G, Wabwire-Mangen F, Black R, Sewankambo N, Serwadda D, et al. Measuring quality of life among HIV-infected women using a culturally adapted questionnaire in Rakai district, Uganda. AIDS Care. 2004;16(1):81-94.

25. Bolton P, Wilk CM, Ndogoni L. Assessment of depression prevalence in rural Uganda using symptom and function criteria. Social psychiatry and psychiatric epidemiology. 2004;39(6):442-7.

26. Derogatis LR. The Hopkins Symptom Checklist (HSCL): a measure of primary symptom dimensions. 1974.

27. Bradley KA, DeBenedetti AF, Volk RJ, Williams EC, Frank D, Kivlahan DR. AUDIT-C as a brief screen for alcohol misuse in primary care. Alcohol Clin Exp Res. 2007;31(7):1208-17.

28. Weiser SD, Bukusi EA, Steinfeld RL, Frongillo EA, Weke E, Dworkin SL, et al. Shamba Maisha: randomized controlled trial of an agricultural and finance intervention to improve HIV health outcomes. AIDS. 2015 Sep 10;29(14):1889-94.

29. Cohen CR, Steinfeld RL, Weke E, Bukusi EA, Hatcher AM, Shiboski S, et al. Shamba Maisha: Pilot agricultural intervention for food security and HIV health outcomes in Kenya: design, methods, baseline results and process evaluation of a cluster-randomized controlled trial. Springerplus. 2015;4:122.

30. Harding R, Simms V, Penfold S, Downing J, Namisango E, Powell RA, et al. Quality of life and wellbeing among HIV outpatients in East Africa: a multicentre observational study. BMC infectious diseases. 2014;14(1):613.

31. Gandhi M, Ameli N, Bacchetti P, Anastos K, Gange SJ, Minkoff H, et al. Atazanavir Concentration in Hair Is the Strongest Predictor of Outcomes on Antiretroviral Therapy. Clinical Infectious Diseases. 2011;52(10):1267-75.
32. Lu T, Kwena Z, Zwicker L, Bukusi E, Maura-Muira E, Dworkin S. Securing women's property rights in the era of HIV/AIDS: Barriers and facilitators of implementing a community-led structural intervention in Western Kenya. AIDS Education and Prevention. 2013;25:151-63.
33. Dworkin SL, Treves-Kagan S, Lippman SA. Gender-transformative interventions to reduce HIV risks and violence with heterosexually-active men: a review of the global evidence. AIDS and Behavior. 2013;17(9):2845-63.
34. Dworkin SL, Fleming PJ, Colvin CJ. The promises and limitations of gender-transformative health programming with men: critical reflections from the field. Culture, health & sexuality. 2015;17(sup2):128-43.
35. Turan JM, Darbes LA, Musoke PL, Kwena Z, Rogers AJ, Hatcher AM, et al. Development and piloting of a home-based couples intervention during pregnancy and postpartum in Southwestern Kenya. AIDS patient care and STDs. 2018;32(3):92-103.

Table Captions:

- Table 1 – Descriptive Statistics for cohort of HIV-positive women in rural Kenya
- Table 2 – Multivariable analysis of Relationship Power, Adherence, and Physical and Mental Health Among HIV-Positive Women in Rural Kenya
- Table 3 - Bivariable Analysis of Relationship Power, Adherence, and Physical and Mental Health Among HIV-Positive Women in Rural Kenya

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**Table 1: Descriptive Statistics for cohort of HIV-positive women in rural Kenya**

| | All participants (N=382) N (%) or Median (IQR) |
|---|---|
| **Socio-demographics characteristics** | |
| **Age (y)** | 38 (31, 44) |
| **Married** | 60.7% |
| **Education** | |
| **None or primary** | 79.6% |
| **Secondary** | 20.4% |
| **Household characteristics** | |
| **Improved water source** | 45.9% |
| **Improved sanitation facility** | 41.2% |
| **Finished floor composition** | 29.8% |
| **Social and behavioral variables** | |
| **Hazardous drinking (AUDIT-C)** | 4.7% |
| **Social support score[a]** | 2.0 (1.7, 2.4) |
| **Anticipated stigma score[b]** | 2.0 (1.3, 2.1) |
| **Enacted stigma score** | 1.0 (1.0, 1.1) |
| **Internalized stigma score** | 2.0 (1.7, 2.7) |
| **Disclosed HIV to primary partner** | 94.0% |
| **Visual adherence scale (VAS) >=95%** | 71.7% |
| **Clinical Characteristics** | |
| **Any AIDS-defining condition** | 4.2% |
| **CD4+ count, (% ≤200 cells/µL)** | 2.4% |
| **HIV viral load ≥200 cells/mm3** | 18.1% |
| **MOS HIV physical health scale[c]** | 83.1 (68.9, 87.7) |
| **MOS HIV mental health scale[c]** | 59.2 (46.9, 70.1) |
| **Probable depression (HSCL-D ≥ 1.75)** | 44.8% |
| **Time on current ART regimen (years)** | 4.7 (2.6, 6.9) |
| **Sexual Relationship Power Scale (SPRS)** | |
| **Sexual relationship power (SPRS), full scale score[d]** | 2.2 (1.9, 2.5) |
| **Decision-making dominance (DMD), subscale score[d]** | 1.9 (1.6, 2.5) |
| **Relationship Control (RC), subscale score[d]** | 2.6 (2.2, 2.9) |

HSCL: Hopkins Symptomatic Check List
AUDIT-C: Alcohol Use Disorders Identification Test
[a] Range: 1 to 4 (lower = more social support)
[b] Range: 1 to 5 (lower = less stigma)
[c] Range: 0 to 100 (higher = better health)
[d] Range: 1 to 4 (higher = greater control)

**Table 2: Multivariable analysis of Relationship Power, Adherence, and Physical and Mental Health Among HIV-Positive Women in Rural Kenya**

| | Visual Adherence Scale ≥95% | | MOSHIV Physical Health Score | | MOSHIV Mental Health Score | | Binary Depression | |
|---|---|---|---|---|---|---|---|---|
| | **AOR** | **p-value** | **Adjusted β** | **p-value** | **Adjusted β** | **p-value** | **AOR** | **p-value** |
| **Relationship Control subscale** | | | | | | | | |
| **Low** | *referent* | | *referent* | | *referent* | | *referent* | |
| **Medium** | 1.17 | 0.607 | 1.323 | 0.559 | 7.489 | <0.001 | 0.268 | <0.001 |
| **High** | 0.858 | 0.644 | 4.108 | 0.098 | 8.881 | <0.001 | 0.288 | <0.001 |
| **Decision-Making Dominance subscale** | | | | | | | | |
| **Low** | *referent* | | *referent* | | *referent* | | *referent* | |
| **Medium** | 0.921 | 0.791 | 0.155 | 0.947 | -2.082 | 0.305 | 1.567 | 0.158 |
| **High** | 1.329 | 0.366 | -3.108 | 0.177 | -2.003 | 0.318 | 1.568 | 0.155 |
| **^Age** | 1.028 | 0.065 | -0.2744 | 0.010 | -0.011 | 0.902 | 1.025 | 0.087 |
| **^Wealth (quintiles)** | | | | | | | | |
| **1st (lowest)** | *referent* | | *referent* | | *referent* | | *referent* | |
| **2nd** | *1.157* | *0.679* | *-0.900* | *0.740* | -0.418 | 0.860 | 0.933 | 0.852 |
| **3rd** | *1.487* | *0.297* | *2.565* | *0.370* | 5.402 | 0.031 | 0.523 | 0.101 |
| **4th** | *1.315* | *0.463* | *-1.970* | *0.387* | 3.996 | 0.106 | 0.760 | 0.485 |
| **5th (highest)** | *1.991* | *0.090* | *-0.756* | *0.808* | 4.893 | 0.074 | 0.574 | 0.196 |
| **Marital Status[a]** | | | | | | | | |
| **Single, widowed, divorced** | *referent* | | *referent* | | *referent* | | *referent* | |
| **Married/in a partnership** | *0.813* | *0.429* | *0.111* | *0.947* | -0.118 | 0.943 | 1.309 | 0.300 |
| **Educational attainment[a]** | | | | | | | | |
| **Primary or less** | *referent* | | *referent* | | *referent* | | *referent* | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Secondary or higher** | *0.912* | *0.764* | *-0.188* | *0.947* | -2.259 | 0.253 | 1.653 | 0.094 |
| **Hazardous drinking[a]** | *0.856* | *0.784* | *9.30* | *0.025* | 0.840 | 0.815 | 0.760 | 0.617 |
| **Length of time on ART (years)[a]** | *0.961* | *0.380* | *0.150* | *0.649* | 0.273 | 0.342 | 0.987 | 0.761 |

[a]Covariates based on the subscale analysis

**Table 3 – Bivariable Analysis of Relationship Power, Adherence, and Physical and Mental Health Among HIV-Positive Women in Rural Kenya**

| | **Visual Adherence Scale ≥ 95%** | | **MOSHIV Physical Health Score** | | **MOSHIV Mental Health Score** | | **Binary Depression** | |
|---|---|---|---|---|---|---|---|---|
| | **OR (95% CI)** | **p-value** | **β (SE)** | **p-value** | **β (SE)** | **p-value** | **OR (95% CI)** | **p-value** |
| **Sexual Relationship Power Scale** | | | | | | | | |
| **Low** | *referent* | | *referent* | | *referent* | | *referent* | |
| **Medium** | 1.17 (0.68, 2.03) | 0.679 | 0.58 (2.13) | 0.784 | 4.30 (1.88) | 0.023 | 0.56 (0.32, 0.96) | 0.034 |
| **High** | 1.29 (0.74, 2.23) | 0.352 | 1.05 (2.12) | 0.620 | 4.60 (1.88) | 0.015 | 0.60 (0.35, 1.03) | 0.063 |
| **Relationship Control subscale** | | | | | | | | |
| **Low** | *referent* | | *referent* | | *referent* | | *referent* | |
| **Medium** | 1.23 (0.72, 2.11) | 0.469 | 1.05 (2.10) | 0.616 | 6.83 (1.82) | <0.001 | 0.32 (0.18, 0.55) | <0.001 |
| **High** | 1.07 (0.61, 1.88) | 0.73 | 2.68 (2.23) | 0.229 | 8.35 (1.93) | <0.001 | 0.38 (0.21, 0.67) | 0.001 |
| **Decision-Making Dominance subscale** | | | | | | | | |
| **Low** | *referent* | | *referent* | | *referent* | | *referent* | |
| **Medium** | 0.92 (0.53, 1.58) | 0.619 | 1.13 (2.16) | 0.602 | 1.27 (1.93) | 0.51 | 0.93 (0.54, 1.60) | 0.806 |
| **High** | 1.36 (0.78, | 0.264 | -2.17 | 0.302 | 1.58 | 0.400 | 0.93 (0.55, | 0.786 |

| | | | | |
|---|---|---|---|---|
| | 2.37) | (2.09) | (1.87) | 1.57) |

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