



A Dyadic Investigation of Relationship Dynamics and Depressive Symptoms in HIV-Affected Couples in Malawi

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Abstract

Depression is the leading cause of disability worldwide with health implications for people living with HIV. Primary partnerships like marriage could be protective against depression but may worsen depression depending on the relationship quality. We examined depression and its association with relationship dynamics in a cross-sectional sample of 211 HIV-affected married couples in Malawi. We fit multivariable multilevel linear regression models for depressive symptoms. Men and women reported similar levels of depressive symptoms; 28% had a score indicative of probable depression. Almost half of couples had at least one partner with probable depression. In the adjusted models, equality ($B = -0.22$; $p < 0.01$) and unity ($B = -0.94$; $p < 0.05$) were associated with fewer depressive symptoms while individuals with more experiences of physical ($B = 0.81$; $p < 0.01$), sexual ($B = 0.87$; $p < 0.01$), and emotional violence ($B = 1.52$; $p < 0.001$) had higher levels of depressive symptoms. Couples-based interventions aiming to improve relationships may address depression, especially in settings with inadequate mental health services.

Keywords Heterosexual couples · Relationship dynamics · HIV · Depression · Sub-Saharan Africa

Introduction

Globally, depression is a common condition among people living with HIV (PLWH). Studies have shown that PLWH are almost twice as likely to experience depressive symptoms as compared to HIV-negative individuals [1, 2]. PLWH who are depressed are more likely to have suboptimal adherence to antiretroviral therapy (ART), experience accelerated disease progression, and disengage from care [3–6]. Treatment for depression is challenging, particularly in low-resource settings like sub-Saharan Africa (SSA) [7]. Many barriers exist to supporting mental health in SSA, including limited mental health infrastructure and trained

clinicians [7, 8]. Consequently, depressive symptoms may be further exacerbated by contextual factors such as poverty, stigma, and HIV infection and thus efforts involving family and community in strategies to support PLWH could be beneficial [2, 9].

Primary partnerships such as marriage play an important role in physical and mental health, including the experience of depression [10, 11]. While being in a relationship is associated with better health as compared to being single, not all relationships are equally protective [10, 12]. Thus, it is the quality of the relationship that is often driving the link between relationships and health. Relationship quality can be defined by both positive and negative relationship dynamics (e.g., support versus stress) that are bidirectionally linked and assessed through self-reported relationship dynamics (e.g., satisfaction), emotional states (e.g., intimacy), and patterns of interaction (e.g., conflict) [12]. A high-quality relationship would therefore be highly satisfying and intimate while having low levels of hostile or negative interactions. Indeed, positive relationship dynamics, such as social support, satisfaction, intimacy, trust, equity and unity, have been shown to protect against or lessen depression [11–13] while negative relationship dynamics such as those involving

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intimate partner violence (IPV), interpersonal conflicts, and disruptive communication toward a spouse could lead to or worsen the experience of depression [14–17].

To our knowledge, no study has examined the association between relationship dynamics and depressive symptoms in the presence of chronic diseases such as HIV or among couples living in SSA. Furthermore, the majority of research has conceptualized depression as an individual-level condition [18]. In marriage or committed partnerships, this approach has been criticized for neglecting the interdependence between partners or considering the advantage (or disadvantage) of close, on-going relationships on health and wellbeing [23, 24].

In this study, we examined depressive symptoms within a sample of HIV-affected married couples (i.e., having at least one partner living with HIV and on ART) in Malawi. Our first aim is to describe intra-couple patterns of depressive symptoms by examining the overlap in depressive symptoms between partners. For example, when one partner reports higher levels of depressive symptoms, how likely is it that the other partner has high levels of depressive symptoms? Our second aim was to test for associations between positive (e.g., intimacy, trust, unity) and negative relationship dynamics (e.g., IPV), and depressive symptoms using both partners' self-reports. Lastly, to our knowledge there is limited evidence on the role of gender in associations between relationship dynamics and depression [19]. Therefore, our third aim examined whether the association between relationship dynamics and depressive symptoms differed by gender. This knowledge is needed to inform couple-based interventions for depression and whether interventions should be designed differently for men and women.

Methods

Study Procedures

Data for this study come from the *Umodzi M'Banja* ("UMB"; Unity in the Family) study in the Zomba district of southern Malawi, which is a mixed-methods, observational study with HIV-positive individuals on ART and their primary partners [20, 21]. The main objective of the UMB was to understand how relationship dynamics affect engagement in HIV care and treatment in order to inform the development of a couple-based intervention to improve HIV treatment outcomes. In August of 2017, we conducted a cross-sectional survey with 211 couples (422 individuals). Couples were eligible to participate in the survey if they were: 1) in a non-polygamous union for at least 6 months; 2) age 18 or older; and 3) had at least one partner (the "index patient") on ART for at least 2 months who had disclosed their HIV status to the primary partner (verified

by the partner). HIV status disclosure was required because this was a dyadic study and we wanted to be able to assess HIV-related social support from both partners' perspectives. Polygamous couples, which only comprise 7% in this region [22], were excluded for feasibility of enrolling the sample and because analytic methods for polygamous couples are currently underdeveloped. We used quota tables during recruitment to ensure an even balance of index patients by each gender.

Couples were recruited at two high-volume HIV clinics in the Zomba district: (1) an urban clinic at a large district hospital (*Tisungane*); (2) a faith-based, private clinic at a rural community hospital (*Pirimiti*). Approximately half of participants were recruited from each clinic. Research staff announced the study during health information sessions and interested index patients could approach the staff in the waiting rooms. If the index patient was eligible, they were given an information card to give to their primary partner who could contact study staff if interested. Partner eligibility was assessed over the phone and then confirmed in-person at the couples' joint interview appointment.

Prior to the start of data collection, the research team in Malawi was trained by the principal investigator on the survey, study procedures, and research ethics. The survey was translated into the predominant local language of Chichewa and back-translated into English by an independent person. During the training, each item of the survey was reviewed by the research team to ensure items were understood, clear, and culturally-appropriate, and to verify the translations. Items were modified as needed.

Research assistants administered the surveys on tablet devices using *SurveyCTO*, a secure, web-based data collection platform (Dobility Inc., <https://www.surveyccto.com>). We first piloted the survey with a small convenience sample of 10 couples to further train the interviewers, gauge the length of the survey, identify errors with skip patterns, and ensure the data were stored properly. We held de-briefing sessions with the research team to assess items that were confusing to respondents and made final modifications to the survey (e.g., clarifying translations, correcting skip pattern errors).

Both partners provided informed consent in private locations of the HIV clinics and were provided a small incentive (equivalent to \$2 USD) for their time. Interviewers were trained to assess and respond to couple conflict/violence or coercion, and on how to facilitate referrals for domestic violence assistance. A list of community-based resources for couples, including services for domestic violence, was systematically provided to every participant. This research received ethical approval from the National Health Science Research Committee in Malawi and the Committee on Human Research at the University of California San Francisco.

Partners were interviewed separately, but simultaneously, by gender-matched interviewers in private areas of the HIV clinics. We chose the HIV clinics for convenience and safety of the interviewers and participants, who lived across a large geographical area. Both partners were asked the same questions on relationship dynamics and depressive symptoms. Following the interview, both partners' surveys were checked for errors by the research manager and uploaded to a secure server. Once available online, the US-based research team checked the data for errors and ensured that couples were properly linked. Discrepancies were tracked in a query spreadsheet, which was discussed at weekly conference calls with the Malawi team until all queries were resolved.

Measures

Explanatory Variables—Positive Relationship Dynamics

Intimacy Emotional intimacy was measured with a five-item subscale from the Triangular Scale of Love (e.g., “I have a relationship of mutual understanding with my partner”) [23]. We used the shortened version of the Triangular Scale of Love scale previously validated through another study in Malawi [24]. Response options range from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher intimacy. Because one respondent skipped a question, we used the average, rather than sum, of all items to compute the scale score. Cronbach's alpha for this scale was 0.90.

Trust Trust was measured with the eight-item Dyadic Trust Scale (e.g., “My partner is honest with me”) [25]. Response options range from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher trust. We created a sum score across all items (no missing responses). The Cronbach's alpha for the trust scale was 0.82.

Equality Relationship quality was measured with the six-item intimacy subscale of the Relationship Values Scale (e.g., “My partner and I have equal power in the relationship”) [26]. Response options range from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher equality. We created a sum score across all items (no missing responses). Cronbach's alpha for the equality scale was 0.87.

Relationship Satisfaction A single item from the Couple Satisfaction Index was used to assess relationship satisfaction (e.g., “Generally, I am satisfied with my relationship”) [27]. Response options range from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher relationship satisfaction.

Unity A single item was used to measure relationship unity or “we-ness” using the inclusion-of-self-in-other diagram [28]. This diagram asks respondents to pick a set of overlapping circles that best describes their current relationship with their partner. Response options included seven sets of circles ranging from 1 (no overlap) to 7 (complete overlap) with higher scores indicating higher relationship unity.

Explanatory Variables—Negative Relationship Dynamics

Physical Violence We asked six questions about past 12-month physical violence from the WHO domestic violence module (e.g., “Has your partner pushed you, shaken you, or thrown something at you?”) [29]. To increase specificity, we included an additional item from the Malawi Demographic Health Survey (DHS) module on domestic violence, (e.g., “Has your partner ever twisted your arm or pulled your hair?”) [22] for a total of seven items. Response options ranged from 1 (never) to 3 (frequently) with higher scores indicating more frequent experiences of physical violence. Cronbach's alpha in this sample was 0.83.

Sexual Violence We asked three questions on past 12-month sexual violence from the WHO domestic violence module (e.g., “Has your partner physically forced you to have sexual intercourse when you did not want to?”) [29]. We included an additional item from the Malawi DHS (e.g., “Has your partner ever physically forced you to perform any sexual acts that you did not want to?”) [22] and an item on sexual coercion based on our prior work in this setting (e.g., “Has your partner ever verbally pressured you to have sex until you gave in?”) [30] for a total of five items. Response options ranged from 1 (never) to 3 (frequently) with higher scores indicating more frequent experiences of sexual violence. Cronbach's alpha in this sample was 0.75.

Emotional Violence We asked four questions on past 12-month emotional violence from the WHO domestic violence module (e.g., “Did your partner ever insult you or make you feel bad about yourself?”) [29]. Response options ranged from 1 (never) to 3 (frequently) with higher scores indicating more frequent experiences of emotional violence. Cronbach's alpha in this sample was 0.78.

Dependent Variable

Depressive Symptoms The 20-item Center for Epidemiologic Studies Depression (CES-D) scale [31] was used to measure depressive symptoms (e.g., “I was bothered by things that usually don't bother me”). Response options range from 1 (rarely or none of the time) to 4 (all of the time), with higher scores indicating higher depressive symptoms. Cronbach's alpha was 0.90. We used a continuous variable

to model depressive symptoms. However, when describing the prevalence of depression, we dichotomized the variable using the standard cutoff of 16 on the CES-D scale to indicate probable depression [30].

Covariates

Multivariable models controlled for gender, age (in years), education (in years), household wealth score [32], number of shared children, relationship length (in months), alcohol use based on the AUDIT-C score [33], overall health status (higher scores indicate poorer health), and HIV status (positive versus negative/don't know).

Data Analysis

One-way frequency tables and measures of central tendency were generated to characterize the sample. Couple-level means were created for all explanatory variables. For aim 1, we explored whether depressive symptoms were correlated within couples. For aim 2 and 3, we fit multilevel linear regression models (i.e., hierarchical linear models; random effects/random coefficient models) for depressive symptoms, controlling for important covariates identified in the literature [14, 34, 35]. The resulting intraclass correlation coefficient (ICC) for depressive symptoms was zero, indicating that partners did not share significant variance in their depressive symptom scores. However, given the hierarchical structure of the data (i.e., persons nested within couples), a multilevel model was justified.

We fit five models for each positive relationship dynamic, and three for each negative relationship dynamic. This approach was selected because we were interested in identifying relationship dynamics that could be targeted in an intervention. We checked for multi-collinearity among all explanatory variables by examining the variance inflation factor (VIF), which were all well below the recommended cutoff of 10 [36]. To examine whether gender modified the association between relationship dynamics and depressive symptoms, we added an interaction term for gender and relationship dynamics to the models. Of all the covariates, we specifically tested for gender as an effect modifier given the background literature indicating these associations could differ by gender and our goal to inform future interventions addressing depression. Missing data was negligible (less than 2% on any given variable) and was complete for all explanatory variables and the outcome variable. The models were estimated using Stata IC version 15.1, using listwise deletion for missing data.

Results

Sample Characteristics

Of the 211 couples (422 individuals), the mean age was 40.5 and the majority (80.8%) had a primary school education or less (see Table 1). All couples were in married or cohabitating unions for an average of 12.5 years. Approximately two-thirds of couples were sero-concordant positive (one-third were sero-discordant). Of participants who were HIV-positive ($N=352$), 98.9% were currently on an established ART regimen for an average of 4.8 years. Over one-quarter (28.2%) of all participants had a CES-D score of 16 or higher (suggestive of probable depression). Men and women were not significantly different on their depressive symptoms scores ($p=0.914$). Almost half (48.8%) of couples had no depression, almost half (45.9%) had one partner with probable depression, and 5.2% of couples had two partners with probable depression.

Are Positive Relationship Dynamics Associated with Depressive Symptoms?

As shown in Table 2, the unadjusted models showed that individuals with higher positive relationship dynamics had lower levels of depressive symptoms in each model: intimacy ($B = -1.80$; $p < 0.05$), trust ($B = -0.20$; $p < 0.05$), equality ($B = -0.35$; $p < 0.001$), relationship satisfaction ($B = -1.95$; $p < 0.05$), and unity ($B = -1.71$; $p < 0.001$). In the adjusted models, equality ($B = -0.22$; $p < 0.01$) and unity ($B = -0.94$; $p < 0.05$) remained associated with depressive symptoms. Gender was not associated with depressive symptoms in the adjusted models. Although not presented in Table 2, covariates significantly associated with depressive symptoms in the adjusted models included household wealth (negative association), number of shared children (positive association), and overall health status (positive association).

Are Negative Relationship Dynamics Associated with Depressive Symptoms?

As shown in Table 3, the unadjusted models showed that individuals with more experiences of physical violence ($B = 1.39$; $p < 0.001$), sexual violence ($B = 1.34$; $p < 0.001$), and emotional violence ($B = 2.17$; $p < 0.001$) had higher levels of depressive symptoms. In the adjusted models, all three measures of violence remained associated with depressive symptoms (Table 3).

Table 1 Sample characteristics of HIV-affected married couples in the Umodzi M'Banja study in Malawi (N=211 couples)

Variable	Total sample %, mean (SD)	Men %, mean (SD)	Women %, mean (SD)	Intra-class correlation coefficient
Individual characteristics				
Age (years)	40.5 (10.2)	43.5 (10.6)	37.4 (8.8)	0.47***
Education level				
Primary school or less	80.8	73.5	88.2	0.22***
Secondary school	18.7	25.6	11.8	
Tertiary school or higher	0.5	1.0	0.0	
Currently on ART (out of N=352)	98.8	98.3	99.4	
Length of time on ART (months; out of N=352)	58.1 (36.7)	54.9 (36.6)	61.2 (36.6)	0.34***
Relationship duration (years)	12.5 (9.0)	12.92 (9.2)	12.1 (8.8)	0.81***
Sero-concordant positive	66.8	–	–	
Positive relationship dynamics				
Intimacy (range 1–5)	4.5 (0.6)	4.5 (0.6)	4.5 (0.7)	0.24***
Trust (range 15–40)	32.5 (5.8)	32.9 (4.8)	32.1 (6.6)	0.08
Equality (range 8–40)	34.2 (5.4)	35.3 (4.9)	33.2 (5.7)	0.05
Relationship satisfaction (range 1–5)	4.6 (0.6)	4.7 (0.6)	4.6 (0.6)	0.16*
Unity (range 1–7)	6.3 (1.1)	6.6 (0.9)	6.0 (1.3)	0.42***
Negative relationship dynamics				
Physical violence (range 7–20)	7.5 (1.4)	7.2 (1.2)	7.8 (1.5)	0.26***
Sexual violence	5.8 (1.4)	5.6 (1.3)	6.1 (1.5)	0.00
Emotional violence (range 4–12)	4.6 (1.2)	4.3 (1.1)	4.9 (1.3)	0.20**
Depression score (CES-D, mean)	10.9 (8.1)	10.6 (7.9)	11.3 (8.3)	0.00
Probable depression (CES-D score > 16, %)	28.2	28.4	27.9	

* $p < .05$; ** $p < 0.01$; *** $p < 0.001$

Does Gender Modify Associations Between Relationship Dynamics and Depressive Symptoms?

The adjusted models showed that gender moderated the association between positive relationship dynamics (subscales of intimacy, trust, and relationship satisfaction) and depressive symptoms (see Table 2). In all models, the slopes for women were more negative than the slopes for men. The corresponding slopes for women were -2.33 ($p < 0.05$) for intimacy, -0.46 ($p < 0.01$) for trust, and -3.37 ($p < 0.05$) for relationship satisfaction (see Table 2). Gender did not moderate the associations between negative relationship dynamics (physical, sexual, and emotional violence) and depressive symptoms (see Table 3).

Discussion

Depressive symptoms were highly prevalent among our sample of couples affected by HIV in Malawi, with nearly 50% of couples having one partner reporting depressive symptoms indicative of depression. However, the overlap of depressive symptoms within couples was not significant, indicating depressive symptoms were usually only

experienced by one partner in the relationship, which is consistent with other studies on couples elsewhere [13]. Overall, approximately 30% of all participants reported depressive symptoms indicative of probable depression, which is consistent with estimates from recent studies in Malawi among PLWH [37] and in SSA more broadly [38].

We found individuals with more positive relationship dynamics, particularly couple-level equality and unity, reported significantly lower levels of depressive symptoms. These findings are consistent with other research on couples showing that positive relationship dynamics are associated with better physical and mental health outcomes [35, 39, 40]. Our study adds to the current evidence by showing that these associations hold among couples affected by HIV in SSA. Equality and unity are particularly salient constructs of relationship quality in this setting where unity and equality may help mitigate normative power imbalances within couples, as shown by other studies with couples in Malawi [30], and may explain why we found significant associations with depressive symptoms. In addition, couples affected by HIV in resource-poor settings, who may have poor physical health to begin with and less access to mental health services, may need to rely more on their social relationships such as primary partners to maintain health. Thus, it is encouraging to

Table 2 Unadjusted and adjusted multilevel linear regression coefficients for positive relationship dynamics and depressive symptoms among married couples living with HIV in Malawi (N=211 couples)

Explanatory variables	Unadjusted model ^a	Adjusted model ^b	Adjusted model ^b + interactions
	B (95% CI)	B (95% CI)	B (95% CI)
Intimacy	-1.80 (-3.33, -0.27)*	-0.37 (-1.88, 1.13)	-2.39 (-4.45, -0.22)*
Gender	-	-1.30 (-3.07, 0.48)	-19.10 (-36.9, -1.25)*
Gender × intimacy interaction	-	-	3.93 (0.07, 7.79)*
Slope for women	-	-	-2.33 (-4.52, -0.16)*
Slope for men	-	-	1.43 (-1.18, 4.04)
Trust	-0.20 (-0.38, -0.03)*	-0.14 (-0.33, 0.04)	-0.46 (-0.73, -0.19)**
Gender	-	-1.24 (-3.01, 0.51)	-23.06 (-35.96, -10.17)***
Gender × trust interaction	-	-	0.67 (0.28, 1.06)**
Slope for women	-	-	-0.46 (-0.73, -0.19)**
Slope for men	-	-	0.19 (-0.07, 0.45)
Equality	-0.35 (-0.53, -0.18)***	-0.22 (-0.38, -0.06)**	-0.44 (-0.71, -0.17)**
Gender	-	-1.19 (-2.97, 0.58)	-16.71 (-32.86, -0.56)*
Gender × equality interaction	-	-	0.45 (-0.01, 0.91)
Relationship satisfaction	-1.95 (-3.60, -0.29)*	-0.79 (-2.39, 0.82)	-3.50 (-6.25, -0.74)*
Gender	-	-1.25 (-3.01, 0.51)	-26.05 (-48.20, -3.90)*
Gender × satisfaction interaction	-	-	5.35 (0.66, 10.03)*
Slope for women	-	-	-3.37 (-6.14, -0.61)*
Slope for men	-	-	1.74 (-1.17, 4.67)
Unity	-1.71 (-2.64, -0.79)***	-0.94 (-1.79, -0.09)*	-1.90 (-3.27, -0.53)**
Gender	-	-1.17 (-2.94, 0.61)	-13.74 (-28.04, 0.56)
Gender × unity interaction	-	-	1.97 (-0.19, 4.15)

* $p < .05$; ** $p < 0.01$; *** $p < 0.001$

^aSeparate sets of models were fit for each relationship dynamic

^bCovariates include gender, age, education, household wealth, number of shared children, relationship length, alcohol use, overall health status, and HIV status

Table 3 Unadjusted and adjusted multilevel linear regression coefficients for negative relationship dynamics and depressive symptoms among married couples living with HIV in Malawi (N=211 couples)

Explanatory variables	Unadjusted model ^a	Adjusted model ^b	Adjusted model ^b + interactions
	B (95% CI)	B (95% CI)	B (95% CI)
Physical violence	1.39 (0.88, 1.90)***	0.81 (0.28, 1.34)**	0.93 (0.14, 1.73)*
Gender	-	-0.79 (-2.53, 0.93)	1.60 (-5.67, 8.89)
Gender × physical violence interaction	-	-	-0.32 (-1.26, 0.61)
Sexual violence	1.34 (0.73, 1.95)***	0.87 (0.32, 1.42)**	1.09 (0.46, 1.72)**
Gender	-	-0.76 (-2.55, 1.03)	2.27 (-4.24, 8.80)
Gender × sexual violence interaction	-	-	-0.53 (-1.66, 0.60)
Emotional violence	2.17 (1.53, 2.80)***	1.52 (0.87, 2.17)***	1.33 (0.44, 2.22)**
Gender	-	-0.18 (-1.97, 1.61)	-2.40 (-8.25, 3.45)
Gender × emotional violence interaction	-	-	0.48 (-0.77, 1.74)

* $p < .05$; ** $p < 0.01$; *** $p < 0.001$

^aSeparate sets of models were fit for each relationship dynamic

^bCovariates include gender, age, education, household wealth, number of shared children, relationship length, alcohol use, overall health status, and HIV status

find that individuals in higher-functioning relationships have lower rates of depressive symptoms—most of whom are living with HIV. Consequently, individuals with more negative relationship dynamics, operationalized as physical, sexual and emotional IPV, reported higher depressive symptoms. The association between IPV and poor mental health related outcomes is well known [41–44]. Among women living with HIV in low resource settings such as Uganda evidence shows that violence (operationalized as sex-victimization [45] and physical, emotional and sexual violence [46]) is associated with depression [45] and incident HIV infection, respectively [46]. Our study adds to this body of research by including multiple forms of violence (i.e., physical, sexual and emotional) and by examining men's experiences of IPV and depression, which has been cited as an area in need of more research [41, 47]. In addition, we explore these relationships from the perspective of couples affected by HIV in long-term relationships. Importantly, violence may be exacerbated in settings with unequal power dynamics, unequal gender-norms, increased poverty and within rural settings [48]—all present among our sample of couples in Malawi.

A major strength of this study is our consideration of a couple-based interdependence approach to understanding depression [49]. Couple interdependence theory suggests that one partner's behaviors or traits could impact the other partner's mental health status, which we expected to be especially salient for long-term partnerships with established patterns of mutual influence [49]. Despite couples in our sample being in relationships for an average of 12 years and the potential for mutual patterns of experience and influence, we did not find evidence to suggest that depression co-occurs within relationships or that depression could be transferable between partners. One explanation may be that couples in longer-term relationships develop coping mechanisms to preserve their own mental health when their partner is depressed. This coping mechanism may be particularly relevant for meeting subsistence and caregiving needs in impoverished settings. It may also be that the depressed partners' symptoms could be worsened from negative communication by the non-depressed partner [18, 50], acting as a destructive form of couple interdependence. In terms of potential interventions, because most couples in our sample only had one partner experiencing depression, there may be opportunities to involve non-depressed partners who are healthy and could be a significant asset to mental health services that incorporate couples.

We also tested if relationship dynamics and its association with depressive symptoms differed by gender. We found that the effect of positive relationship dynamics on depressive symptoms was stronger and more negative for women than men. A possible explanation may be that women are more relationship-centered than men, with relationship dynamics exerting a stronger influence on women's experiences of

depression than men's. Another possible explanation for the interaction may be related to power dynamics and the typical gender roles men and women assume in Malawi. Gender Socialization Theory suggests that culturally assumed gender roles promote the health of men more than women [51–53]. Men may expect their partner to promote their well-being and therefore they may be less impacted by a supportive partner whereas women are socialized to believe they should not expect their partner to nurture them and thus may be more influenced when men step into a nurturing role to support them. There is a need for additional research to investigate exactly how relationship power may differentially affect gender roles, relationship dynamics and depressive symptoms. Identifying key predictors of men's depressive symptoms—beyond relationship dynamics—should also be the focus of subsequent studies. In addition, more research on this topic is needed because the role of relationships on health, including depressive symptoms, and whether it differs by gender, has been inconsistent and conducted primarily in high-resource settings [54–57].

In developed countries such as the US, couples therapy has been recommended for partnered individuals experiencing depressive symptoms [58]. This is for several reasons. First, evidence supports a strong relationship between depressive symptoms and marital strain, a factor that is amenable to couples therapy [13]. Second, the impact of negative partner interactions and criticism are among the greatest stressors involved in long-term depression [59, 60]. Finally, optimal relationship dynamics may buffer the effect of depressive symptoms, facilitate recovery, and prevent relapse [61]. In SSA, where mental health services including couples therapy are lacking, routine HIV care may provide an opportunity to screen for depressive symptoms, counsel patients with probable depression, and involve primary partners in the process. One feasible option could be to train lay counselors or paraprofessionals to provide brief relationship counseling using models shown to be successful in other studies in SSA such as interventions targeting substance abuse among PLWH [62] to support mental health.

Study Limitations

We used cross-sectional data collected at a single time-point, which cannot show causality or direction of associations. There is evidence to suggest the relationship could be bidirectional; on one hand, partners experiencing negative relationship dynamics are at risk for depressive symptoms [63], on the other hand, depressive symptoms experienced by one partner predicts future marital discord, which places both partners at higher risk for the onset, worsening or perpetuation of depressive symptoms [14, 24]. Future longitudinal research that evaluates change over time among couples living with HIV may

provide helpful information for understanding experiences of both relationship dynamics and depressive symptoms, and to adequately inform mental health interventions with couples. However, a major strength of this study is applying the couple interdependence framework to examine depression within couples using both partners' information. By interviewing both partners on their perspective of relationship dynamics, and level of depressive symptoms as suggested by others [49], we were able to understand how relationship dynamics from both partners' perspectives contribute to the mental health of each.

Conclusions

In our study, we found that positive aspects of relationship dynamics (e.g., equality and unity) were associated with less depressive symptoms, while negative aspects of relationship dynamics (e.g., physical violence) were associated with more depressive symptoms, and these associations differed by gender. Supporting positive relationship dynamics within the couple may have downstream effects on health-related issues such as depression while also providing opportunities to build core relationship skills that can be transferrable to other health domains such as adherence to ART. Given the limited access to anti-depression medications and mental health services in SSA, couples-based support systems may be an important avenue to influence physical health and wellbeing.

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Compliance with Ethical Standards

Conflicts of interest The authors have no conflicts of interest to declare.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained for all individual participants included in the study.

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