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ORIGINAL PAPER

Partner Support, Willingness to Sacrifice, and HIV Medication Self-Efficacy

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Abstract When taken as prescribed, highly active anti-retroviral medications allow individuals with HIV to live long, healthy lives. Nevertheless, poor adherence is common. In the current study, we examined why some people fail to feel efficacious to adhere, focusing on their interpersonal relationships. Given past findings that some individuals with primary partners adhere better than those without, whereas others adhere worse, we examined whether relationship dynamics influence the association between support from a primary partner and adherence self-efficacy. Specifically, we hypothesized and found that relationship partners' support regarding medication adherence undermines self-efficacy when the partner is perceived as unwilling to sacrifice for the relationship. We discuss the implications of these results for intervention construction and for understanding the power of the relationship context on HIV medication adherence.

Keywords HIV medication self-efficacy · Willingness to sacrifice · Personal goal pursuits · Romantic relationships · Partner support

Partner Support, Willingness to Sacrifice, and HIV Medication Self-Efficacy

When taken as prescribed, highly active anti-retroviral (HAART) medications allow individuals with HIV to live long, healthy lives with low risk of disease transmission to their partners. Unfortunately, poor adherence is common, with estimates indicating that as many as 50% of all individuals on an HIV regimen report suboptimal adherence levels [1]. Medication adherence self-efficacy is an important determinant of medication adherence, explaining more variance than any other social-cognitive element of adherence (e.g., attitudes, norms) [2]. As such, understanding what bolsters or undermines individuals' efficacy is an important research priority.

Although most research on HIV medication adherence self-efficacy focuses on individual-level factors, relationship factors may also influence adherence self-efficacy. Social psychological research on self-regulation and personal goal pursuits indicates that whereas interdependent partners can provide helpful resources and support in some contexts, they can also increase anxiety, deplete self-regulatory resources, and otherwise derail goals. More specifically, when an interdependent relationship is strained, individuals perform worse on their goal pursuits due to decreased perceived control over the goal, reduced focus on the goal, and reduced partner support [3]. When an individual associates a particular goal with a controlling partner, they experience psychological reactance (i.e., feel motivated to reject the partner's wishes), and are less likely to pursue the goal [4].

There is also evidence that HIV medication goals can be helped or hindered by having a primary partner. Some studies indicate that individuals who have a primary partner evidence greater HIV medication adherence than do those without such a partner [5, 6], whereas other studies report that medication adherence is worse among patients reporting that they have a primary partner [7, 8]. Partners may provide support for medication adherence by providing reminders, instrumental help, and coaching [9]. However, how the individual perceives their partner's support

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may be critical in determining whether a partner is helpful or harmful [9].

In the current study, we examine a relationship dynamic that may undermine individuals' medication self-efficacy: the perception that their partner does not have the best interest of the relationship in mind. In situations where it is challenging or impossible for both partners to attain optimal outcomes, individuals may choose to emphasize their own needs, whereas others may be more willing to sacrifice for the relationship (i.e., forego one's immediate self-interest for the betterment of the relationship or partner) [10]. Sacrificing not only improves coordination between partners, but also provides relatively clear evidence that the partner is motivated to achieve the long-term best interest of the relationship and partner. A partner who is perceived as unwilling to sacrifice for the relationship communicates that he or she is pursuing their own best interests, rather than the best interests of both individuals. We hypothesize that support from such a partner would be perceived negatively (e.g., as controlling, insincere), compared to support provided by a partner who is willing to sacrifice for the individual. As such, insofar as an individual views his or her partner as unwilling to sacrifice, we hypothesize that the partner's support will be detrimental for HIV mediation adherence self-efficacy.

The Current Study

In the present study, we sought to clarify the conditions under which partner support for medication adherence is helpful versus detrimental to medication adherence self-efficacy. We collected dyadic data from sexually-involved dyads in which at least one of the partners is HIV positive, enabling us to assess elements of both the support provider (i.e., how much support partners provide and how willing to sacrifice they are), and the support receiver (i.e., how much support individuals perceive their partners provide and how willing to sacrifice they perceive their partners are). We hypothesized that *the association between partner support and HIV medication self-efficacy would be moderated by perceived partner willingness to sacrifice for the relationship, such that when perceived partner willingness to sacrifice is low, support would be negatively associated with self-efficacy, but when it is high, support would be positively associated with self-efficacy*. After testing this primary hypothesis, we examine whether substituting a partner's report of his or her own willingness to sacrifice is as predictive of self-efficacy as the individual's perception of that willingness, and whether the individual's perception of support is as predictive as the partner's own report.

Method

Participants

We recruited people living with HIV/AIDS (PLWHA) who self-identified as being in close, sexual relationships and whose partner was also willing to participate from an outpatient infectious disease (ID) clinic affiliated with a research university ($N = 50$ dyads). This ID clinic is a Designated AIDS Care center providing outpatient and inpatient medical care for PLWHA from the surrounding area, with an active outpatient consensus of approximately 1200 PLWHA. Patients were eligible if they were: (a) receiving outpatient care for HIV at the ID Clinic or being the close, sexual relationship partner of someone who is; (b) involved in a close, sexual or romantic relationship (in which the partner is willing to participate and meets all eligibility requirements); (c) 18 years or older; (d) medically able to participate (i.e., not experiencing acute medical or psychiatric illness or declining health status when it is determined by a treatment provider that research participation is contraindicated); and (g) able to understand spoken English.

On average, target participants were 42.5 years old at the time of the study ($SD = 11.7$, range: 23–63). Seventeen of the participants (34%) identified as female, and 33 identified as male. Nineteen participants identified as gay/homosexual (all men; 38%), five as bisexual (10%), and 26 (52%) as straight/heterosexual. Six participants indicated that they were Hispanic (12%), whereas the remaining 44 reported they were not (88%). Most participants reported their racial background as White or Caucasian ($n = 26$, with 17 African American or Black, 2 Mixed or Multiracial, and 5 who opted not to provide this information). In terms of education, most participants had a high school diploma ($n = 14$), with the remaining participants ranging from having completed 6–19 years of school ($M = 12.04$, $SD = 2.5$). Finally, the relationships had been intact, on average, for nearly nine years ($M = 104.14$ months, $SD = 100.4$, range: 1–360 months).

Procedure

All procedures were approved by the involved institution's IRB prior to beginning recruitment. If both members of the dyad were deemed eligible, they were invited to come to our laboratory for the questionnaire session. All individuals participated at the same time as their close, sexual partner. All participants indicated their consent via written consent form, after which they were directed to a computer to complete our measures via Audio Computer Assisted Self-Interview (ACASI). Upon completion of the measures,

participants received a debriefing about the study, which included their receiving $20 each for their time. On average, participants took 1 h to complete our battery of questionnaires.

Measures. This battery included items spanning the domains of romantic relationships, sexuality, medication adherence, condom use, mental health, and substance use. Described here are only the measures utilized in the current study's analyses. Means, standard deviations, and correlations among all study variables are presented in Table 1.

Self-Efficacy for Adherence. Both partners completed a measure the first six items of the HIV Treatment Adherence Self-Efficacy Scale (HIV-ASES) [11]. We selected the first six questions only, as they specifically refer to taking medication (rather than attending appointments, etc.). Each item begins with the stem "in the past month, how confident have you been that [you/your partner] can…" and was followed with items such as, "stick to [your/their] treatment plan even when side effects begin to interfere with daily activities." Participants rated their agreement from 1 ("not at all confident [I/they] can do it") to 5 ("completely confident [I/they] can do it"). Words in brackets represent the different wording presented depending on whether the target participant was reporting about his or her own self-efficacy (i.e., you, your, I), or the partner was reporting about his or her partner's efficacy (i.e., your partner, their, they). Both versions of this scale evidenced acceptable reliability (target: $\alpha = .91$, partner: $\alpha = .84$).

Partner Support for Adherence. Both partners reported on how much support the partner provided for the target participant's medication adherence in a measure designed for this study. This measure contained three items assessing the frequency with which each member of the dyad provides medication support as follows: "[Your partner checks/You check] in with [you/your partner] about [your/your partner's] medication," "[Your partner helps you/You help your partner] to believe [he or she/you] can take [his or her/my] medications as prescribed," and "[Your partner reminds you/You remind your partner] to take [his or her/your] medications." Participants rated their agreement from 1 ("never") to 5 ("always"). Both versions of this scale evidenced acceptable reliability (target: $\alpha = .77$, partner: $\alpha = .73$).

Willingness to Sacrifice for the Relationship. Willingness to sacrifice for the relationship was measured using a procedure developed by Van Lange and colleagues [10]. First, all participants (target and partner) listed the four parts of their life that are most important to them, other than their relationship. Next, participants were asked to "Imagine that it was not possible for you to engage in [Activity #1] and maintain your relationship (impossible for reasons that are not your partner's fault). To what extent would you consider giving up [Activity #1]." Participants responded on a scale from 1 ("definitely would not give up activity" to 5 ("definitely would give up activity"). They completed this rating for all four activities. Next, they listed two parts of their partners' lives that were

Table 1 Correlations among study variables

	1	2	3	4	5	6	7	8	9	10	11
M	4.28	4.32	3.81	3.59	2.67	2.91	40.41	79.27	0.98	0.48	5263.2
SD	.89	.76	1.03	1.25	1.23	1.23	15.38	37.09	1.42	.50	13518.5
1. Self-efficacy	.										
2. Perceived partner self-efficacy	.24	.									
3. Perceived partner support	.25	.03	.								
4. Partner support	−.24	.05	.14	.							
5. Perceived partner willingness to sacrifice	.31*	.08	−.06	−.09	.						
6. Partner willingness to sacrifice	.03	.22	.13	−.04	.38**	.					
7. Symptoms	−.40**	−.32*	−.31*	.10	.10	−.12	.				
8. Percentage adherence	.33*	.26	−.01	.01	.23	.37*	−.34*	.			
9. Self-reported adherence	−.64***	−.41**	−.10	.18	−.17	−.12	.27	−.26	.		
10. Viral load (dichotomous)	−.21	−.24	.03	.45**	.07	−.07	.27	−.33*	.12	.	
11. Viral load (count)	.31	−.28	.46	−.31	−.40	−.49	−.27	−.72**	−.23	n/a	.

See the method section for details of how each construct was measured. The target participant provided the reports of self-efficacy, perceived partner support, perceived partner willingness to sacrifice, symptoms, percentage adherence, self-reported adherence, viral load (dichotomous) and viral load (count). The partner provided the reports of perceived partner self-efficacy, partner support, and partner willingness to sacrifice

***$p < .001$, **$p < .01$, *$p < .05$

most important to their partner (other than their relationship), and rate how willing they perceived their partners were to give each up using the same procedure. As is customary [10], we combined the ratings for the self by averaging all four of the ratings, and for the perceived partner version of the scale by averaging the two ratings.

Additional Measures. Participants were asked to report on their most recent HIV viral load, including both: a) whether it was detectable or not, and b) what the number was. As target participants were recruited during one of their regular clinic appointments, they would have just learned this information. Although not central to this work, we additionally collected the Investment Model Scale [12] to assess relationship satisfaction. Likewise, we collected a series of items that speak to medication adherence. We asked participants with HIV about 20 physical symptoms (e.g., fatigue, nausea, headache, problems having sex, feeling nervous) that they may have experienced [13]. Participants rated these from 1 ("I do not have this symptom") to 5 ("I have this symptom and it bothers me terribly"), and their overall score was created by taking the sum of all of the responses.

Demographics. Participants completed a standard demographic battery, including items assessing sex, age, race, income, education, sexual orientation, and relationship duration.

Data Preparation and Analytic Approach

Participants were categorized as either the target participant (i.e., the participant recruited from the ID clinic) or the partner (i.e., the partner of the target participant). In the case of serodiscordant dyads ($n = 30$ dyads), the target participant was always HIV+, whereas the partner was always HIV−. In these cases, both participants reported about the target participant's HIV and medication self-efficacy. In the seroconcordant dyads, however, both partners were HIV+ ($n = 20$ dyads). We assigned the label of "target participant" to the individual our research team approached in the ID clinic, but acknowledge that this is relatively arbitrary (i.e., had we come on a different day, we may have recruited the partner, which would have switched which was the target participant and which was the partner in our dataset). The procedure was identical, regardless of whether a given individual was assigned the target participant or partner role: both dyad members completed measures about their own HIV as well as their partner's HIV. As such, we were able to, and did, rerun all study analyses five additional times, beyond what is presented subsequently. Each time, we randomly selected which of the two partners in seroconcordant relationships was the target participant. In all six sets of analyses, the results did not change meaningfully as a result of which partner was selected to be the target participant.

Prior to hypothesis testing, we first constructed a dataset in which each dyad had one line of data, including both the target participants' data and their partners'. Given that our outcome of interest (i.e., medication self-efficacy) is relevant for only one member of the dyad, this approach to data structuring was the most appropriate and enabled us to use standard data analytic techniques (e.g., regression). Also prior to hypothesis testing, we examined all of the bivariate associations among our hypothesis-central and additional variables (See Table 1).

Our primary hypothesis holds that an individual's own level of adherence self-efficacy will be predicted by an interaction of: a) their partner's reported level of support for medication adherence, and b) their perception of their partner's willingness to sacrifice for the relationship. To test this hypothesis, we constructed a general linear model in which each target participant's own level of self-efficacy was held to be predicted by three grand-mean centered predictors: 1) partner's report of their support provided, 2) target participant's perception of partner's level of willingness to sacrifice, and 3) the interaction of the previous two predictors.

Results

The overall model predicting adherence self-efficacy explained a moderate portion of the variance in self-efficacy ($R^2 = .23$; see results for Model 1 in Table 2). Importantly, the interaction term was significantly different from zero, and had a medium effect size ($f^2 = .12$; Cohen 1988). Probing this interaction revealed a pattern that was not perfectly aligned with our hypothesis. Unexpectedly, partner support, when coming from a partner who was perceived as being high in willingness to sacrifice (+1SD) was not significantly associated with self-efficacy ($b = .05$ (.10), $t = 0.53$, $p = .60$). As hypothesized, however, support coming from a partner who was perceived as being low in willingness to sacrifice (−1SD) was significantly and negatively associated with self-efficacy ($b = -.38$ (.12), $t = -3.03$, $p < .01$). See Fig. 1 for a visual depiction of this interaction.

Next, we wanted to ensure that willingness to sacrifice here is, in and of itself, important, rather than simply serving as a proxy for general relationship satisfaction. To rule out this possibility, we ran the same model, but included relationship satisfaction as a covariate, entered into the model prior to our predictors of interest. The overall model remained significant [$F(4, 41) = 4.82$, $p < .01$, $R^2 = .32$]. Above and beyond satisfaction, the interaction of perceived partner willingness to sacrifice and

Table 2 Multiple regression results for main hypothesis and ancillary analyses

	Parameter (std err)	β	t	p	F	p	R^2
Model 1					4.14	.01	.23
Intercept	4.31 (.12)						
Partner support	−.17 (.10)	−.233	−2.02	.05			
Perceived partner WS	.20 (.10)	.285	2.09	.01			
Interaction	.18 (.08)	.320	2.35	.02			
Model 2					3.38	.03	.19
Intercept	4.27 (.12)						
Perceived partner support	.23 (.12)	.27	2.11	.04			
Perceived partner WS	.24 (.10)	.34	2.50	.02			
Interaction	−.10 (.11)	−.12	−.94	.35			
Model 3					1.21	.32	.08
Intercept	4.26 (.13)						
Perceived partner support	.24 (.13)	.278	2.28	.03			
Partner WS	−.03 (.11)	−.044	−.34	.74			
Interaction	.09 (.11)	.126	1.19	.24			
Model 4					0.88	.46	.06
Intercept	4.31 (.13)						
Partner support	−.17 (.11)	−.24	−1.85	.07			
Partner WS	−.01 (.11)	−.01	−.07	.94			
Interaction	.03 (.11)	.04	.38	.71			

The dependent variable in each model is medication adherence self-efficacy

WS willingness to sacrifice

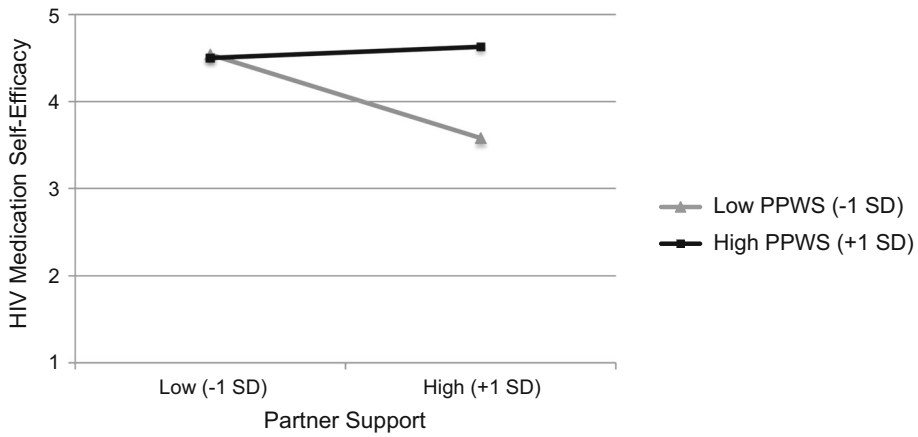

Fig. 1 Interaction of perceived partner willingness to sacrifice (PPWS) and partner's support on HIV medication adherence self-efficacy

partner support remained significantly different from zero, with a nearly identical effect size as when tested in the model without satisfaction ($b = .16$ (.07), $t = 2.18$, $p < .05$, $f^2 = .12$). Thus, the effects obtained were not explained by general satisfaction.

Testing Exploratory Hypotheses. Our exploratory hypotheses all considered whether the source of the reports of partner support and willingness to sacrifice affected the results obtained. Using the same structure as Hypothesis 1 (i.e., self-efficacy is predicted by support and willingness to sacrifice), we tested an additional four combinations of predictors. The results for each of these models are presented in full in Table 2. Only one of these models explained a significant amount of variance in self-efficacy (Model 2, $R^2 = .19$), and in none of the models was the focal interaction term significantly different from zero.

Discussion

We found that interdependent partners, when perceived as unwilling to sacrifice for the relationship, hinder self-efficacy regarding medication adherence by providing support. The implications of this work speak to interventions aimed

at increasing medication adherence (more on that subsequently), but also to the power of the relationship context on individuals.

It is commonly assumed that support from a relationship partner should enhance a person's medication adherence self-efficacy: For example, to miss a dose, two individuals would need to forget or choose not to take the dose. However, the results of the current study align with a growing recognition that partners are not always beneficial to HIV medication adherence [7–9]. Our results add to this literature by showing that how the individual perceives his or her partner plays a significant role in whether that partner's support is undermining. Support from a partner who is perceived as being unwilling to sacrifice for the relationship lowers an individual's self-efficacy. To advance this literature further, research is needed to clarify how support is perceived in these cases. Based on past findings, we expect that support is seen as undermining or controlling [14].

Utilizing data from both partners in a relationship, we examined whether actors' reports of their actions, perceivers' reports of actions, or both influenced individuals' medication adherence self-efficacy. Our a priori conceptual prediction was that partners' supportive messages are perceived through the filter of the individuals' expectations [15]: when an individual expects his or her partner is unwilling to provide resources to the relationship, their messages of support harm self-efficacy. Model 1 tested this prediction directly and findings indicated that the interaction between partner support and perceived partner willingness to sacrifice was significantly associated with self-efficacy. Examining the bivariate correlations provides additional support: Partner support and perceived partner support are not significantly correlated ($r = .14$), suggesting that a filter or lens is applied to a supportive message, causing the two partners to disagree about the amount of support provided.

One part of our hypothesis was unsupported, however. We had hypothesized that when perceived partner willingness to sacrifice was high, greater amounts of support would lead to greater self-efficacy. We had expected this based on findings that, when in a satisfying relationship (i.e., one with a partner who is able and willing to provide resources to the relationship) [16], individuals obtain greater personal goal achievement [3]. However, in the context of HIV medication adherence, this was not supported. In looking at the means for our study variables (available across the top row of Table 1), we see a potential explanation. Self-efficacy regarding medication adherence was high in this sample ($M = 4.28$, $SD = 0.89$, scale range: 1–5). On average, individuals in our sample had known they were HIV+ for 15 years ($M = 15.0$, $SD = 12.2$, range: 0–50 years). This amount of time is certainly sufficient to become experienced with medication (i.e., self-efficacious), so perhaps participants simply could not become more efficacious as a result of their partner's support. Research with a sample of newly diagnosed individuals, or individuals who are new to their medication regimen, is needed to determine if self-efficacy is increased more by partner support early in treatment.

This work is not without limitations. Most notably, we have a relatively small sample size (50 dyads). A priori power analyses suggested that we had sufficient power to detect large effect sizes (Cohen's $f^2 = .35$) using multiple linear regression (3 predictors), but were slightly underpowered to detect medium effects (Cohen's $f^2 = .15$). We did detect the medium effects we had hypothesized, but nevertheless, the validity of these conclusions will be enhanced by future work that replicates our findings. Additionally, we relied on self-reported measures of constructs. Some of our conclusions would be stronger if we had objective measurement (e.g., those to do with viral load), however, as that was not the main focus of this work we believe there is utility to these findings even without objective measurement.

The current study examined medication self-efficacy, rather than rates of adherence as our outcome. Future research would benefit from examining how partner support and pro-relationship orientation combine to predict adherence to a medication regimen. We predict that individuals whose partners provide support but lack willingness to sacrifice may evidence high levels of adherence in the short term. However, from the current study, we know that such a partner will ultimately erode the individuals' self-efficacy, which is an important predictor of adherence [11, 17]. As such, we predict the best long-term solution for medication adherence involves bolstering self-efficacy.

Study findings point to two broad implications for understanding ways to promote medication adherence. First, interventions should be targeted at the dyad. Relationship dynamics are important in understanding whether support will strengthen individuals' self-efficacy or hinder it. Any intervention to bolster adherence that is situated within a relationship context, then, should include a component that is intended to strengthen the relationship. Such strengthening interventions include ones that target overall relationship quality (e.g., the Marriage Hack [18]), or ones that specifically target acceptance of one's partner (e.g., mindfulness interventions [19]). In cases where relationship dynamics are quite poor, interventions that emphasize self-efficacy and self-reliance (rather than the relationship context) may be more effective. Second, support is perceived through the eyes of the receiver, not the giver, so all supportive messages should be specific to the receiver's needs.

Conclusion

In the United States and other developed countries, effective treatments for HIV have led to dramatic improvements in life expectancy and quality of life among PLWHA. However, not all PLWHA achieve sustained viral suppression, as survival depends on lifetime adherence to challenging medication regimens. With nearly 50,000 new HIV infections occurring each year in the United Stated alone [20], there is a growing population of PLWHA who face a range of disease specific and general life stressors associated with living with a chronic, highly stigmatized disease. Research that informs the development of interventions to improve the lives of PLWHA and reduces HIV disease transmission remains a critical public health priority. Most research on HIV prevention and medication adherence focuses on predictors within the individual, but there is now growing recognition of the importance of research that focuses on the close, sexual relationship partners of PLWHA [21, 22]. We add to this conversation by demonstrating that characteristics of the relationship fundamentally change outcomes related to an individual's medication adherence self-efficacy.

Compliance with Ethical Standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the Syracuse University research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards

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

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