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The role of mental health in mediating the relationship between social support and optimal ART adherence

Alexis K. Huynh^a, Janni J. Kinsler^b, William E. Cunningham^{a,c}, and Jennifer N. Sayles^a

^aDivision of General Internal Medicine and Health Services Research, David Geffen School of Medicine at University of California, Los Angeles, CA, USA

^bDepartment of Community Health Sciences, University of California, Los Angeles, USA

^cDepartment of Health Services, School of Public Health, University of California, Los Angeles, CA, USA

Abstract

Optimal adherence to antiretroviral therapy (ART) is essential for reducing mortality and morbidity in persons living with HIV/AIDS (PLWHA), as well as for reducing the risk of further HIV transmission. While studies have identified psychosocial factors such as lack of social support and poor mental health status as important barriers to optimal ART adherence, few studies have explored the potential of a mediation effect of psychosocial factors on the relationship between social support and optimal ART adherence. This paper assessed whether mental health status mediated the relationship between social support and optimal ART adherence among a cross sectional sample of 202 persons living with HIV who were recruited from HIV clinical care sites and community-based organizations in Los Angeles County. Participants completed a survey that included social support items from the Medical Outcome Study: Social Support Survey (MOS-SSS) Instrument, mental health measures from the Medical Outcomes Study Short Form (SF-12), and ART adherence based on self-report. Among those currently taking ART, 61.7 percent reported having optimal adherence. Social support was significantly associated with high score on the mental health status scale (AOR = 2.90; 95% CI = 1.14-5.78) and optimal ART adherence (AOR = 1.81; 95% CI = 1.81; 95% CI = 1.18-2.79). When mental health status was introduced into the model, the association between social support and optimal ART adherence was no longer significant. Our findings suggest the HIV interventions targeting social support to improve ART adherence will likely be most successful if the support bolsters the mental health of the participants. Clearly, better understanding the relationships among social support, mental health, and ART adherence will be critical for development and implementation of future ART adherence interventions.

Keywords

HIV/AIDS; ART adherence; social support; mental health; mediation analyses

Introduction

Optimal adherence to antiretroviral therapy (ART) is essential to the health and well-being of persons living with HIV/AIDS (PLWHA) because it reduces AIDS-related morbidity and mortality and slows the HIV disease progression by suppressing viral replication (Cohen et

Correspondence to: Janni J. Kinsler.

Corresponding author. janni.kinsler@yahoo.com; jkinsler@ucla.edu.

al, 2011; Montaner et al., 2006; WHO, 2011). Optimal ART adherence also has public health significance as it can reduce the risk of HIV transmission (Cohen et al, 2011; Montaner et al., 2006; Donnell et al., 2010).

Numerous research studies have documented that among the most important factors influencing ART adherence are psychosocial factors such as social support and mental health status (Davies et al., 2006; McDowell & Serovich, 2007; Mills, et al., 2006; Nel & Kagee, 2011; Simoni, Frick, & Huang, 2006; Simoni, Frick, Lockhart, & Liebovitz, 2002; Starace et al., 2002; Vyavaharkar et al., 2007). For example, studies have shown an association between the availability of social support and greater ART adherence as well as an association between better mental health status and greater ART adherence (Davies et al., 2006; Starace et al., 2002; Vyavaharkar et al., 2007). At the same time, it is possible that a more complex relationship exists among social support, mental health, and ART adherence. For example, a few studies have examined the role of mediators on the relationship between social support and ART adherence (Simoni, Frick, et al., 2006; Simoni et al., 2002; Vyavaharkar et al., 2007). One study reported that the need for social support was positively correlated with adherence to ART and that this relationship was mediated by self-efficacy and depressive symptomatology (Simoni et al., 2002). Another study found that coping by spiritual activities and focusing on the present mediated the relationship between social support and adherence to ART (Vyavaharkar et al., 2007). Thus, understanding these relationships could prove extremely valuable for developing more targeted interventions to improve adherence. This paper contributes to the small amount of literature that has explored whether mental health status mediates the relationship between social support and ART adherence, and is among the first to measure mental health status by capturing several mental health conditions.

In the present study, we test the following hypotheses: (1) optimal ART adherence is associated with social support and a favorable mental health status, and (2) mental health status mediates the relationship between social support and optimal ART adherence among a sample of 202 largely low income racial/ethnic minority HIV positive adults in Los Angeles County (LAC).

Methods

Participants and procedures

Data were collected from a purposive sample of 202 HIV positive adults in LAC. Participants were recruited from two HIV clinical care sites and five community organizations providing outreach and social services to PLWHA. To be eligible for the study, participants had to be 18 years of age or older, HIV-positive, and capable of providing informed consent. Participants who were eligible for the study completed an anonymous self-administered questionnaire. Informed consent was obtained for all study participants. University of California at Los Angeles (UCLA) Institutional Review Board (IRB) approved the study. Further details of data collection can be found from previously published works by the authors (Sayles et al., 2008).

Measures

Sociodemographics and clinical factors—Sociodemographics included gender, race/ethnicity, age, education, income, relationship status, primary language spoken, health insurance, sexual orientation, and history of intravenous drug use (IDU). Clinical factors included years since HIV diagnosis, CD4 cell count, and currently on ART (Table 1).

Social support, mental health, and ART adherence—Social support was assessed using five items from the Medical Outcome Study: Social Support Survey (MOS-SSS) Instrument, which taps into perceived availability of social support (Table 2). Items reflect emotional, informational and tangible functional forms of social support. The Cronbach's alpha of this 5 item scale was 0.92.

The Survey measured mental health status using the Mental Health Composite Scores (MCS) from the Medical Outcomes Study Short Form (SF-12) which assesses feelings such as depression, anxiety, and being downhearted. The reliability and validity of this measure is well established (Ware, Kosinski, & Keller, 1996).

Self-reported ART adherence in the past week was assessed with the following item obtained from the instrument used in The HIV Cost and Services utilization Study (HCSUS) (Berry, Brown, & Athey, 2002): “How often during the past week were you able to take your antiretroviral medications exactly as your doctor or nurse told you?”

Data analysis

We first examined the distributions of all independent and dependent variables. We then used logistic regression to assess the unadjusted and adjusted odds ratios (UOR/AOR) for the associations between the main independent variables (social support and mental health status) and the outcome variable (optimal ART adherence). Finally, we used logistic regression to examine whether mental health mediated the relationship between social support and ART adherence. All analyses were conducted using STATA 10.0 (Stata Corp, College Station, TX)

Results

Sociodemographics, clinical factors, social support, mental health status, and ART adherence—Sociodemographic characteristics and clinical factors of the sample are presented in Table 1. Table 2 presents the mean score of the social support items, and frequency of HIV positive persons with a high score on the mental health status scale and optimal adherence to ART. The overall mean on the social support scale was 3.45 (based on scores ranging from 1-5) indicating that social support was available some of the time or most of the time, 20.7% had a high score on the SF-12 MCS measure, and 61.7% reported optimal adherence to ART.

Unadjusted and adjusted association of social support and mental health with ART adherence—The UOR and AOR for the associations of social support and mental health with ART adherence are presented in Table 3. Those with a higher odds of optimal ART adherence included those with greater social support in the unadjusted model only (UOR=1.59; 95% CI=1.13-2.23) and those with a higher score on the MCS in both the unadjusted and adjusted models (UOR=5.02; 95% CI=1.63-15.44; AOR=5.40; 95% CI=1.26-23.09).

Mental health as a mediator between the relationship of social support and ART adherence—The results of the multivariate mediation analysis are presented in Figure 1. The availability of social support was significantly associated with high score on the MCS (AOR=2.90; 95% CI=1.45-5.78) and optimal ART adherence (AOR=1.81; 95% CI=1.81-2.79). When the MCS measure was introduced into the model, the association between social support and optimal ART adherence was no longer significant.

Discussion

This study supported our first hypothesis (and previous research studies) that optimal ART adherence is associated with both social support and a favorable mental health status (Davies et al., 2006; Starace et al., 2002; Vyavaharkar et al., 2007). Our second hypothesis was also supported in that mental health status mediated the relationship between social support and ART adherence. These findings are consistent with the idea that social support promotes better mental health in PLWHA, which in turn provides these individuals with the energy and focus necessary to adhere to the ART regimens. While this study provides strong evidence in support of our hypothesis, it is also possible that some other causal relationship exists between these variables. For example, it may be that individuals with a better mental health status elicit more social support from family and friends who, in turn then help the individual to improve their medication adherence.

The potential mediation effects of mental health status have important implications for future interventions aimed at increasing ART adherence. While many interventions have solely targeted social support as a means of increasing ART adherence (Simoni, Pantalone, Plummer, & Huang, 2007), our findings suggest that future interventions should also consider adding a mental health counseling or treatment component in concert with social support. Mental health problems – such as depressive symptoms or anxiety – can be modified through a variety of intervention approaches, including cognitive behavioral therapy and social approaches (Safren et al., 2009; Starace et al., 2002; Vyavaharkar et al., 2007).

There are limitations to this study. First, this was a cross-sectional study, thus causality between the main independent variables (social support and mental health) and outcome variable (ART adherence) cannot be established. Second, ART adherence was assessed using self-report, thus there is the potential for reporting bias. While several studies have documented that self-reporting of medication adherence tends to overestimate adherence, studies have also documented the shortcomings of other objective measures, such as pills counts, in overestimating adherence (Liu et al., 2001). Next, the small sample size (n=202) may have limited our ability to detect statistically meaningful differences in predictors of ART adherence, such as social support, in the multivariate analyses. Finally, although we successfully recruited a sample of diverse PLHA in Los Angeles County, our results may not be generalizable to all PLWA.

Despite these limitations, our findings suggest social support promotes better mental health in PLWHA, which in turn provides these individuals with the necessary motivation and focus to adhere to ART regimens. Understanding the relationship between social support, mental health, and optimal ART adherence will be critical for development and implementation of future interventions with the ultimate aim of improving optimal ART adherence.

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*Mediation models control for age, gender, race/ethnicity, education, sexual orientation, history of IDU, income, insurance status, primary language, marital status, years since diagnosis, and CD4 count.

**p<0.01

Figure 1.

Mediation model to explore the role of mental health in mediating the association of social support and optimal ART adherence.*

Table 1

Sociodemographic characteristics and clinical factors of sample (Total N = 202).

SAMPLE CHARACTERISTICS	N (%)
Sociodemographics	
Gender	
Male	100 (50)
Female	99 (49)
Transgender	3 (1)
Race/ethnicity	
White	56 (28)
African American	112 (56)
Latino/Hispanic	20 (10)
Other	12 (6)
Age (years)	
18-35	40 (20)
36-49	109 (54)
50+	53 (26)
Education	
Less than high school	48 (24)
High school	92 (46)
More than high school	60 (30)
Income level	
<=100% FPL *	109 (54)
>100% FPL	93 (46)
Marital status	
Married/in a committed relationship	55 (27)
Single/divorced/widowed	147 (73)
Primary language	
English	191 (96)
Other	11 (4)
Health insurance	
Yes	89 (46)
No	113 (56)
Sexual orientation	
Homosexual/bisexual	91 (45)
Heterosexual	111 (55)
History of IDU	
Yes	44 (22)
No	158 (78)

SAMPLE CHARACTERISTICS	N (%)
Clinical factors	
Years since HIV diagnosis	
0-5	43 (22)
6-10	51 (26)
>10	100 (52)
Current CD4 Count ^{**}	
<200 (cells/mm ³)	32 (16)
200 – 350 (cells/mm ³)	64 (33)
351 – 500 (cells/mm ³)	36 (19)
500+ (cells/mm ³)	62 (32)
Currently taking ART	
Yes	142 (71)
No	60 (29)

* FPL = federal poverty level for family of 2, less than \$1140/month

** N = 194

Table 2

Frequency of HIV positive persons reporting availability of social support, a high score on the mental health status scale, and optimal adherence to ART.

Social support items (n=202) *	Mean (SD)
Do you have:	
1. Someone you can count on to listen to you when you need to talk?	3.59 (1.20)
2. Someone to take you to the doctor if you need it?	3.31 (1.38)
3. Someone to give you information to help you understand a situation?	3.47 (1.29)
4. Someone whose advice you really want?	3.42 (1.32)
5. Someone who understands your problems?	3.49 (1.31)
Overall social support	3.45 (1.14)
Mental health status (n = 202) **	High mental health score (%)
Mental health composite (MCS) score	20.7
ART adherence (n = 142) ***	All of the time (%)
How often during the past week were you able to take your antiretroviral medications exactly as your doctor or nurse told you?	61.7

* Based on the mean of the 5 social support items. Response options included *none of the time* (represented by a score of 1), *a little of the time* (score = 2), *some of the time* (score = 3), *most of the time* (score = 4), and *all of the time* (score = 5).

** The MCS, based on a six point Likert scale, was linearly transformed to T-scores using standardized weights based upon a mean of 50 and a standard deviation of 10 with higher scores indicating better mental health status. For analyses, we dichotomized the MCS at the 50-point cutoff (i.e., mean) and designated participants with an MCS of ≥ 50 as having a high MCS and those with <50 as having a low MCS.

*** N based on those respondents currently taking ART. Response options included *none of the time* (represented by a score of 1), *a little of the time* (score = 2), *some of the time* (score = 3), *most of the time* (score = 4), and *all of the time* (score = 5). Optimal adherence is defined as adhering to ART "all of the time" (vs. none of the time, a little of the time, some of the time, or most of the time).

Table 3

Unadjusted and adjusted odds ratios (OR) of social support and mental health status with optimal ART adherence (Total N = 142).^{*}

Characteristics (reference group)	Optimal ART adherence Unadjusted OR (95% CI)	Optimal ART adherence Adjusted OR (95% CI)
Overall social support	1.59 (1.13 – 2.23)	1.57 (0.95 – 2.58)
Mental health (low MSC score)		
High MSC score	5.02 (1.63 – 15.44)	5.40 (1.26 – 23.09)
Gender (male)		
Female	0.61 (0.37 – 1.21)	0.44 (0.15 – 1.24)
Race/ethnicity (White)		
African American	0.79 (0.40 – 1.58)	0.64 (0.20 – 2.02)
Latino/Hispanic	0.43 (0.14 – 1.30)	0.52 (0.09 – 2.89)
Other	0.93 (0.25 – 3.44)	1.94 (0.23 – 16.32)
Age (50+ years)		
18-35	0.36 (0.14 – 0.92)	0.26 (0.05 – 1.30)
36-49	1.34 (0.68 – 2.67)	2.21 (0.70 – 6.96)
Education (greater than H.S.)		
H.S.	0.83 (0.59 – 1.63)	1.22 (0.37 – 3.98)
Less than H.S.	0.66 (0.28 – 1.52)	1.84 (0.39 – 8.73)
Income level (>100% FPL) ^{**}		
<=100% FPL	0.92 (0.47 – 1.82)	1.16 (0.41 – 3.24)
Marital status (Single/divorced/widowed)		
Married/in a committed relationship	1.03 (0.50 – 2.14)	1.46 (0.52 – 4.06)
Primary language spoken (other)		
English	3.50 (0.84 – 14.63)	2.41 (0.30 – 19.42)
Health insurance (yes)		
No	0.93 (0.46 – 1.86)	0.89 (0.32 – 2.44)
Sexual orientation (homosexual/bisexual)		
Heterosexual	0.48 (0.24 – 0.97)	0.30 (0.09 – 0.98)
History of IDU (no)		
Yes	0.46 (0.19 – 1.10)	0.41 (0.12 – 1.39)
Yrs since HIV diagnosis (>5)		
<5	1.80 (0.66 – 4.93)	7.43 (1.67 – 33.11)
CD4 Count (>=200 cells/mm ³)		
<200 (cells/mm ³)	1.21 (0.50 – 2.96)	1.00 (0.32 – 3.09)

^{*} N based on those participants who reported currently taking ART

^{**} FPL = federal poverty level for family of 2, less than \$1140/month