Published in final edited form as:
Appl Nurs Res. 2016 May ; 30: 204–209. doi:10.1016/j.apnr.2015.08.001.

Social Resources, Health Promotion Behavior, and Quality of Life in Adults Living with HIV

Allison R. Webel, RN, PhD [Assistant Professor],
Frances Payne Bolton School of Nursing, Case Western Reserve University

Abdus Sattar, PhD [Assistant Professor],
Department of Epidemiology and Biostatistics, Case Western Reserve University

Nate Schreiner, RN, MBA, and
Frances Payne Bolton School of Nursing, Case Western Reserve University

J. Craig Phillips, RN, PhD [Associate Professor]
University of Ottawa

Abstract

Purpose—To describe the associations among three social resource variables (social belonging, social support networks, and social capital) and two health promotion behaviors, HIV medication adherence and physical activity, and quality of life among persons living with HIV (PLHIV).

Method—We conducted a cross-sectional analysis in 102 adult PLHIV. Social resource variables and quality of life were assessed using validated and widely-used instruments. Physical activity was assessed using a daily physical activity diary and medication adherence was abstracted from the participant's medical record. Spearman correlations and descriptive statistics were used to analyze associations among variables.

Results—Fifty-four participants (54%) were male and most were African American (84%), single (69%), and living in poverty (82%). Participants had been living with HIV for an average of 13.6 years (+/−7) and most were living with at least one non-AIDS comorbidity (80%). Social belonging was significantly associated with HIV medication adherence ($\rho = 0.25$, $p = 0.02$), overall functioning ($\rho = 0.48$, $p < 0.01$) and life satisfaction quality of life ($\rho = 0.50$, $p < 0.01$). Social capital was also associated with HIV medication adherence ($\rho = 0.17$, $p = 0.10$) and life satisfaction quality of life ($\rho = 0.29$, $p < 0.01$).

Conclusions—We found that there are distinctions among various, widely-used social resource constructs. By describing these unique associations and distinctions, our study helps identify which social resources should be targeted in the development of interventions to improve health promotion and the quality of life of members of this marginalized population.

(*corresponding author)*Allison.webel@case.edu, 216-368-3939 (no fax).

Conflicts: No conflict of interest has been declared by the authors.

Keywords

HIV; Health Promotion; Social Support; Quality of Life

Background

Recent biomedical and political advances in the treatment of HIV have contributed to the realistic possibility for an end to the HIV epidemic. Continued progress toward achieving an end to the epidemic will require concerted efforts and resource expenditures to address persistent health inequities that exist globally. HIV is a highly stigmatized disease that often affects marginalized peoples who historically have had limited access to social resources. Racial and ethnic minorities and gay and bisexual men are disproportionally affected by the HIV epidemic in the United States (Ayala, Bingham, Kim, Wheeler, & Millett, 2012; Millett et al.; Oster et al., 2011). The increased HIV burden among these groups necessitates a better understanding of what social resources are available to them and what effects these resources have on health outcomes. Efforts to address the challenges of persons living with HIV who are disenfranchised or marginalized require innovative approaches that integrate their daily context-specific challenges (2014). Understanding the relationships between social resources and health promoting or risk behaviors, and how key demographic variables influence social resources may help us develop targeted interventions with marginalized groups. Among all people, including people living with HIV, the achievement of optimal health requires individual and collective resources. Individual and collective resources have been studied over the past several decades through studies of social resources (Cohen, Gottlieb, & Underwood, 2000; Foa & Foa, 1980; Kawachi & Berkman, 2001), social belonging/friendship (Hawthorne, 2006; Holt-Lunstad, Smith, & Layton, 2010), social capital (Murayama, Fujiwara, & Kawachi, 2012), and social networks (L. Berkman, 1977; Berkman LF, 2000). The purpose of this study was to describe associations between social belonging/friendship, social networks, social capital, and the health promotion behaviors and quality of life of persons living with HIV.

Social resources are defined as any concrete or symbolic item that can be used as an object of exchange among people (Foa & Foa, 1980). They are constructs that have consistently been observed to improve and maintain health. Examples of social resources include both tangible items such as money, information, goods and services, and less tangible concepts such as love/affection and status within society. Over the last few decades, social resources have been documented to have direct and indirect benefits for members of society that possess them (Umberson & Montez, 2010). Individuals and groups with adequate social resources tend to be healthier and are more able to manage health threats in their communities. When social resources are present, they mediate the deleterious effect of stress on health as well as directly affect physical and psychological health (Cohen, Gottlieb, & Underwood, 2000; Kawachi & Berkman, 2001). Foa and Foa classified social resources into six categories: love/affection, status, information, services, goods, and money. This categorization remains a useful framework for analysis despite being debated, elaborated on, and synthesized by other scholars (Törnblom & Kazemi, 2012). In this analysis, we use Foa and Foa's Social Resource Theory to help describe the distinct contributions of social belonging, social networks, and social capital on select health promotion behaviors (HIV medication adherence and physical activity) and quality of life of persons living with HIV.

Social belonging (friendship) or inclusion is a universal and basic human need for being accepted as a member of a group (Baumeister & Leary, 1995). Elements of social belonging include companionship, affiliation, and connectedness (Lee & Robbins, 1995). Associations between social belonging and increased heath promoting behaviors have been documented, but remain an emerging area of health research (Kaczynski & Glover, 2012). Social belonging encompasses all six of Foa and Foa's (1980) social resource categories with an emphasis on love/affection and status. The relationship between social belonging and other social resources, and their combined impact on the health promotion behaviors and quality of life of persons living with HIV, has yet to be explored. However, understanding this relationship may provide critical information on the nature of social resources in this population, leading to improved health promoting interventions.

Social support network is a multidimensional construct that emphasizes the structure and function of a person's social relationships (Smith & Christakis, 2008). The members of social support networks can help to convey a strong sense social belonging, or the lack thereof. Social support networks can be shaped by individual factors (e.g. personality, norms), interpersonal (e.g. family, neighbors, organizational membership) and sociostructural conditions (e.g. local geography, civil stability, macroeconomic conditions) (L. Berkman, 1977; L. F. Berkman, 1984; Berkman LF, 2000). Social support networks are prerequisites for the development of social capital (Cattell, 2001) and are recognized as essential for good health by the World Health Organization (Marmot, Allen, Bell, Bloomer, & Goldblatt). The effects of social support networks have figured prominently in health research, practice, and policy. Extensive research has demonstrated that social support networks decrease illness and mortality across populations (Holt-Lunstad, et al., 2010). However, the mechanisms by which social support networks lead to improved health outcomes are elusive (Kawachi & Berkman, 2001) and expanding the distinctions between social support networks, social belonging (friendship) and social capital may lead to a better understanding of these mechanisms.

Social capital is the “aggregate of potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition” (Bourdieu, 1985; Portes, 1998). While debated (Lochner, Kawachi, & Kennedy, 1999; Pitkin Derose, 2009), it can be useful to think of individual social capital comprising reciprocity, trust, participation, norms, social networks, value of life (Szreter & Woolcock, 2004). Many of the definitions of social resources are similar to those of capital – an ability to exchange object entities, capabilities for other objects, entities of value (Törnblom & Kazemi, 2012) – helping to make social capital a popular area of study in health research. However, conceptualization and operationalization of social capital vary tremendously across studies rendering aggregation of findings difficult (Pitkin Derose, 2009). In general, social capital is thought to be associated with positive health behaviors and outcomes, although rigorous prospective trials are lacking. Similar to social belonging, social capital encompasses all of Foa and Foa's (1980) social resource categories, however social capital can more easily illuminate the concrete and particular categories including services, goods, and money.

Given the overlap and inter-relatedness of these constructs, scholars have called for conceptual clarity among social resources constructs (Berkman LF, 2000; Portes, 1998; Smith & Christakis, 2008). For example, Locher et al (2005) examined the relationship between social isolation, social support, social capital and nutritional risk among 1000 older adults and found that indicators of social isolation were associated with greater nutritional risk. However, they did not examine associations between social resource variables and did not use psychometrically sound scales to measure these variables, leaving many gaps in the literature (Locher et al., 2005). To our knowledge our study is the first to examine the relationships between social belonging/friendship, social support networks, social capital, health promoting behavior, and quality of life among people living with HIV.

Objectives

We hypothesized that the nature of various constructs that contribute to conceptualizations of social resources, particularly those most commonly used in the health literature, are different and each construct adds distinct information about the impact of social resources on the health of people living with HIV. In this paper, our objectives were to examine the associations among three variables, social belonging/friendship, social support networks, and social capital. Guided by previous research (Kawachi & Berkman, 2001), we further examined the role of the demographic characteristics gender, age (stage of life) and economic position on these social resources. Finally, we described the associations between these social resource variables and two important health behaviors, HIV medication adherence and weekly physical activity, and quality of life among persons living with HIV.

Methods

This analysis was conducted as part of a larger study examining the relationships between age, gender and self-management behavior in adults living with HIV. A more full description of the inclusion criteria and data collection methods for this analysis are included in prior publications (Webel et al., 2015; Webel et al., 2014).

Sample and Recruitment

We examined the relationships between social belonging/friendship, social support networks, social capital, health promoting behavior, and quality of life among people living with HIV using a convenience cohort. Adults living with HIV were recruited from HIV clinics, HIV service organizations, and a northeast Ohio HIV research registry and organized into four groups that most approximated equal sized strata and equivalent age cut points (27 males <51yrs, 27 males ≥51yrs, 23 females <51yrs and 25 females ≥51yrs) to ensure representation of both males and females, and older and younger participants. Individuals with a documented HIV diagnosis (provided by the primary HIV clinic) who were 18 years of age or older and on antiretroviral therapy (ART) were recruited from November 2011 to June 2012 (N=102).

The study was approved by the institutional review board of University Hospitals, Case Medical Center (Cleveland, OH). Written informed consent was obtained from eligible adults living with HIV before completing study related activities. Participants completed the demographic survey, which was collected via computer-assisted delivery, to enhance self-report accuracy. Participants were compensated for their time with a $50 cash gift card.

Measures

Demographic characteristics were obtained by self-report and clinical data were abstracted from participant's medical records. Clinical data included HIV disease variables (current HIV viral load, CD4+ T cell count, current medications, 3-day self-reported HIV medication adherence, and date of HIV diagnosis) and current health conditions. Social belonging was measured with the 6-item *Hawthorne Friendship Scale* (Hawthorne, 2006). This scale was developed from the 2004 South Australian Health Omnibus Survey ($N = 3015$) and was refined through administration to 829 older adults. We used the refined scale, which measures perceived social isolation and perceived emotional loneliness in the past four weeks. Items are scored on a 0-4 scale with a total scale range of 0 to 24. Higher scores indicate greater social connectedness and lower scores indicate more social isolation. Examples of items include “It has been easy to relate to others” and “I had someone to share my feelings with”. The *Hawthorne Friendship Scale* has good psychometric properties and a Cronbach's alpha reliability coefficient of 0.72 in this study.

Social support networks were measured using the *Lubben Social Network Scale* (Lubben et al., 2006). This 6-item scale is a psychometrically sound measure of perceived social support provided by friends and family. It measures both the structure and function of social support networks. Each item is scored 0-5 with a total scale range from 0 to 30. Respondents are asked to report the number of friends or family who provide various types of support. Higher scores indicate greater social network support and lower scores indicate greater social isolation. Examples of items include “how many relatives (family members) do you see at least once a month” and “how many friends do you feel at ease with that you can talk about private matters”. The *Lubben Social Network Scale* had a Cronbach's alpha reliability coefficient of 0.84.

Social capital was measured with Bullen and Onyx's 36-item individual *Social Capital Scale*. This widely-used instrument measures eight subscales including: participation in the local community, social agency, feelings of trust and safety, neighborhood connections, friends and family connections, tolerance of diversity, value of life, and workplace connections; these items were used to create a total score. Participants were asked to rate items on a 1–4 Likert-type scale. Higher mean scores indicate more social capital. Examples of scale items include “if you were caring for a child and needed to go out for a while, would you ask a neighbor to help” and “are you on a management committee or organizing committee for any local group or organization”. Reliability and validity of the social capital scale have been reported as acceptable (Onyx & Bullen, 2000; Webel et al., 2012) and the Cronbach's alpha reliability for the Social Capital Scale in adults living with HIV is 0.88 in this study. This scale has the advantage of being developed a priori for the purpose of measuring social capital, not integrating various measures post-hoc, and integrates the various perspectives of social capital (Szreter & Woolcock, 2004).

Physical activity was measured using a pen and paper exercise diary. Hours of exercise participants completed per week was assessed using a daily exercise diary completed by each participant for seven consecutive days. The diary contained four questions about (1) whether a participant exercised at all that day, (2) if so, what times the participant started and ended exercise, (3) the perceived intensity of exercise, and (4) the type of exercise. Each question was completed at the end of the day. The cumulative duration of each exercise session was summed for a daily total and then the daily totals were summed to obtain hours of exercise per week.

Quality of life was measured with the *HIV/AIDS Targeted Quality of Life Instrument.* This widely-used, 34-item instrument is an HIV-specific quality of life measure assessing nine dimensions: Overall function, life satisfaction, health worries, financial worries, medication worries, HIV mastery, disclosure worries, provider trust, and sexual function(Sousa, 1999). Each dimension is scored and reported individually. We administered the overall functioning and life satisfaction subscales to indicate participants' quality of life. Examples of items on these scales include "in the past 4 weeks, I've been satisfied with my physical activity" (overall functioning) and "in the past 4 weeks, I've felt in control of my life" (life satisfaction). Reliability coefficients ranged from 0.83 to 0.88 for all dimensions (Holzemer W., 2000).

Statistical Analysis

All data were directly imported from the web-based data collection system, REDCAP, into a data management program (Harris et al., 2009). Subjects' demographics, HIV disease characteristics, social resources and health outcomes were summarized using descriptive statistics, e.g., means and standard deviations for continuous variables and frequencies and percentages for categorical variables. The primary measures of interests are social belonging, social support networks, social capital, and health outcomes. Distributions of these variables are not symmetric. Therefore, for studying associations among these variables we used spearman rank (nonparametric) correlations coefficients. Similarly, for finding association between a risk factor and the measures of interests we used median regression analysis. The median regression analysis is a robust regression approach. It does not assume normality of the response/dependent variable, as in the case of mean regression. A covariate with p-value <0.05 was considered statistically significantly associated with the underlying response variable.

Results

Demographic and clinical characteristics

One hundred and two eligible participants completed the study procedures. Of these, there were 27 males <51yrs, 27 males >51yrs, 23 females <51yrs and 25 females >51yrs. The mean age of all participants was 48 (± 8.7) years, most were African-American ($n = 85$; 84%), single ($n = 70$; 69%), and had a high school degree or less education ($n = 52$ 51%).

Almost all, ($n = 44$; 92%) female participants identified as heterosexual and more than half of male participants identified as gay ($n = 29$; 54%). Participants had been living with HIV for an average of 13.6 (± 7.0) years. Mean duration of HIV antiretroviral therapy was 9.0 (± 5.4) years, and most participants had an undetectable viral load ($n = 80$; 78%). Eighty percent (n = 81) had a co-occurring health condition (e.g. depression, bone disease, cardiovascular disease). On average, participants reported a mean social belonging/ friendship score of 17.0 (± 4.8), a mean social support network score of 13.9 (± 6.4), and a mean social capital score of 2.64 (± 0.53). Participants had an average 3-day HIV medication adherence rate of 92.7% (± 17.1%) and exercised on average 4.6 (± 5.4) hours per week. Overall functioning quality of life was 66.5 (± 20.6) and their life satisfaction quality of life was 74.3 (± 20.3). Additional participant characteristics are in Table 1.

Social resources, demographics, and health outcomes

To achieve our first objective, we examined the associations between our social resources variables (social belonging, social support networks, and social capital) and found that there were moderate-strong and statistically significant bivariate relationships. The strongest association was between social capital and social support networks ($\rho = 0.44$, $p < 0.01$), followed by the association between social belonging and social capital ($\rho = 0.42$, $p < 0.01$), and then the association between social belonging and social support networks ($\rho = 0.36$, $p < 0.01$). These associations can be found in Table 2. Multivariate median regression analyses only found two sociodemographic variables that influenced social resources. Having a college education significantly influenced the strength of one's social support network ($\beta =$ 6.0, 95% confidence interval = 0.78, 11.21) and increasing age ($\beta = -0.01$, 95% confidence interval = 0.0, 0.22) and having a college education ($\beta = 0.60$, 95% confidence interval = −0.30, 0.90) influenced one's perceived social capital. Full multivariate median regression analyses results are in Table 3.

To fulfill our final objective, we examined the associations between social resources and select health promotion behaviors (i.e. HIV medication adherence and weekly exercise) and quality of life. Of our three social resource variables, social belonging was the most strongly associated with health outcomes. It was significantly associated with HIV medication adherence ($\rho = 0.25$, $p = 0.02$), overall functioning quality of life ($\rho = 0.48$, $p < 0.01$) and life satisfaction quality of life ($\rho = 0.50$, $p < 0.01$). While less strong, social capital was also associated with HIV medication adherence ($\rho = 0.17$, $p = 0.10$) and life satisfaction quality of life ($\rho = 0.29$, $p < 0.01$). Social support networks were not significantly associated with health outcomes. None of the social resource variables were associated with weekly exercise. Associations are in Table 3.

Discussion

We found that in this sample of adults living with HIV the association between social belonging/friendship, social support networks, and social capital was moderate and significant but not perfectly overlapping. This was an expected finding. In examining the associations with our health outcomes, it appears that among our sample of adults living with HIV, social belonging is most strongly associated with health outcomes; followed by social capital. Social support networks were not associated with health outcomes in our study. This evidence supports Foa's (1980) contention that social belonging/friendship comes before any sort of assets can be derived from social relationships (Foa & Foa, 1980). Additionally, several explanations should be considered in light of this evidence.

Since the development of Foa and Foa's (1980) social resource theory, much work has highlighted the significance of place/location in a person's ability to access and use social resources. In the United States, a person's health status is often linked to his or her zip code (Sathyanarayanan, Brooks, Hagen, & Edington, 2012).With the exception of an over-representation of African Americans, our sample characteristics are similar to those of the national population of adults living with HIV and would be considered a marginalized group (Ayala, et al., 2012; Millett, et al.; Oster, et al., 2011). However, our sample reported high levels of HIV medication adherence, exercise and quality of life. These health outcomes were associated with social belonging/friendship and social capital. One reason for this may be that among our Midwestern population, our participants may be less transient than in other geographic areas and are able to develop a sense of identity in place. This stability may allow individuals to form egalitarian social relationships and then, over time, build stronger and perhaps more reliable friendship ties and social bonds (Umberson & Montez, 2010). This may lead them to feel as though people care more about them, instilling a desire to actively participate in the social relationships, which facilitates easier and fuller access to the benefits of those social relationships and the development of social capital (Cornwell, 2014). One implication of this explanation is that a more nuanced understanding of the individual's social resources, and their inter-relationships, in both academic/research and clinical settings is necessary (Turner & Turner, 2013). It is our contention that social belonging and social capital are distinct and measureable elements of social support that influence health outcomes among marginalized populations. Simply reducing these constructs to social support would minimize important information necessary for the development of interventions to improve health behaviors and quality of life among people living with HIV and perhaps other marginalized populations.

We also found that social support networks were not significantly associated with health behaviors. One explanation for this is that the quality of social relationships may matter more than the quantity or density of social relationships. This hypothesis has been proposed previously, but evidence supporting it has been limited (House, Landis, & Umberson, 1988). By distinguishing between the existence of social relationships (social belong/friendship), their quantity (social support networks), and the content and consequences of these relationships (social capital), our study provides additional support for this hypothesis in a sample of adults living with HIV. We further report the associations of these constructs with health behaviors and health-related quality of life, which improves our understanding of how social resources are consequential for health. An implication of this finding in the field of HIV relates to the current initiatives to link HIV-positive individuals to formal health care. Substantial resources have been invested in identifying HIV-positive adults, linking them to, and retaining them in health care services. This strategy is proposed to improve HIV outcomes and to reduce HIV infection (Nachega et al., 2014). However, although many people living with HIV have been identified and linked to care, our ability to retain people living with HIV in care and to help them take their HIV antiretroviral medications in a way that suppresses HIV viral replication has been less successful (E. M. Gardner, McLees, Steiner, del Rio, & Burman, 2011). Engagement with care is often defined in terms of numbers of appointments rather than the quality of the relationship between the patient and the rest of the health care team. However, when investigating the quality of the social relationships between patient and health care provider, improved quality of the relationships has been found to be highly predictive of HIV medication adherence (Bakken et al., 2000; Chen et al., 2013; Johnson et al., 2006). Additionally, a recent multi-site randomized clinical trial found that enhanced personal contact with a clinic staff member improved the number of primary care visits in HIV clinics (L. I. Gardner et al., 2014). Although the outcome was defined as a quantitative measure of visits and not the quality of the social relationships with the clinic staff, that study provided evidence that consistent personal contact was the efficacious intervention component. The findings from that study further supports the notion that the quality of relationships and not simply quantity has a bigger impact on patients engaging with and being retained in care. Recently, Christopoulous and colleagues (2013) conducted a qualitative study with newly diagnosed HIV-positive patients that examined barriers and facilitators of engagement in HIV care (Christopoulos et al., 2013). Their results illustrated the primacy of the quality of the relationship with health care team members for continued engagement in care, which was particularly important as the individual experienced health changes over time. Our findings, when taken in context of this evidence on the quality of the relationships between persons living with HIV and members of their health care team, suggests that the development of a social resource intervention to improve health outcomes in this population is appropriate.

Finally, our findings lead us to recommend that investigators interested in examining the role of social resources on health outcomes in people living with HIV or other marginalized populations should include measures of social belonging and social capital. The information yielded by these separate instruments was distinct and significant allowing for a more nuanced understanding of the social resources necessary for optimal health outcomes in this population. An additional advantage of the Social Capital Scale is that social support networks are a subscale of the instrument and allows investigators who are also interested in social support networks to analyze the subscale separately. Appropriate psychometric testing must be done before analyzing the subscale in lieu of a separate measure of social network support. Clinicians who routinely assess social resources of their clients in order to develop a holistic care plan, should be aware that there are distinctions between social belonging, social support networks and social capital. These unique constructs have differential associations with health behaviors and quality of life that are often the goal of the treatment plan. It will be important to maintain a conceptual clarity and verbal precision when assessing patients’ social resources.

Limitations

We have several limitations. The Lubben Social Network Scale does not measure network density or activation, is confined to the structure of social support networks comprised of friends and family, resulting in an inability to understand the type of social network and extent of its support (Cattell, 2001). While the scales we chose to measure our social resource constructs are limited, the scales we chose were designed a priori to measure the construct each purports to measure and each scale has undergone extensive psychometric evaluation in other studies. Further, these scales are commonly used in the health literature and the Lubben Social Network Scale has been included in the PhenX toolkit by the U. S. National Institutes of Health to help pragmatically facilitate common data elements and cross-sample and cross-study analyses. In the future, investigators may want to consider an approach similar to factor analysis or item response theory to further disentangle these constructs and methods of measurement. A framework like the PhenX toolkit may be the most likely way to accomplish these analyses (Hamilton, 2011). Additionally, our cross-sectional data were only collected at one site and may not be generalizable to other populations of people living with HIV. However, our single site design allowed us to consider the unique geographic attributes of the sample and their implications for assessment and use of social resources in health research. Future, multi-site studies examining social resources should analyze data both at individual sites and pooled across sites to further explore the role of social geography in relation to health outcomes. Finally, our behavioral data were collected using self-report measures (e.g. diaries, 3-day visual analog scale of medication adherence). This may have led to an overestimation of both physical activity and medication adherence in our sample.

In conclusion, we found that there are distinctions among various, widely-used social resource constructs. Social connectedness/friendship and social capital were associated with medication adherence and quality of life among our sample of PLWH. By describing these unique associations and distinctions, our study helps identify which social resources should be targeted in the development of interventions to improve the health of members of this marginalized population. Our findings reinforce the importance of understanding the nuanced ways in which complex social factors, such as social belonging/connectedness, social network support, and social capital influence health outcomes of persons from marginalized populations. The adage “it takes a village” to manage HIV as a chronic disease is evident in our study's findings and requires close attention to the social resources available to persons living with HIV.

Acknowledgements

The authors gratefully acknowledge the support of the women and men who participated in this study, our clinical colleagues including Jane Baum, Robert Bucklew, Sheila Garven, Isabel Hilliard, and Jason McMinn.

Funding: The project described was supported by the National Institute for Allergy and Infectious Disease through Grant P30AI36219 and the National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institutes of Health, through Grants 5KL2RR024990 and KL2TR000440. The contents of this article are solely the views of the authors and do not represent the official views of the National Institutes of Health.

References

Ayala G, Bingham T, Kim J, Wheeler DP, Millett GA. Modeling the Impact of Social Discrimination and Financial Hardship on the Sexual Risk of HIV Among Latino and Black Men Who Have Sex With Men. American Journal of Public Health. 2012; 102(S2):S242–S249. [PubMed: 22401516]

Bakken S, Holzemer WL, Brown M-A, Powell-Cope GM, Turner JG, Inouye J, et al. Relationships between perception of engagement with health care provider and demographic characteristics, health status, and adherence to therapeutic regimen in persons with HIV/AIDS. AIDS patient care and STDs. 2000; 14(4):189–197. [PubMed: 10806637]

Baumeister RF, Leary MR. The need to belong: desire for interpersonal attachments as a fundamental human motivation. Psychological bulletin. 1995; 117(3):497. [PubMed: 7777651]

Berkman, L. Social networks and health. University of Berkeley; Berkeley: 1977.

Berkman LF. Assessing the Physical Health Effects of Social Networks and Social Support. Annual Review of Public Health. 1984; 5(1):413–432.

Berkman LF, GT. Social integration, social networks, social support, and health. Berkman & Kawachi; 2000. p. 137-173.

Bourdieu, P. The forms of capital.. In: Richardson, J., editor. Handbook of Theory and Research for the Sociology of Education. Greenwood; New York: 1985. p. 241-258.

Cattell V. Poor people, poor places, and poor health: the mediating role of social networks and social capital. Social Science & Medicine. 2001; 52(10):1501–1516. [PubMed: 11314847]

Chen W-T, Wantland D, Reid P, Corless IB, Eller LS, Iipinge S, et al. Engagement with Health Care Providers Affects Self-Efficacy, Self-Esteem, Medication Adherence and Quality of Life in People Living with HIV. Journal of AIDS & clinical research. 2013; 4(11):256. [PubMed: 24575329]

Christopoulos KA, Massey AD, Lopez AM, Geng EH, Johnson MO, Pilcher CD, et al. “Taking a Half Day at a Time:” Patient Perspectives and the HIV Engagement in Care Continuum. AIDS patient care and STDs. 2013; 27(4):223–230. [PubMed: 23565926]

Cohen S, Gottlieb BH, Underwood LG. Social relationships and health. Social support measurement and intervention: A guide for health and social scientists. 2000:1–25.

Cornwell B. Social Disadvantage and Network Turnover. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences. 2014

Foa, EB.; Foa, UG. Resource theory Social exchange. Springer; 1980. p. 77-94.

Gardner EM, McLees MP, Steiner JF, del Rio C, Burman WJ. The Spectrum of Engagement in HIV Care and its Relevance to Test-and-Treat Strategies for Prevention of HIV Infection. Clinical Infectious Diseases. 2011; 52(6):793–800. [PubMed: 21367734]

Gardner LI, Giordano TP, Marks G, Wilson TE, Craw JA, Drainoni M-L, et al. Enhanced Personal Contact With HIV Patients Improves Retention in Primary Care: A Randomized Trial in 6 US HIV Clinics. Clinical Infectious Diseases. 2014

Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform. 2009; 42(2):377–381. [PubMed: 18929686]

Hawthorne G. Measuring soical isolation in older adults: development and inital validation of the friendship scale. Soical Indicators Research. 2006; 77:521–548.

Holt-Lunstad J, Smith TB, Layton JB. Social relationships and mortality risk: a meta-analytic review. PLoS Med. 2010; 7(7):e1000316. [PubMed: 20668659]

Holzemer W, S. H. Portillo C, Miramontes H. The client adherence profiling-intervention tailoring (CAP-IT) intervention for enhancing adherences to HIV/AIDS medications: A pilot study. Journal of the Association of Nurses in AIDS care. 2000; 11(1):36–44. [PubMed: 10670005]

House JS, Landis KR, Umberson D. Social relationships and health. Science. 1988; 241(4865):540–545. [PubMed: 3399889]

Johnson MO, Chesney MA, Goldstein RB, Remien RH, Catz S, Gore-Felton C, et al. Positive provider interactions, adherence self-efficacy, and adherence to antiretroviral medications among HIV-infected adults: A mediation model. AIDS Patient Care & STDs. 2006; 20(4):258–268. [PubMed: 16623624]

Kaczynski AT, Glover TD. Talking the talk, walking the walk: examining the effect of neighbourhood walkability and social connectedness on physical activity. Journal of Public Health. 2012; 34(3): 382–389. [PubMed: 22378942]

Kawachi I, Berkman L. Social ties and mental health. Journal of Urban Health. 2001; 78(3):458–467. [PubMed: 11564849]

Lee RM, Robbins SB. Measuring belongingness: The Social Connectedness and the Social Assurance scales. Journal of Counseling Psychology. 1995; 42(2):232–241.

Locher JL, Ritchie CS, Roth DL, Baker PS, Bodner EV, Allman RM. Social isolation, support, and capital and nutritional risk in an older sample: ethnic and gender differences. Social Science & Medicine. 2005; 60(4):747–761. [PubMed: 15571893]

Lochner K, Kawachi I, Kennedy B. Social capital: a guide to its measurement. Health & Place. 1999; 5:259–270. [PubMed: 10984580]

Lubben J, Blozik E, Gillmann G, Iliffe S, von Renteln Kruse W, Beck JC, et al. Performance of an abbreviated version of the Lubben Social Network Scale among three European community-dwelling older adult populations. Gerontologist. 2006; 46(4):503–513. [PubMed: 16921004]

Marmot M, Allen J, Bell R, Bloomer E, Goldblatt P. WHO European review of social determinants of health and the health divide. The Lancet. 2012; 380(9846):1011–1029.

Millett GA, Peterson JL, Flores SA, Hart TA, Jeffries WL 4th, Wilson PA, et al. Comparisons of disparities and risks of HIV infection in black and other men who have sex with men in Canada, UK, and USA: a meta-analysis. The Lancet. 380(9839):341–348.

Murayama H, Fujiwara Y, Kawachi I. Social capital and health: a review of prospective multilevel studies. Journal of Epidemiology. 2012; 22(3):179. [PubMed: 22447212]

Nachega JB, Uthman OA, del Rio C, Mugavero MJ, Rees H, Mills EJ. Addressing the Achilles' Heel in the HIV Care Continuum for the Success of a Test-and-Treat Strategy to Achieve an AIDS-Free Generation. Clinical Infectious Diseases. 2014; 59(suppl 1):S21–S27. [PubMed: 24926028]

Oster AM, Wiegand RE, Sionean C, Miles IJ, Thomas PE, Melendez-Morales L, et al. Understanding disparities in HIV infection between black and white MSM in the United States. AIDS. 2011; 25(8):1103–1112. 1110.1097/QAD.1100b1013e3283471efa. [PubMed: 21505305]

Pitkin Derose K, Varda M. Social Capital and Health Care Access. Medical Care Research and Review. 2009; 66(3):272–306. [PubMed: 19174538]

Portes A. Social Capital: Its Origins and Applications in Modern Sociology. Annual Review of Sociology. 1998; 24:1–24. ArticleType: research-article / Full publication date: 1998 / Copyright © 1998 Annual Reviews.

Sathyanarayanan S, Brooks AJ, Hagen SE, Edington DW. Multilevel Analysis of the Physical Health Perception of Employees: Community and Individual Factors. American Journal of Health Promotion. 2012; 26(5):e126–e136. [PubMed: 22548431]

Smith KP, Christakis NA. Social Networks and Health. Annual Review of Sociology. 2008; 34(1):405–429.

Sousa K, Holzemer W, Bakken Henry S, R. Slaughter R. Dimensions of health-related quality of life in persons living with HIV disease. Journal of Advanced Nursing. 1999; 29(1):178–187. [PubMed: 10064297]

Szreter S, Woolcock M. Health by association? Social capital, social theory, and the political economy of public health. International Journal of Epidemiology. 2004; 33(4):650–667. [PubMed: 15282219]

Törnblom, K.; Kazemi, A. Handbook of social resource theory. Springer; 2012.

Turner, JB.; Turner, RJ. Social relations, social integration, and social support Handbook of the sociology of mental health. Springer; 2013. p. 341-356.

Umberson D, Montez JK. Social Relationships and Health: A Flashpoint for Health Policy. Journal of Health and Social Behavior. 2010; 51(1 suppl):S54–S66. [PubMed: 20943583]

UNAIDS. The Gap Report: Beginning of the end of the AIDS epidemic. 2014. Retrieved from http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2014/UNAIDS_Gap_report_en.pdf

Webel AR, Barkley J, Longenecker CT, Mittelsteadt A, Gripshover B, Salata RA. A Cross-Sectional Description of Age and Gender Differences in Exercise Patterns in Adults Living With HIV. J Assoc Nurses AIDS Care. 2015; 26(2):176–186. [PubMed: 25249267]

Webel AR, Longenecker CT, Gripshover B, Hanson JE, Schmotzer BJ, Salata RA. Age, stress, and isolation in older adults living with HIV. AIDS Care. 2014; 26(5):523–531. [PubMed: 24116852]

Table 1

Characteristics of the Participants

	Male (n=54)	**Female (n=48)**	**Total (n=102)**
Age (years)	47 (8.6)	48 (9.0)	48 (8.7)
Race			
African American/Black	42 (81%)	43 (88%)	85 (84%)
Hispanic/Latina	0 (0%)	2 (4%)	2 (2%)
Native American/Indian	1 (2%)	0 (0%)	1 (1%)
White/Anglo (non-Hispanic)	7 (13%)	3 (6%)	10 (10%)
Other	2 (4%)	1(2%)	3 (3%)
Marital Status			
Married or Domestic Partnership	7 (13%)	7 (15%)	14 (14%)
Single	41 (79%)	29 (59%)	70 (69%)
Separated or Divorced	4 (7%)	11 (23%)	15 (15%)
Education Level			
High School, General Equivalency Degree or less	24 (44%)	28 (58%)	52 (51%)
Some College, Associates Degree, College Degree	29 (54%)	20 (42%)	49 (48%)
Income			
Less than $400	17 (32%)	13 (27%)	30 (29%)
$401-$999	27 (50%)	27 (56%)	54 (53%)
$1,000 or more	9 (17%)	8 (16%)	17 (17%)
Have Health Insurance (yes)	47 (87%)	48 (100%)	95 (93%)
Have Children (yes)	15 (29%)	41 (84%)	56 (56%)
Paid Employment	6 (12%)	8 (16%)	14 (14%)
Permanent Housing	46 (88%)	45 (92%)	91 (91%)
Sexual Orientation			
Gay	29 (54%)	0	29 (28%)
Bisexual	8 (15%)	2 (4%)	10 (10%)
Heterosexual	11 (20%)	44 (92%)	55 (54%)
Other	1 (2%)	2 (4%)	3 (3%)
HIV Clinical Characteristics			
Years Living with HIV	14.1 (6.4)	13.21 (7)	13.57 (7)
Years since initiation of antiretroviral treatment	9.4 (4.9)	8.0 (5.6)	8.8 (5.4)
Recent CD4+ T-cell count (cells/μL)	534 (322)	679 (385)	602 (358)
Undetectable HIV Viral Load	40 (77%)	40 (83%)	80 (78%)
One or more non-AIDS co-morbidities	45 (83%)	36 (75%)	81 (80%)
Social Resources			
Social Belonging	16.6 (5.3)	17.3 (4.5)	17.0 (4.8)
Social Support Network	13.5 (6.3)	14.3 (6.5)	13.9 (6.4)
Social Capital	2.63 (0.6)	2.62 (0.5)	2.63 (0.53)

	Male (n=54)	**Female (n=48)**	**Total (n=102)**
Health Outcomes			
Three-day HIV Antiretroviral Medication Adherence (%)	93.4 (13.7)	92.9 (18.8)	92.7 (17.1)
Hours per week of exercise	5.1 (5.7)	4.1 (5.2)	4.6 (5.4)
Quality of Life- Overall Functioning	67.9 (21.4)	65.0 (19.3)	66.5 (20.6)
Quality of Life- Life Satisfaction	72.2 (20.8)	76.6 (19.8)	74.3 (20.3)

Data presented as mean (standard deviation) or frequency (%).

Table 2

Associations among social belonging, social support networks, social capital and health outcomes in people living with HIV

	Social Belonging	Social Support Networks	Social Capital	HIV Medication Adherence	Weekly Exercise	Overall Functioning Quality of Life
Social Belonging	1.0					
Social Support Networks	0.36 (p<0.001)					
Social Capital	0.42 (p<0.001)	0.44 (p<0.001)	1.0			
HIV Medication Adherence	0.25 (p=0.02)	0.08 (p=0.46)	0.17 (p=0.10)			
Weekly Exercise	0.10 (p=0.36)	0.01 (p=0.90)	0.10 (p=0.38)	0.03 (p=0.79)		
Overall Functioning Quality of Life	0.48 (p<0.001)	0.13 (p=0.19)	0.15 (p=0.15)	0.34 (p<0.001)	0.11 (p=0.34)	
Life Satisfaction quality of Life	0.50 (p<0.001)	0.12 (p=0.26)	0.29 (p=0.005)	0.24 (p=0.02)	0.21 (p=0.05)	0.44 (P<0.001)

Spearman's rho statistic and corresponding p-value

Table 3

Covariate adjusted median regression analyses examining the influence of sociodemographic variables on social resources

	B Coefficient	Standard Error	95% Confidence Interval	
Social Belonging				
Age	0.08	0.10	-0.12	0.28
High school education or less	1.12	1.96	-2.78	5.01
College education	3.48	2.55	-1.59	8.54
Being Married	-1.96	1.60	-5.14	1.22
Being Employed	-0.36	2.64	-5.61	4.89
Constant	14.28	4.92	4.50	24.05
Social Support Network				
Age	3.86^{-17}	0.11	-0.21	0.21
Female	2.0	1.91	-1.80	5.79
High school education or less	1.0	2.11	-3.19	5.19
College education	6.0	2.28	0.78	11.21*
Constant	12.0	2.27	1.48	22.51
Social Capital				
Age	0.01	1.79	-0.00	0.22**
High school education or less	0.08	0.64	-0.16	0.31
College education	0.60	4.01	0.30	0.90*
Constant	2.01	6.85	1.42	2.59

Note:

* $p=0.05$

** $p<0.01$