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Examining the relationship of social support and family cohesion on ART adherence among HIV-positive adolescents in southern Uganda: baseline findings

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Abstract

Several studies in sub-Saharan Africa have linked social support to better ART (antiretroviral therapy) adherence among adults living with HIV. Less is known about the role of social support and family cohesion in ART adherence among children below 18 years. This paper focuses on HIV-infected adolescents as they transition through the vulnerable developmental stage of adolescence to examine the association between family cohesion and social support, and ART adherence in southern Uganda. We utilized baseline data from *Suubi+Adherence* study, a five-year randomized longitudinal clinical trial with the overall goal of examining the impact and cost associated with an innovative asset-based social intervention to increase adherence to HIV treatment for HIV-infected adolescents in Uganda. This study employed self-reports to measure social support, family cohesion and ART adherence to treatment from 702 participants in 39 clinics situated in southern Uganda. Regression results indicated that after adjusting for sociodemographic characteristics that family cohesion and social support from caregivers/family were associated with self-reported adherence to ART among HIV-infected adolescents. Social support from classmates, teachers, and friends were not associated with ART adherence. Study results suggest that strengthening family relationships and promoting social support within families caring for adolescents living with HIV can be crucial in addressing ART adherence challenges among adolescents in sub-Saharan Africa.

Keywords

Social support; family cohesion; ART adherence; adolescents; Uganda

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Introduction

By the end of 2016, approximately 36.7 million people were living with HIV (PLWHIV) worldwide, 70% of whom lived in sub-Saharan Africa (WHO, 2016). An estimated 1.8 million children were living with HIV globally (UNAIDS, 2017). By mid-2017, 20.9 million people had access to antiretroviral therapy (UNAIDS, 2017). Despite this increase in access to ART, the United Nations' '90–90-90' goals aimed at having 90% of the people with HIV diagnosed, 90% on treatment and 90% with a viral load suppression by the year 2020 are still unmet (UNAIDS, 2014). Moreover, non-adherence to antiretroviral therapy (ART) continues to be the leading cause of treatment failure among PLWHIV (Heestermans, Browne, Aitken, Vervoort, & Klipstein-Grobusch, 2016). Several determinants of non-adherence to ART have been identified at the individual level, including poverty, lack of food, inadequate psychological support, pill burden, side-effects of drugs, forgetfulness, as well as at the institutional level, such as health-care costs, lack of information about treatment, inadequate counselling, long distance to treatment, lack of patient follow-up, overburdened facilities (Iuga & McGuire, 2014; Kagee et al., 2011; Nachega et al., 2010; Sanjobo, Frich, & Atle, 2008). Moreover, cultural-level factors, including stigma, discrimination, also tend to negatively impact adherence levels (Sanjobo et al., 2008).

There are differences in ART initiation, with men and children showing lower rates of ART initiation compared to women (Johnson, 2012). Studies also indicate that youths aged 18 to 27 living with HIV are at a high risk for depression, anxiety, and decreased adherence to ART (Lypen, Lockwood, Shalabi, Harper, & Ngugi, 2015). This is often a result of the stigma associated with taking ARV medications (Rintamaki, Davis, Skripkauskas, Bennett, & Wolf, 2006). In addition, during the transition from adolescence to young adulthood, youth experience developmental changes such as an increase in autonomy and independence, which often results into deliberate nonadherence (MacDonell, Naar-King, Huszti, & Belzer, 2013). Moreover, adolescence is a period when non-adherence is typical for children with a range of chronic health conditions (e.g. asthma, diabetes), and HIV is no exception (Mellins et al., 2011). Therefore, providing social support to adolescents as they transition through this period may be important to improve medication adherence and their overall health wellbeing.

Several studies have identified social support as a contributing factor to ART adherence (Knodel, Kespichayawattana, Saengtienchai, & Wiwatwanich, 2010; Li et al., 2011; Rotheram-Borus et al., 2010). Social support is defined as a provider-recipient relationship that involves an exchange of resources resulting in an enhanced well-being of the recipient (Shumaker & Brownell, 1984). A systematic review of the literature on adherence and social support found different types of social support, including practical/instrumental support, and emotional support as important to adherence (Scheurer, Choudhry, Swanton, Matlin, & Shrank, 2012), whereas practical/instrumental support comprises activities such as picking up medications, paying for prescriptions or physical assistance, emotional support includes encouragement, listening, nourishment and informational support (Scheurer et al., 2012). Overall, PLWHIV who have people to remind them to take their medication or to go for refills exhibited higher adherence to ART (Kelly, Hartman, Graham, Kallen, & Giordano, 2014).

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Likewise, family cohesion relates to the emotional bond family members have towards each other (Olson, Russell, & Sprenkle, 1983). In this regard, family cohesion enhances family support and ultimately strengthens the family ability to deal with external stressors. It also determines the family's emotional and behavioral response to an HIV positive person (Rotheram-Borus, Flannery, Rice, & Lester, 2005). In sub-Saharan African context, families rely on a close network of kinship members for loyalty, exchange and support among members (Iwelunmor, Airhihenbuwa, Okoror, Brown, & BeLue, 2008) It is highly probable that cohesive families will know the HIV status of children in the family and hence more likely to support children while taking their ART medications. Most importantly, family cohesion has been associated with HIV disclosure (Simoni, Demas, Mason, Drossman, & Davis, 2000), coping with HIV (Iwelunmor et al., 2008) and medication adherence (DiMatteo, 2004). This stems from the trust and connectedness that family members build and have towards one another. On the other hand, Karim et al. (2008) found that a lack of family cohesion and support negatively affect HIV-positive women. Particularly, lack of family cohesion and support was associated with limited access to care, counseling and testing and lack of disclosure (Karim et al., 2008; Sanjobo et al., 2008). Thus, we sought to examine how family cohesion buffers ART adherence among adolescents

Although these studies have documented positive ART outcomes among adults (Bhat et al., 2010; Demisse, Mekonnen, Amogne, & Shibeshi, 2014; Kunihira, Nuwaha, Mayanja, & Peterson, 2010), limited research has been conducted on social support factor associated with ART adherence among children below 18 years of age, especially in sub-Saharan Africa. Hence, this paper is focused on HIV-infected children transitioning through adolescence. Specifically, we examined the association between family cohesion, defined as shared affection, support, helpfulness, and caring among family members (Moos, 1974), social support, and ART adherence among HIV infected adolescents in southern Uganda.

Methods

Study sample and data

We utilized *Suubi+Adherence* study data, a 5-year (2012–2017) randomized longitudinal clinical trial (Grant # R01HD074949) funded by NICHD. The Suubi+Adherence study examined the impact and cost associated with an innovative asset-based intervention to increase adherence to HIV treatment among adolescents in Greater Masaka, the region most affected by HIV/AIDS in Uganda with higher prevalence rates of 7.9%, compared to the national average of 6.9% (Government of Uganda, 2016).

The inclusion criteria for the study were: (1) HIV-positive status – defined as a child tested with confirmation by medical report and has been disclosed to; (2) prescribed ART and receiving care from one of the study's participating clinics in Southern Uganda; (3) living within a family (defined broadly – not necessarily with biological parents); and (4) Ages 10 to 16. A total of 702 adolescents were enrolled in the study from 39 clinics. Caregivers provided written consent for their children to participate. Adolescents also provided voluntary written assent to participate in the study. This paper utilized baseline data collected by Ugandan Research Assistants (RAs) trained in Good Clinical Practices and

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CITI certificate. A detailed explanation of the *Suubi+Adherence* study is provided elsewhere (Bermudez et al., 2016).

The study obtained IRB approval from Columbia University (Protocol AAAK3852), the Makerere University School of Public Health (Protocol 210) and the Uganda National Council for Science and Technology (Protocol SS 2969).

Measures

Adherence to medication was measured using participants' self-report. Specifically, participants were asked the following question: 'In the last 30 days, on how many days did you miss at least one dose of any of your HIV medicines?' In addition, percentage ART adherence was calculated as a difference between the expected 30 days of ART prescription minus the reported days missed taking medication by the expected 30 days of ART prescription (range 0–100%). Meaning, a participant with more missed doses was non-adherent to their ART medication.

Social support was measured via two indicators: family cohesion and social support from multiple sources, including caregivers/parents, friends, teachers and classmates. Family cohesion was assessed using eight items (theoretical range: 8–40, alpha = 0.79) that measure the degree of commitment, help and support family members provide for one another. The items were adapted from both the Family Environment Scale (R. H. Moos & Moos, 1994) and the Family Assessment Measure (Skinner, Steinhauer, & Santa-Barbara, 1983). Participants were asked to rate how often each item occur in their family, on a 5-point scale (with 1 = 'never' and 5 = 'always'). Sample items include 'Do your family members ask each other for help before asking nonfamily members for help?', and 'Do you listen to what other family members have to say, even when you disagree?' Summary scores were created, with a higher score indicating higher levels of family cohesion.

Social support from multiple sources was measured using items adapted from the Friendship Qualities Scale (Bukowski, Hoza, & Boivin, 1994). The 24-item scale (theoretical range: 24–120, alpha = 0.82) assesses the impressions of the quality of children's friendships and relationships with their caregivers, classmates, closest friends and teachers on a 5-point scale (with 1 = 'never' and 5 = 'always'). Summary scores were created for each source, with high scores indicating higher levels of social support.

In addition, we adjusted for several socio-demographic characteristics including age, gender, household size (number of people and children in the household), type of the primary caregiver and family assets.

Data analysis

Data were analyzed using Stata software SE. 12.1. We conducted a bivariate analysis of socio-demographic characteristics across gender. In this regard, we estimated the chisquare or *t*-test values for each of the study characteristics. We also conducted hierarchical regression model to examine the relationship between family cohesion, social support from caregivers, teachers, friends and classmates, and ART adherence among HIV-infected adolescents. Specifically, model 1 controlled for socio-demographics and household

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characteristics. Model 2 controlled for family cohesion, and model 3 controlled for social support.

Results

Results of study socio-demographic characteristics are presented below in Table A1. The average age of participants is 12.4 years. Fifty-seven percent of participants are females. The average household is 5.7 people, with 2.4 children ($t = -1.98$; p .05) living in the household. Across gender groups, more participants identified a biological parent as their primary caregiver, followed by grandparent and other relatives. In terms of ownership of assets, the average family assets score is 10.80 assets in a family out of the possible assets, indicating a moderate level of asset ownership.

Regression analysis results in Table A2 are presented. Controlling for other sociodemographic factors in model 1, results show being a female child was associated with better ART adherence to medication (*b = 0.74; 95%CI: 0.12, 1.35*). In addition, the availability of family assets (*b = 0.12; 95%CI: 0.03, 0.21*) was associated with better ART adherence to medication among HIV-infected adolescents in southern Uganda. Specifically, a participant with an additional asset has better ART adherence to HIV medication.

In model 2, when we control for socio-demographic characteristics, family cohesion (*b = 0.08; 95%CI: 0.03, 0.12*) and availability of family assets (*b = 0.10; 95%CI: 0.01, 0.19*), were associated with better ART adherence. Specifically, a participant with an additional: score on family cohesion and asset has better ART adherence to HIV medication

In model 3, when we add family cohesion and social support subscales, results indicate that controlling for socio-demographic characteristics, social support from the parent/caregiver (*b = 0.11; 95%CI: 0.03, 0.19*) and family cohesion (*b = 0.08; 95%CI; 0.03, 0.13*) were associated with better ART adherence to HIV medication. However, no other source of social support was associated with ART adherence. Similarly, availability of family assets (*b = 0.11; 95%CI: 0.01, 0.21*) and living with grandparent (*b = 0.99 95%CI: 0.06, 1.93*) were associated with better ART adherence to HIV medication. Specifically, a participant with an additional: score on social support related to parent/caregiver, score on family cohesion and the asset has better ART adherence to HIV medication.

Discussion

This paper examined the relationship between social support (from multiple sources) and family cohesion on ART adherence among HIV positive adolescents in southern Uganda. Our findings indicate that social support is associated with an increase in adherence to HIV medication. Furthermore, parent/caregiver support, as well as family cohesion characterized by togetherness, information sharing and emotional support, was associated with an improvement in adherence to ART.

One possible explanation for these findings could be that having supportive family members and family cohesion might have reduced the pressure associated with HIV stigma, including taking HIV medication, especially if family members know the HIV status of the child.

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Moreover, the majority of children in this study were perinatally infected, which means that family members are more likely to be aware of the child's HIV status. In such circumstances, evidence shows that families demonstrate remarkable capacities to adjust to the burden of HIV by readily providing support, psychological and emotional support to individuals living with HIV, if they know the truth about their status (Iwelunmor et al., 2008). Importantly, supportive family members may act as medication partners to HIV positive adolescents including facilitating clinic visits, reminding youth to take their medication as well as providing emotional support (MacDonell et al., 2013; Scheurer et al., 2012).

Our findings are consistent with previous studies that examined adherence and family relationship factors among adults living with HIV. For example, Rotheram-Borus et al. (2010) reported that family functioning was positively associated with ART adherence, improved mental health functioning as well as improved physical health. Additionally, assistance from treatment partners, family members and others help to prioritize adherence to ART (Ware et al., 2009).

Further, findings from our study indicate that support from other sources, e.g., teachers, friends and classmates was not significantly associated with adherence to medication. One possible explanation could be that adolescents living with HIV are less likely to disclose their HIV status to other individuals outside of their homes, for fear of being stigmatized (Nachega et al., 2012). Moreover, in this study, 42% of the adolescents reported that none of their friends knew of their HIV status and 49% generally never talk to other people about their HIV status (Ssewamala, Meyer, & Ddamulira, 2016). Therefore, it is not surprising that social support from others was not associated with adherence.

Previous studies have linked family cohesion, social support, and availability of family resources and assets to medication adherence (Knodel et al., 2010). Bermudez et al. (2016) have documented that having an additional asset at home increase the chances of adolescents adhering to their medication. Behavioral economists argue that access and ownership of family assets, as well as family support, is associated with an increased sense of social and economic security and a more positive outlook for life (Sherraden, 1990). Our results suggest that HIV-infected adolescents with family togetherness, social support and having financial assets might feel an increased sense of social and economic security, and relatedly a more positive future orientation, which might encourage them to adhere to their medication regimen.

Limitations

First, our study used a quantitative measure of social support and family togetherness. However, mixed study design, augmenting quantitative work with qualitative work may be desirable to allow the team to ascertain how adolescents understand social support and family togetherness and how it influences medication to ART treatment. In addition, the study employed only baseline data. Further follow-up data analysis is needed to understand how social support and family togetherness models influence changes to adherence to ART treatment.

Second, our study employed self-report to measure ART adherence, which is subject to social desirability. However, studies have found that self-reported adherence has been useful, and essentially associated with viral load, which is adequately dependable to make inferences on ARV uptake (Bermudez et al., 2016; Kabore et al., 2015; Usitalo et al., 2014).

Conclusion

The study findings indicate that there is a positive relationship between caregiver/parent support, family cohesion, asset ownership and ART adherence among HIV-infected adolescents. Social support from classmates, teachers and friends was not associated with ART adherence. Strengthening family relationships and promoting social support within families caring for adolescents living with HIV is crucial in addressing ART adherence challenges among adolescents in sub-Saharan Africa.

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Appendix

Table A1.

Sample characteristics: *n* (%).

Variable	Total sample (*N* = 702)	Male (*n* = 306)	Female (*n* = 396)	X^2 or *t*-test
Age (Mean, SD)	12.42(1.98)	12.28(1.90)	12.53(2.03)	−1.64
Household composition				
Number of people in the household (Mean, SD)	5.74(2.56)	5.72(2.58)	5.77(2.54)	−0.25
Number of children in the household (Mean, SD)	2.35(1.92)	2.18(1.81)	2.47(1.99)	−1.98 *
Primary caregiver				
Grandparent	206(29.39)	89(29.08)	117(29.62)	0.13
Parent	330(47.08)	143(46.73)	187(47.34)	
Other relatives	165(23.54)	74(24.18)	91(23.04)	
Family assets (Mean, SD)	10.79(3.54)	10.79(3.55)	10.78(3.54)	0.04

* *p* .05

** *p* .01

*** *p* .001.

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Table A2.

Regression on socio-demographic characteristics, family cohesion, social support and adherence.

Variable	Model 1: B (95% CI.)	Model 2: B (95% CI.)	Model 3: B (95% CI.)
Age	−0.12(−0.27, 0.04)	−0.12(−0.28, 0.03)	−0.16(−0.34, 0.01)
Gender: Female	0.74(0.12, 1.35)*	0.56(−0.06, 1.18)	0.41(−0.27, 1.09)
Household composition	−0.04(−0.25, 0.16)	−0.04(−0.24, 0.17)	−0.06(−0.29, 0.17)
Number of children in the household	0.03(−0.24, 0.30)	0.05(−0.22, 0.32)	0.17(−0.13, 0.46)
Primary caregiver: Other relatives			
Grandparent	0.69(−0.15, 1.54)	0.61(−0.23, 1.45)	0.99(0.06, 1.93)*
Parent	0.72(—0.06, 1.49)	0.58(−0.20, 1.35)	0.79(−0.07, 1.65)
Family assets	0.12(0.03, 0.21)**	0.10(0.01, 0.19)*	0.11(0.01, 0.21)*
Family cohesion		0.08(0.03, 0.12)***	0.08(0.03, 0.13)**
Social support:			
Related to parents/caregivers			0.11(0.03, 0.19)**
Related to friends			−0.005(−0.08, 0.07)
Related to classmates			−0.09(−0.20, 0.01)
Related to teachers			0.03(−0.06, 0.13)
The F-value	3.00**	4.03***	3.92***
Adjusted R-squared (df)	0.02(7)	0.03(8)	0.05(12)
N	701	701	612

* *p* .05

** *p* .01

*** *p* .001.

References

Karim QA, Meyer-Weitz A, Mboyi L, Carrara H, Mahlase G, Frohlich JA, & Abdool Karim SS (2008). The influence of AIDS stigma and discrimination and social cohesion on HIV testing and willingness to disclose HIV in Rural KwaZulu-Natal, South Africa. Global Public Health, 3(4), 351–365. doi: 10.1080/17441690802076496

Bermudez LG, Jennings L, Ssewamala FM, Nabunya P, Mellins C, & McKay M (2016). Equity in adherence to antiretroviral therapy among economically vulnerable adolescents living with HIV in Uganda. AIDS Care - Psychological and Socio-Medical Aspects of AIDS/ HIV, 28(sup2), 83–91.

Bhat VG, Ramburuth M, Singh M, Titi O, Antony AP, Chiya L, … Msengana M (2010). Factors associated with poor adherence to anti-retroviral therapy in patients attending a rural health centre in South Africa. European Journal of Clinical Microbiology and Infectious Diseases, 29, 947–953. Retrieved from http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=eference&D=emed9&NEWS=N&AN=2010431880 [PubMed: 20467769]

Bukowski WM, Hoza B, & Boivin M (1994). Measuring friendship quality during pre- and early adolescence: The development and psychometric properties of the friendship qualities scale. Journal of Social and Personal Relationships, 11(3), 471–484.

Demisse R, Mekonnen A, Amogne W, & Shibeshi W (2014). Knowledge and adherence to antiretroviral therapy among adult people living with HIV/AIDS at Tikur Anbessa Specialized Hospital, Ethiopia. International Journal of Basic & Clinical Pharmacology, 3(2), 1.

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DiMatteo MR (2004). Social support and patient adherence to medical treatment: A meta-analysis. Health Psychology, 23(2), 207–218. [PubMed: 15008666]

Government of Uganda. (2016). Uganda population-based HIV impact assessment. Retrieved from http://www.afro.who.int/sites/default/files/2017-08/UPHIAUgandafactsheet.pdf

Heestermans T, Browne JL, Aitken SC, Vervoort SC, & Klipstein-Grobusch K (2016). Determinants of adherence to antiretroviral therapy among HIV-positive adults in Sub-Saharan Africa: A systematic review. BMJ Global Health, 1(4), e000125.

Iuga AO, & McGuire MJ (2014). Adherence and health care costs. Risk Management and Healthcare Policy, 7, 35–44. [PubMed: 24591853]

Iwelunmor J, Airhihenbuwa CO, Okoror TA, Brown DC, & BeLue R (2008). Family systems and HIV/AIDS in South Africa. International Quarterly of Community Health Education, 27(4), 321–335.

Johnson LF (2012). Access to antiretroviral treatment in South Africa, 2004–2011. Southern African Journal of HIV Medicine, 13(1), 22–27. Retrieved from https://www.ajol.info/index.php/sajhivm/article/view/77233

Kabore L, Muntner P, Chamot E, Zinski A, Burkholder G, & Mugavero MJ (2015). Selfreport measures in the assessment of antiretroviral medication adherence: Comparison with medication possession ratio and HIV viral load. Journal of the International Association of Providers of AIDS Care, 14(2), 156–162. [PubMed: 25421930]

Kagee A, Remien RH, Berkman A, Hoffman S, Campos L, & Swartz L (2011). Structural barriers to ART adherence in Southern Africa: Challenges and potential ways forward. Global Public Health, 6(1), 83–97. doi: 10.1080/17441691003796387 [PubMed: 20509066]

Kelly JD, Hartman C, Graham J, Kallen MA, & Giordano TP (2014). Social support as a predictor of early diagnosis, linkage, retention, and adherence to HIV care: Results from the steps study. Journal of the Association of Nurses in AIDS Care, 25(5), 405–413. [PubMed: 24508174]

Knodel J, Kespichayawattana J, Saengtienchai C, & Wiwatwanich S (2010). Adherence : Evidence from Thailand. NIH Public Access, 32(1), 1–18.

Kunihira NRR, Nuwaha F, Mayanja R, & Peterson S (2010). Barriers to use of antiretroviral drugs in Rakai district of Uganda. African Health Sciences, 10(1), 120–129. Retrieved from https://www.ajol.info/index.php/ahs/article/view/60054 [PubMed: 21326962]

Li L, Ji G, Liang LJ, Ding Y, Tian J, & Xiao Y (2011). A multilevel intervention for HIV-affected families in China: Together for empowerment activities (TEA). Social Science and Medicine, 73(8), 1214–1221. [PubMed: 21852030]

Lypen KD, Lockwood NM, Shalabi F, Harper GW, & Ngugi E (2015). ‘when we are together i feel at home.’ Types and sources of social support among youth newly diagnosed with HIV in Kenya: Implications for intervention. African Journal of AIDS Research, 14(3), 275–284. [PubMed: 26439602]

MacDonell K, Naar-King S, Huszti H, & Belzer M (2013). Barriers to medication adherence in behaviorally and perinatally infected youth living with HIV. AIDS and Behavior, 17(1), 86–93. [PubMed: 23142855]

Mellins CA, Tassiopoulos K, Malee K, Moscicki A-B, Patton D, Smith R, … Seage GR III, for the Pediatric HIV-AI. (2011). Behavioral health risks in perinatally HIV-exposed youth: Co-occurrence of sexual and drug use behavior, mental health problems, and nonadherence to antiretroviral treatment. AIDS Patient Care and STDs, 25(7), 413–422. [PubMed: 21992620]

Moos R (1974). The social climate scales: An overview (pp. 1). Palo Alto, CA: Consulting Psychologists Press.

Moos RH, & Moos BS (1994). Family environment scale manual. Palo Alto, CA: Consulting Psychologists Press.

Nachega JB, Leisegang R, Bishai D, Nguyen H, Hislop M, Cleary S, … Maartens G (2010). Association of antiretroviral therapy adherence and health care costs. Annals of Internal Medicine, 152(1), 18. [PubMed: 20048268]

Nachega JB, Morroni C, Zuniga JM, Sherer R, Beyrer C, Solomon S, … Rockstroh J (2012). HIV-related stigma, isolation, discrimination, and serostatus disclosure. Journal of the International Association of Physicians in AIDS Care, 11(3), 172–178. [PubMed: 22431893]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Olson DH, Russell CS, & Sprenkle DH (1983). Circumplex model of marital and family systems: Vl. Theoretical update. Family Process, 22, 69–83. [PubMed: 6840263]

Rintamaki LS, Davis TC, Skripkauskas S, Bennett CL, & Wolf MS (2006). Social stigma concerns and HIV medication adherence. AIDS Patient Care and STDs, 20(5), 359–368. [PubMed: 16706710]

Rotheram-Borus MJ, Flannery D, Rice E, & Lester P (2005). Families living with HIV. AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV, 17(8), 978–987.

Rotheram-Borus MJ, Stein JA, Jiraphongsa C, Khumtong S, Lee SJ, & Li. L (2010). Benefits of family and social relationships for Thai parents living with HIV. Prevention Science, 11(3), 298–307. [PubMed: 20020208]

Sanjobo N, Frich JC, & Atle F (2008). Barriers and facilitators to patients' adherence to antiretroviral treatment in Zambia: A qualitative study. Methods, 5(3), 136–143.

Scheurer D, Choudhry N, Swanton KA, Matlin O, & Shrank W (2012). Association between different types of social support and medication adherence. American Journal of Managed Care, 18(12), e461–e467. Retrieved from http://europepmc.org/abstract/med/23286676 [PubMed: 23286676]

Sherraden M (1990). Stakeholding: Notes on a theory of welfare based on assets. Social Service Review, 64(4), 580–601.

Shumaker SA, & Brownell A (1984). Toward a theory of social support: Closing conceptual gaps. Journal of Social Issues, 40(4), 11–36.

Simoni JM, Demas P, Mason HRC, Drossman JA, & Davis ML (2000). HIV disclosure among women of African descent: Associations with coping, social support, and psychological adaptation. AIDS and Behavior, 4(2), 147–158.

Skinner HA, Steinhauer PD, & Santa-Barbara J (1983). The family assessment measure. Canadian Journal of Community Mental Health, 2(2), 91–105.

Ssewamala FM, Meyer S, & Ddamulira C (2016). Suubi+Adherence: Family - Based Economic Empowerment for HIV Positive Youth in Southern Uganda Baseline Study Report. Retrieved from http://ichad.wustl.edu/wp-content/uploads/2018/02/Baseline-Adherence_FINAL_05June.pdf

UNAIDS. (2014). 90–90-90 an ambitious treatment target to help end the AIDS epidemic. Retrieved from http://Www.Unaids.Org/Sites/Default/Files/Media_Asset/90-90-90_En_0.Pdf

UNAIDS. (2017). Fact sheet - Latest global and regional statistics on the status of the AIDS epidemic. Unaids.

Usitalo A, Leister E, Tassiopoulos K, Allison S, Malee K, Paul ME, … Mellins CA (2014). Relationship between viral load and self-report measures of medication adherence among youth with perinatal HIV infection. AIDS Care - Psychological and Socio-Medical Aspects of AIDS/HIV, 26(1), 107–115.

Ware NC, Idoko J, Kaaya S, Biraro IA, Wyatt MA, Agbaji O, … Bangsberg DR (2009). Explaining adherence success in Sub-Saharan Africa: An ethnographic study. Edited by Chris Beyrer. PLoS Medicine, 6(1), 39–47.

WHO. (2016). HIV/AIDS [Fact Sheet]. Retrieved from http://www.who.int/en/news-room/factsheets/detail/hiv-aids