The Influence of Social Support on the Lives of HIV-Infected Individuals
in Low- and Middle-Income Countries

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Introduction

After thirty years, the HIV/AIDS pandemic remains a significant problem for individuals, communities and even nations -- especially in regards to low and middle-income countries (LMIC). As of 2010, over 34 million people were living with HIV across the globe (Joint United Nations Programme on HIV/AIDS, 2011). Sixty-eight percent of all those infected with HIV globally reside in LMIC, even though these countries account for just 13% of the world’s population. Additionally, the HIV epidemic in LMIC has had a major impact on their social and economic development (Shao & Williamson, 2012).

Advances in the treatment and care of HIV/AIDS have improved the health outlook for people living with HIV/AIDS (PLWHA; (Joint United Nations Programme on HIV/AIDS, 2011; Volberding, 2003). The success of antiretroviral therapy (ART) has markedly reduced AIDS-related mortality rates and increased survival for PLWHA (Palella et al., 1998). HIV/AIDS is now often regarded as a chronic illness because life expectancy estimates are now similar to those of patients with type-1 diabetes (Lohse et al., 2007). Despite advances in clinical science, those infected with HIV continue to experience high levels of discrimination and stigmatization in the communities where they live (Vanable, Carey, Blair, & Littlewood, 2006), amongst other health-related stressors and challenges (Strine, Chapman, Balluz, & Mokdad, 2008).

What is Social Support?

Although the construct of social support was first conceptualized by social scientists in the late 1970s (Berkman & Syme, 1979), the definition of the concept varies widely among researchers and their study context (William, Barclay, & Schmeid, 2004). Social support is generally defined as “the perception or experience that one is loved and cared for by others,
esteemed and valued, and part of a social network of mutual assistance and obligations” (Taylor, 2007, pg. 145). Conceptualizations of social support have also focused on the source of support, which can vary from family, spouse, friend, coworkers, doctor, and community ties/affiliations. House, Landis, and Umberson (1981) outlined the following four broad types of social support, which are still extensively used in research conducted today:

1. **Informational Support** involves the provision of information, education, or guidance for use in managing personal and health-related problems.

2. **Instrumental Support** (also referred to as tangible support) involves the provision of tangible assistance, in the form of financial aid, material goods, labor, time, or any direct help. Given the context of LMIC, we included both food insecurity and microcredit loan programs in this category.

3. **Emotional Support** involves the provision of empathy, affection, love, trust, encouragement, listening, and care from members of an individual’s social network.

4. **Appraisal Support** (also referred to as affiliative support and social integration) involves the number of social relationships an individual has with others that have mutual interests. This type of support also provides affirmation and feedback.

Social support can be thought of as a meta-construct with multiple dimensions, which makes measurement of the concept complex (Barrera, 1986). Critiques in the literature on social support have pointed to the use of heterogeneous methods and metrics as a hindrance in understanding the true effects of social support on varying outcomes (Decker, 2006; Uchino, 2006). Those that have studies social support have used varying techniques to measure the concept, often collecting data on one or more of the following dimensions: 1) the nature of what was provided; 2) the source(s) of support; 3) whether social support was actually
received (objective) or simply perceived (subjective) to be available; and 4) whether there was an explicit or implicit expectation of reciprocity of support. Even with these limitations, we can still draw firm conclusions from this body of literature.

**Linking Social Support to Health Outcomes in High-Income Countries**

“Social relationships, or the relative lack thereof, constitute a major risk factor for health – rivaling the effect of well established health risk factors, such as cigarette smoking, blood pressure, blood lipids, obesity and physical activity” (House et al., 1988)

The vast majority of research on social support has been conducted in Western Europe and North America, with a focus on disease management, physical and mental health, and responses to stress. This research provides evidence that social support is associated with a decreased risk of mental and physical illness, as well as mortality (Achat et al., 1998; Holt-Lunstad, Smith, & Bradley Layton, 2010; Lyyra & Heikkinen, 2006; Seeman, 2000), and suggests that it positively affects cardiovascular, endocrine, and immune functioning (Seeman, 1996; Uchino, 2006). It can also affect the way people cope with stress (Jackson, 2006), their adherence to medication (DiMatteo, 2004; Honda & Kagawa-Singer, 2006), and their quality of life (Helgeson, 2003; Keyes, Michalec, Kobau, Zack, & Simoes, 2005). For example, Strine and colleagues (2008) analyzed data from a state-based surveillance system that collected data on social support, health-related quality of life, and health behaviors and discovered that those who reported lower levels of social support had increased obesity, physical inactivity, alcohol consumption, and a higher prevalence of smoking. Although the exact means by which social support contributes to health and the factors that influence this relationship are not yet entirely understood (Vitaliano et al., 2001), these findings indicate that social support can affect and encourage engagement in positive health behaviors.
Patient adherence may mediate the relationship between social support and health (Dunbar-Jacob & Schlenk, 2001). Indeed, support from friends and family can promote patient adherence, as it buffers the stress associated with the illness, encourages optimism, reduces depression, and improves healthful behaviors (Shumaker & Hill, 1991; Wallston, Alagna, DeVellis, & DeVellis, 1983). In a recent meta-analysis, DiMatteo (2004) identified 122 studies published between 1948 and 2001 that correlated social support with patient medication adherence across multiple medical conditions. The study found that patients were over two times more likely to adhere if they had greater levels of social support; social support also had a greater effect on adherence for patients that took more than one medication. Additionally, this investigation revealed that adherence was strongly and consistently associated with functional support (i.e., instrumental and emotional support) as compared to structural support (i.e., living arrangements and relationship status).

However, not all studies on social support demonstrate benefits. Wills and Vaughan (1989) found that some social relationships might actually encourage partaking in unhealthy behaviors, such as drinking alcohol, smoking, and drug use among adolescents. Additionally, findings from Bolger, Zuckerman, and Kessler (2000) suggest the actual receipt of social support can enhance stress. In this study, couples kept daily diaries that documented stressors they experienced, the intensity of the stressor, and whether they received or provided support to their partners. The recipients of support reported poorer adjustment to stress, suggesting they might feel a sense of obligation following the receipt of supportive acts. However, stress-protective effects were found when the support provider reported conducting supportive acts and the recipient did not realize they had received the support. These findings suggest that the most effective form of support is that which is “invisible,” in that the recipients of support are unaware of the assistance they’ve received. Interestingly,
recent studies have also documented the benefits of providing support on health and well-being (Brown, Nesse, Vinokur, & Smith, 2003; Gruenewald, Karlamangla, Greendale, Singer & Seeman, 2007; Krause, 2006).

The influence of social support on positive health outcomes may also differ by gender and culture. In the United States, researchers have documented differences between men and women when receiving support. In a meta-analysis examining gender differences in relation to coping with stress, women were more likely to seek and use support to handle the stressors they encounter, as compared to men (Tamres, Janicki & Helgeson, 2002). Furthermore, in an experimental study that had couples conduct stressful tasks alone and with their partners found that the presence of the wife buffered men’s stress response when completing tasks, but the presence of the husband increased stress for women when completing tasks (Kiecolt-Glaser & Newton, 2001). Since gender roles differ across cultures, it is difficult to ascertain whether these findings would be similar in LMIC.

Taylor (2007) suggests social support may be experienced differently across cultures and is an area in need of further study. Given that much of the research on social support has been conducted in Western cultures, which tend to value independence (Markus & Kitayama, 1991) and many other cultures (Asian, Southern European, and Latin) value interdependence, it is importance to understand how and whether the protective factors associated with social support differ across cultures. In this review, we will examine and summarize the literature on social support in low and middle-income countries, with an emphasis on HIV/AIDS.

Methods

Search Strategy and Selection Criteria
We searched PubMed, the Cochrane Central Register of Controlled Trials, Social Sciences Citation Index and PsycINFO for manuscripts published in peer-reviewed journals on the topic of social support for people with HIV, from January 2000 to June 2012. A comprehensive search strategy, which included a range of terms and keywords relevant to social support, HIV, and low and middle-income countries, was used. The search was not restricted by age, gender, or sexual orientation, and no language restrictions were imposed. After removing duplicates, a total of 542 published papers were found during the electronic search. Two researchers reviewed the abstracts of the published papers and excluded articles that did not: 1) focus on a low or middle-income country; 2) have a study sample that consisted of at least 50% PLWHA; 3) directly measure the construct of social support; and 4) study the influence of social support on any health-related variables. Full texts of 74 articles were reviewed and of those, 46 were eligible for inclusion in this narrative review.

Systematic review methods were not utilized for this paper, since measurement of social support differed greatly across studies and the effectiveness of social support interventions was not the primary purpose of this review. The purpose of this review is to summarize research studies on social support among people living with HIV/AIDS in low and middle-income countries, identify significant findings in this body of literature, and suggest future research directions needed to expand our understanding of social support among PLWHA in LMIC.

**Results**

Almost all of the studies examining the influence of social support on the lives of people with HIV/AIDS in low- and middle-income countries employed scales that did not distinguish between the varying types of social support identified by House et al. (1981). A composite
score of social support was used in most cases, as outlined in Tables 2-5, which includes a summary of included articles and specifies their measurement of social support. Because of this, the review is instead organized across four main topics that appeared readily in the studies on social support among PLWHA in LMIC. The topics included adherence to medication (serostatus disclosure [4] and access to care [1] were subsumed in this category; 23 articles total), mental (13 articles) and physical health (5 articles), and quality of life (6 articles). Lastly, articles evaluating social support interventions are outlined in Table 1 below and described in detailed across the four main topical areas.

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Sample</th>
<th>Purpose</th>
<th>Intervention Description</th>
<th>Major Findings Related to SS</th>
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<tr>
<td>Cantrell et al., 2008</td>
<td>Zambia</td>
<td>N=636 PLWHA (212 male, 414 female)</td>
<td>To evaluate the effect of nutritional support on ART adherence</td>
<td>Home-based adherence support program that employs community health workers to monitor and encourage patient adherence to ART, as well as household food security. Patients from 4 clinics were provided nutritional support, while four other clinics served as the control arm and only offered the adherence support program without food supplementation.</td>
<td>Nutritional support was associated with improvements in adherence and medication pick-up. Seventy percent of patients in intervention arm achieved a medication possession ratio of 90% or greater, as compared to only 48% of patients in the control group (relative risk=1.5; 95% confidence interval: 1.2 to 1.8). However, the provision of food did not have a significant effect on weight gain or CD4 cell response.</td>
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<tr>
<td>Chang et al., 2010</td>
<td>Uganda</td>
<td>N=1336 (gender not specified)</td>
<td>To examine the effects of community-based peer health worker intervention on AIDS care</td>
<td>Fifteen AIDS clinics were randomized to receive either the intervention (N=10) or control (N=5). Peer health worker intervention tasks were conducted in the clinics (e.g., providing ART counseling and support) and at the patients’ home (e.g., counsel and educate patients on ART adherence and other HIV-related health issues). The analysis was by intention to Primary outcomes included adherence and cumulative risk of virologic failure; secondary outcomes were virologic failures at 24 week intervals. No significant differences were found for adherence or cumulative risk of virologic failure. However, virologic failure rates significantly decreased in intervention arm as compared to the control.</td>
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<td>Study</td>
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<td>Li et al., 2011a</td>
<td>China</td>
<td>N=167</td>
<td>To examine effectiveness of a family intervention at decreasing depressive symptoms and improving SS</td>
<td>Recruited and randomized participants into the TEA intervention (N=38) and a control group (N=41). The TEA family intervention consisted of three main components: 1) small group for PLWHA and family; 2) home-based family activities; and 3) community events that build social integration.</td>
<td>Intervention participants reported significant improvements in depressive symptoms, SS, and family functioning post-intervention, as compared to the control group.</td>
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<td>Muhamadi et al., 2011</td>
<td>Uganda</td>
<td>N=400</td>
<td>To examine the effects of a post-test counseling intervention on uptake of pre-ART care</td>
<td>400 participants were recruited and randomized into the intervention (N=200) or the control condition (N=200). The intervention consisted of post-test counseling by trained counselors, combined with monthly, 2-hour home visits by community support agents for continued counseling. Participants in control arm received standard care, including post-test counseling by staff without formal training in counseling.</td>
<td>Provision of post-test counseling intervention had a significant effect on uptake of pre-ART care, retention in care, and disclosure of HIV status. Intervention participants were 80% more likely to accept pre-ART care as compared to the control.</td>
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<td>Mundell et al., 2011</td>
<td>South Africa</td>
<td>N=361</td>
<td>To evaluate a structured SS group intervention</td>
<td>Intervention study with a non-randomized, quasi-experimental design. 144 patients participated in the intervention, while 217 served in the control group. The intervention consisted of 10 structured psychosocial support</td>
<td>Intervention arm increased disclosure, active coping (t=2.68, p&lt;0.05), self-esteem (t=2.11, p&lt;0.05), and reduced avoidant coping (t=-2.02, p&lt;0.05) as compared to the control group.</td>
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<td>Study</td>
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<td>Munoz et al., 2011</td>
<td>Peru</td>
<td>N=60 PLWHA (gender not specified)</td>
<td>Adherence intervention consisting of Community-based Accompaniment with Supervised Antiretroviral (CASA) support (12 months of home-based DOT-HAART delivered by community health workers). Other intervention components were tailored to participants and included the provision of emotional and instrumental support, microfinancing, and peer support groups.</td>
<td>Intervention had impact on adherence (79% of intervention group was adherent, as compared to 44% of those in control), virologic suppression (66.7% versus 46.7%) and mortality; participants reported higher SS (t=3.97, p&lt;0.01) and lower stigma (t=2.89, p&lt;0.01)</td>
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<td>Smith Fawzi et al., 2012</td>
<td>Haiti</td>
<td>N=178 (168 youth, 130 caregivers)</td>
<td>Psychosocial support group intervention for HIV-infected youth and their caregivers carried out bi-monthly over the course of 1 year. Consisted of two phases, phase one included eight group sessions for HIV-positive caregivers that focused on coping with the challenges related to HIV. The second phase consisted of six sessions for caregivers, seven sessions for children, and eight sessions with both children and caregivers. Sessions typically focused on building support, lessening distress, and increasing awareness.</td>
<td>Youth had less psychological symptoms and improved psychological functioning and SS post-intervention. Caregivers had reduced depressive symptoms, stigma, and increased SS post-intervention</td>
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<td>Vu et al., 2012 **</td>
<td>Vietnam N=228 PLWHA (155 male, 73 female)</td>
<td>To examine the effectiveness of a peer support intervention on QOL and internalized stigma</td>
<td>In the intervention group, participants (N=119) received adherence support from trained peer supporters who visited participants’ homes regularly. The control (N=109) did not receive the intervention.</td>
<td>QOL significantly improved for intervention participants that presented at clinical stages 3 and 4 at baseline</td>
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\*\* indicates the use of a validated measures of SS

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**Adherence and Social Support**

Adherence is the second strongest predictor of progression to AIDS and death, after CD4 count (Amberbir, Woldemichael, Getachew, Girma, & Deribe, 2008); high levels of adherence to ART regimens are necessary to achieve and maintain viral load suppression and prevent drug resistance (Mills et al., 2006a). Numerous factors may contribute to whether a patient is adherent to antiretroviral therapy, including whether they have social support. For instance, Shin and colleagues (2008) conducted a study to identify risk factors for non-adherence among 43 patients infected with HIV and tuberculosis in Peru; analysis indicated low social support, substance use, and depression were associated with non-adherence (see also Amberbir et al., 2008; Peltzer, Friend-du Preez, Ramlagan, & Anderson, 2010).

Additionally, Adewuya et al. (2010) also found a significant relationship between perceived social support and low adherence; compared to those reporting strong social support, those reporting fair social support were over three time more likely to report non-adherence and those reporting poor social support were close to nine times more likely to report low adherence. Furthermore, a study on the predictors of adherence among PLWHA in Ethiopia provided evidence that social support was an independent predictor of adherence to ART (Amberbir et al., 2008).
Peltzer et al. (2010) assessed the factors contributing to ART adherence among 736 PLWHA in South Africa; findings revealed that those residing in urban areas were up to three times more likely to be adherent as compared to those residing in rural areas. The authors suggest this finding is reflective of the lack of resources available in many rural setting. Poor environmental factors (e.g., safe and healthy physical environment, having enough money, ability to access information and health services) and experiences of discrimination were also associated with lower adherence. Luszczynska, Sarkar, and Knoll (2007) investigated the relationship between resource variables (social support, self-efficacy, and finding benefits in disease) and patients’ physical functioning and adherence to antiretroviral therapy among 104 PLWHA and found that adherence was moderately correlated to receiving social support, higher self-efficacy, and finding more benefits. Path analysis revealed that both social support and self-efficacy were related to better physical functioning and finding more benefits in living with HIV. Although social support was unrelated to adherence directly, the effects of social support on adherence were mediated by self-efficacy. These findings suggest that patients that receive more social support are more likely to have stronger self-efficacy, which in turn can influence both physical functioning and adherence (Luszczynska et al., 2007).

Support from one’s family has also been documented as a source of assistance in accessing (Posse & Baltussen, 2009) and adhering to ART (Nassali et al., 2012), with some studies finding that those with family support were twice as likely to adhere to ART than those that did not have support from family members (Harris et al., 2011; Tiyou, Belachew, Alemseged, & Biadgilign, 2010). Chamroonsawasdi, Insri, and Pitikultang (2011) confirmed these findings and produced results that highlighted the significant predictive value of family support on ART adherence among 230 PLWHA in Thailand. Though, Li et al. (2010) found
the relationship between social support and adherence to be non-significant, they identified a predictive relationship between family communication and adherence. Findings from Muoghalu and Jegede’s (2010) study on the role of culture and family among PLWHA in Nigeria suggest family members feel a sense of cultural obligation to those infected with HIV and thus care and support them. Likewise, in a study that qualitatively examined the affects of family support on PLWHA in China (Li et al., 2006), study investigators demonstrated the myriad ways in which family support (e.g., financial assistance, support in serostatus disclosure, medical assistance, and psychological support) positively impacted PLWHA. Although family members experienced high levels of shame and psychological pressure once their kin’s HIV status was revealed, this process also brought family members closer and enhanced support to the PLWHA.

In a qualitative study conducted in South Africa, which consisted of two focus groups (n=12) with PLWHA and seven in-depth interviews with health care providers, researchers concluded that family members (excluding spouse/partners) were more likely to be chosen as treatment supporters and assist with decision-making on care and treatment (Nachega et al., 2006). Although health care providers emphasized the support needed from clinicians and adherence counselors, patients identified the financial/material, instrumental, and emotional support provided by family members as essential to maintenance of high adherence levels.

There is conflicting evidence on whether the support of a spouse/partner may improve or reduce adherence. Most studies in low- and middle-income countries suggest women face violence, shame, and stigma from partners once their serostatus is disclosed (Akani & Erhabor, 2006), while other studies suggest it may be beneficial (Skogmar et al., 2007; Nassali et al., 2009). Research shows women that disclose their HIV status have increased social support (Antelman et al., 2001); major reasons for disclosure among both men and
women included the expectation of economic, spiritual, and emotional support (Akani & Erhabor, 2006). Indeed, Rotheram-Borus and colleagues (2010) confirmed serostatus disclosure to be significantly and positively associated with ART adherence in Thailand, in addition to family functioning and social support.

In resource-limited settings, the impact of poverty on health behaviors and health services can limit one’s ability to access (Posse et al., 2009) and adhere to ART (van Oosterhout, 2005; Brouwer, Lok, Wolffers, & Sebagalls, 2000). Studies have found financial constraints to be a significant barrier to access and adherence, as patients with middle or high average family income more likely to adhere as compared to those with low family income (Tiyou et al., 2010). Patients with high transportation costs (Portelli, Tenni, Kounnavong, & Chanthivilay, 2012; Posse et al., 2009) and food insecurity (Goudge & Ngoma, 2011), defined as having limited availability of nutritionally sufficient food (Anderson, 1990), also faced significant barriers to adherence (Nachega et al., 2006). Additionally, a pilot study conducted in Zambia found that providing nutritional support to food insecure individuals led to significantly better adherence to ART and resulted in high medication pick-up as compared to the control group (Cantrell et al., 2008).

In a study designed to evaluate the effectiveness of a community-based ART adherence intervention, which included modified directly observed treatment (DOT), daily social support, and comprehensive support (e.g., financial aid for lab tests and medication, transportation and nutritional support), forty-eight percent of participants report food insufficiency at baseline (Franke et al., 2011). Household food insufficiency was associated with a twofold increase in the odds of having poor adherence to ART. Following the intervention, participants in the intervention arm reported high levels of adherence; good
adherence self-efficacy and high social support were significant protective factors against poor adherence. Munoz and colleagues (2011) implemented a tailored DOT-oriented intervention in Peru, which also combined components of microfinance assistance and peer support groups as needed. Patients in the intervention group also received financial assistance for lab tests and medication, as well as transportation and nutritional support.

Findings show the intervention was successful at increasing adherence and virologic suppression, as well as reducing mortality within 24 months of implementation. Intervention participants also reported higher levels of social support and reduced stigma post-intervention. Though these interventions show promise, the study investigators did not look at individual components of the interventions, which limits our understanding of what activities yielded the most benefit.

The majority of research linking adherence to social support has been conducted on adults; limited information is known about this relationship for children and adolescents. Although Harris et al. (2011) did not collect data from children; their study revealed that having a child was not only significantly associated with non-adherence, but also more than doubled the odds of non-adherence. Findings from this study imply that having one or more children may cause pressure on the part of the caregiver, which results in less care for oneself. In a study that examined adherence among caregivers and their children in West Africa, data showed that children whose caregivers disclosed their serostatus and participated in support groups were more likely to be adherent. This finding suggests that parents’ healthy adjustment to their HIV diagnosis can have benefits to HIV-infected children as well (Polisset, Ametou, Arrive, Aho, & Perez, 2009). In a qualitative study that consisted of in-depth interviews with children and their caregivers (n=36), researchers assessed the barriers and facilitators to adherence (Fetzer et al., 2011). Study findings indentified lack of food and hunger to be a
significant barrier to adherence for both children and their caregivers, as taking medicine without food often made them sick. Children reported the need for assistance from caregivers in taking their medications and wanted their caregivers to show them love and support in this process.

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Sample</th>
<th>Purpose</th>
<th>SS Measurement</th>
<th>Major Findings Related to SS</th>
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<tbody>
<tr>
<td>Adewuya et al., 2010</td>
<td>Nigeria</td>
<td>N=182 PLWHA (86 male, 96 female)</td>
<td>To examine the relationship between psychiatric comorbidity and ART adherence</td>
<td>Single-item question with a likert-type scale (poor, fair, and good); focused on support from spouse/partner</td>
<td>Perceived SS was significantly associated with low adherence; those that reported poor SS were 8 times more likely to report low adherence</td>
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<tr>
<td>Akani et al., 2006</td>
<td>Nigeria</td>
<td>N=187 PLWHA (105 male, 82 female)</td>
<td>To evaluate the rate, pattern, and barriers to disclosure of HIV status</td>
<td>SS was qualitatively assessed</td>
<td>Participants disclosed to receive economic, spiritual, and emotional SS; fear of stigma was a barrier to disclosure.</td>
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<tr>
<td>Amberbir et al., 2008</td>
<td>Ethiopia</td>
<td>N=400 PLWHA (161 male, 239 female)</td>
<td>To determine the barriers and facilitators to ART adherence</td>
<td>A pre-tested questionnaire with 1 or more questions on SS was utilized</td>
<td>At baseline, adherence was common among those that perceived good SS (OR, 1.82). At follow-up, SS was found to be an independent predictor of adherence</td>
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<td>Antelman et al., 2001</td>
<td>Tanzania</td>
<td>N=1087 pregnant women with HIV</td>
<td>To examine the factors predictive of women's disclosure</td>
<td>10-item survey derived from the validated Duke-UNC Functional SS Questionnaire</td>
<td>Increases SS associated with increased disclosure rates, as was attendance at voluntary self-help group meetings</td>
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<td>Chamroonsawasdi et al., 2011</td>
<td>Thailand</td>
<td>N=230 (55.2% female)</td>
<td>To examine predictive factors of ART adherence</td>
<td>Study generated, locally validated questionnaire with 15 questions on family support</td>
<td>Family support predicted adherence; family SS also had the highest in on ART adherence as compared to other study variables</td>
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<tr>
<td>Fetzer et al., 2011</td>
<td>Democratic Republic of Congo</td>
<td>N=36 (18 children, 18 caregivers)</td>
<td>To examine the effects of child-caregiver relationships and psychosocial support; barriers and facilitators of adherence were</td>
<td>Qualitatively assessed</td>
<td>Lack of assistance in the home was documented as a barrier to adherence, as well as lack food/hunger.</td>
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<td>Study</td>
<td>Country</td>
<td>Sample Size</td>
<td>Methodology</td>
<td>Results</td>
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<td>Franke et al., 2011</td>
<td>Peru</td>
<td>N=134 PLWHA (55 male, 79 female)</td>
<td>To examine the relationship between food insufficiency and ART adherence</td>
<td>Single-item, likert type question on food insecurity. Duke-UNC Functional SS Questionnaire also collected Good adherence self-efficacy and high SS at baseline were significantly protective against poor adherence; food insecurity was predictive of poor adherence</td>
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<tr>
<td>Goudge et al., 2011</td>
<td>South Africa</td>
<td>N=22 PLWHA (5 male, 17 female)</td>
<td>To examine the experiences of PLWHA with adherences</td>
<td>Qualitatively assessed</td>
<td>Patients without stable food sources faced significant barriers to ART adherence</td>
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<tr>
<td>Harris et al., 2011</td>
<td>Dominican Republic</td>
<td>N=300 PLWHA</td>
<td>To examine risk factors for low ART adherence</td>
<td>Two-items on family support, both with a likert scale</td>
<td>Risk factors for non-adherent participants included low SS and adherence support; these participants were twice as likely to be non-adherent</td>
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<tr>
<td>Li et al., 2006</td>
<td>China</td>
<td>N=30 PLWHA (36.7% female)</td>
<td>To examine the influence of family support on PLWHA</td>
<td>Qualitatively assessed</td>
<td>Though family members felt shame and distress when their kin's HIV status was disclosed to the community, this also brought families closer together. Support provided by family had multiple levels of positive impact on PLWHA,</td>
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<tr>
<td>Li et al., 2010</td>
<td>Thailand</td>
<td>N=386 (67.3% female)</td>
<td>To examine barriers to adherence</td>
<td>19-item, validated Medical Outcome Study SS Survey</td>
<td>Adherence was significantly associated with family communication. Family communication was a significant predictor of adherence. Although SS was measured, it was not significant in any analysis</td>
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<td>Study</td>
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<td>Sample Size</td>
<td>Methods Description</td>
<td>Findings/Significance</td>
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<tr>
<td>Luszczynska et al., 2007</td>
<td>India</td>
<td>N=104 PLWHA (63.5% female)</td>
<td>To examine between resource variables and adherence</td>
<td>Received SS and SS satisfaction subscales of validated Berlin Social Support Scales. SS and self-efficacy were related to better physical functioning. Effects of SS on adherence were mediated by self-efficacy; SS predicted self-efficacy.</td>
<td></td>
</tr>
<tr>
<td>Muoghalu et al., 2010</td>
<td>Nigeria</td>
<td>N=914 (461 male, 453 female)</td>
<td>To examine the role of culture and family among PLWHA</td>
<td>Analyzed source of support and qualitatively assessed. Cultural practices and family play major roles in care of PLWHA, as participants felt a cultural obligation to care for the sick.</td>
<td></td>
</tr>
<tr>
<td>Nachega et al., 2006</td>
<td>South Africa</td>
<td>N=19 (12 PLWHA, 7 health care providers)</td>
<td>To understand how patients select treatment supporters and identify the components of SS, which might enhance adherence</td>
<td>Qualitatively assessed. Family members most likely to be chosen as treatment support, which participate in medical decision-making and adherence. Barriers to adherence include stigma and lack of financial resources and food. Disclosure was identified as a major factor in securing effective adherence support.</td>
<td></td>
</tr>
<tr>
<td>Nassali et al., 2009</td>
<td>Uganda</td>
<td>N=289 HIV-infected mothers</td>
<td>To examine the factors associated with adherence</td>
<td>Qualitatively assessed. SS from spouse was key motivator for mothers to adhere.</td>
<td></td>
</tr>
<tr>
<td>Peltzer et al. 2010</td>
<td>South Africa</td>
<td>N=735 PLWHA (70.2% female)</td>
<td>To examine factors contributing to adherence</td>
<td>3-items drawn from the validated SS Questionnaire on perceived tangible and emotional SS. Adherence is 3 times more likely for urban residents. Better adherence associated with higher SS and social relationships, as well as low rates of depression.</td>
<td></td>
</tr>
<tr>
<td>Polisset et al., 2009</td>
<td>Togo</td>
<td>N=148 (74 children with HIV, 74 caregivers [42 had HIV])</td>
<td>To examines correlates of pediatric adherence</td>
<td>Single-item on caregiver participant in support groups. Non-adherence related to not participating in support groups. Children whose caregiver disclosed their HIV status during interviews were also more likely to be adherent.</td>
<td></td>
</tr>
</tbody>
</table>
Health and Social Support

Mental Health

The World Health Organization recommends the psychosocial needs (e.g., prevention and treatment of mental health disorders, assistance with coping on discrimination and stigma, and financial forms of assistance) of PLWHA be integrated into HIV care (World Health Organization, 2005). Indeed, mental health among PLWHA is a pervasive issue, especially in low- and middle-income countries where studies have shown depression rates reaching up to 63% for those infected with HIV (Collins, Holma, Freeman, & Patel, 2006). Adewuya and colleagues (2007) found a similar rate (59%) for participants with psychiatric disorders in
Nigeria. Their findings also reveal that having poor social support and the stage of disease progression were significant factors associated with psychiatric disorders; those reporting poor levels of social support were 11 times more likely to have a psychiatric disorder as compared to those with good social support. Additionally, a study examining the psychosocial and clinical factors associated with depression in Uganda demonstrated that participants with both current and lifetime depressive disorder were less likely to have social support, high self-efficacy, and be adherent to ART (Nakimuli-Mpungu, Musisi, Katabira, Nachega, & Bass, 2011). These studies demonstrate the positive effects of social support on mental health of those with HIV.

A qualitative study consisting of interviews with 79 PLWHA and an HIV-negative family member (n=158) in rural China confirmed negative relationships between symptoms of depression and protective factors, such as social support and family relations (Li, Liang, Ding & Ji, 2011a). Zhao et al. (2011) utilized data from a longitudinal study of 1299 rural Chinese children infected with HIV to examine whether functional measures of social support (i.e., informational, emotional, instrumental, and appraisal) and structural measures of social support (i.e., social network, including family, friends, teacher, etc.) predicted psychosocial outcomes. Study findings indicated informational support to be positively associated with depression, but tangible support and support from family were negatively associated with depression. Conversely, findings from Bajunirwe and colleagues (2009) provide conflicting evidence of a significant, positive relationship between informational and affectionate support with both mental and physical health, but not tangible support. Patients who received more overall social support experienced less distress and perceived their health to be better than those who received less social support. Additionally, they found informational support and CD4 count to be independently associated with better quality of life for PLWHA and to
be protective of having a lower physical health score. These findings suggest social support is positively correlated with psychological well-being, but the strength of correlations varied by type and source of support.

Stigmatization, or the experience of discrimination to the extent that normal social life is disrupted, can have a profound impact on the lives of PLWHA, as the experience can affect their mental health (Wang et al., 2012), whether they disclose their serostatus (Akani et al., 2006), and what level of social support they have available to them (Li, Lee, Thammawijaya, Jiraphongs & Rotheram-Borus, 2009). Adewuya et al. (2009) suggests the intense stigmatization associated with having HIV can be traumatic for those in sub-Saharan Africa. Their study examined the probability of developing posttraumatic stress disorder (PTSD) after experiencing intense stigma; over 27% of participants reported experiences of HIV-stigma related PTSD. Poor levels of social support was found to be an independent predictor of this type of PTSD, as those with low social support were three times more likely to have experienced HIV-stigma related PTSD. Similarly, Li et al. (2009) found that higher levels of stigma were significantly associated with lower levels of social support, with low social support significantly associated with higher levels of depression. Study findings also revealed that both internalized shame and social support were significant predictors of depression, after controlling for age, gender, education, and income level. In a study investigating the relationship between varying risk and protective factors for depression, involving 755 AIDS orphans and 466 children of HIV-infected parents in rural China, study investigators documented that trusting relationships, future orientation and perceived social support mediated the effects of traumatic events and HIV-related stigma on depression (Wang et al., 2012). However, trusting relationships was the most influential protective factor for depression.
Food insecurity may also be a risk factor for poor mental health, even though it can be altered to improve health outcomes. Research conducted in developing countries has suggested an association between food insecurity and poor mental health (Cole & Tembo, 2011; Gupta et al., 2010; Maes, Hadley, Tesfaye, & Shifferaw, 2010). A cross-sectional study investigating the prevalence and risk factors for depression in Uganda found food insecurity to be significantly associated with depression, after controlling for age and gender. However, this study also specified that social support was neither significantly associated with depression, nor did it moderate the effects of stress, negative life events, or depression (Kinyanda, Hoskins, Nakku, Nawaz & Patel, 2011). Conversely, Tsai and colleagues (2012) found social support to buffer the effects of food insecurity on depression among women. Study investigators went further to explore the type of social support that was most significant at buffering this relationship and it was discovered that instrumental support was the most influential variable. This longitudinal study, which collected data from 456 PLWHA in rural Uganda, also found significant gender differences as increased severity of depression among women was associated with increased food insecurity and decreased social support; these findings were non-significant among men in the study sample.

Three studies highlighting findings from intervention programs, which contained a social support component, aimed at improving participant mental health were obtained for this review. The first study evaluated the effectiveness of a psychosocial support group intervention for HIV infected youth (n=168) and their caregivers (n=130) in Haiti (Smith-Fawzi et al., 2012). One year post assessments showed program participants had decreased psychological symptoms, improved psychosocial functioning, and social support. Caregivers (95% were HIV-infected) had significantly reduced depressive symptoms and HIV-related
stigma, as well as improved social support post-intervention. Qualitative findings were convergent with quantitative, as decreased psychological distress and social isolation, as well as greater hope for the future were emergent themes in analysis. The second intervention was grounded in qualitative data collected from 317 women with two pilots conducted to refine the intervention. The intervention consisted of 10 structured psychosocial support sessions for newly HIV-infected, pregnant women in South Africa (Mundell et al., 2011). A total of 15 support groups were held for 144 women, while 217 women chose not to participate and subsequently served as the control. The first follow-up assessment (2 months post-intervention) indicated the intervention group had higher levels of active coping, lower levels of avoidant coping, and those who attended at least half of the intervention support sessions reported improvements in self-esteem. The second follow-up assessment (8 months post-intervention) indicated the intervention groups’ rate of serostatus disclosure was significantly higher than that of comparison group. The third intervention aimed at reducing depressive symptoms and increasing social support for PLWHA and their family members in rural China (Li et al., 2011b). The intervention had three main components: 1) small group sessions for PLWHA and their family member; 2) home-based family activities; and 3) community events intended to build social integration. A total of 79 families (n=167) were recruited with 38 families assigned to the intervention and 41 families in the control group. All PLWHA were parents and more than half of family members were PLWHA’s spouse. Intervention participants reported significant improvements in depressive symptoms, social support, and family functioning following the intervention. Gender emerged as significantly associated with social support and family functioning, as men were more likely to perceive better social support and family functioning as compared to women.

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Sample</th>
<th>Purpose</th>
<th>SS Measurement</th>
<th>Major Findings Related to SS</th>
</tr>
</thead>
</table>

Table 3. Summary of Articles on Mental Health and Social Support (SS) Among PLWHA in LMIC
<table>
<thead>
<tr>
<th>Author</th>
<th>Country</th>
<th>Sample Size</th>
<th>Study Design</th>
<th>Measures</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adewuya et al., 2007</td>
<td>Nigeria</td>
<td>N=175 (88 PLWHA, 87 non-HIV infected)</td>
<td>To estimate the prevalence of psychiatric disorders among PLWHA, as compared to the control group</td>
<td>Single-item question with a likert-type scale (poor, fair, and good)</td>
<td>Poor levels of SS were significantly associate with psychiatric disorders; those with poor SS were up to 11 times more likely to have a disorder</td>
</tr>
<tr>
<td>Adewuya et al., 2009</td>
<td>Nigeria</td>
<td>N=182 PLWHA (86 male, 96 female)</td>
<td>To investigate the correlates of PTSD after experiencing intense forms of stigma</td>
<td>Single-item question with a likert-type scale (poor, fair, and good); focused on support from spouse/partner</td>
<td>Participants with low SS were more likely to have experienced HIV-stigma related PTSD.</td>
</tr>
<tr>
<td>Bajunirwe et al., 2009</td>
<td>Uganda</td>
<td>N=329 PLWHA (107 male, 222 female)</td>
<td>To examine the factors associated with QOL among PLWHA on ART</td>
<td>Utilized Sarason's validated SS scale, which measures tangible, affectionate, and informational SS</td>
<td>Patients perceiving more SS experienced less health distress and perceived themselves to have better health as compared to those with low SS. CD4 count and informational SS were independently associated with having better QOL.</td>
</tr>
<tr>
<td>Kinyanda et al., 2011</td>
<td>Uganda</td>
<td>N=618 (169 male, 449 female)</td>
<td>To examine the prevalence and risk factors of depression</td>
<td>Adapted the European Parasuicide Interview Schedule</td>
<td>SS not associated with depression, but food insecurity was</td>
</tr>
<tr>
<td>Li et al., 2009**</td>
<td>Thailand</td>
<td>N=408 PLWHA (72.5% female)</td>
<td>To examine the relationships between SS, depression, and HIV-related stigma</td>
<td>Composite score of two subscales of Medical Outcomes Study SS Scale</td>
<td>Emotional SS negatively associated with depression; internalized shame and emotional SS significant predictors of depression.</td>
</tr>
<tr>
<td>Li et al., 2011b**</td>
<td>China</td>
<td>N=158 (79 families [79 PLWHA, 70 family members])</td>
<td>To examine the predictive value of SS and family relationships on depression</td>
<td>19-item, validated Medical Outcome Study SS Survey</td>
<td>Negative associations between depressive symptoms and both SS and family relations were observed; finding true for both groups of participants</td>
</tr>
<tr>
<td>Nakimuli-Mpungu et al., 2011**</td>
<td>Uganda</td>
<td>N=500 PLWHA (151 male, 349 female)</td>
<td>To examine the factors associated with having depression</td>
<td>12-item Multidimensional SS Scale, which was validated in Uganda</td>
<td>PLWHA with depressive disorder were less likely to be adherent, have SS, and have self-efficacy</td>
</tr>
<tr>
<td>Tsai et al., 2012</td>
<td>Uganda</td>
<td>N=456 PLWHA (132 male, 324 female)</td>
<td>To examine the relationship between food insecurity and depressive symptoms, as well as the buffering effects of SS</td>
<td>9-item Household Food Insecurity Access Scale and 10-item modified Duke-UNC Functional SS Questionnaire</td>
<td>Food insecurity was associated with depressive symptoms among women; SS buffered the impact of food insecurity on depression</td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Sample Size</td>
<td>Study Objective</td>
<td>Methodology</td>
<td>Findings</td>
</tr>
<tr>
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</tr>
<tr>
<td>Wang et al., 2012**</td>
<td>China</td>
<td>N=1221 (755 AIDS orphans, 466 children of HIV-infected parents)</td>
<td>To examine the relationship between protective factors for depressive symptoms</td>
<td>16-item validated scale for HIV-infected children in rural China</td>
<td>SS, trusting relationships, and future orientation mediated the effects of stigma and traumatic events on depression. HIV-related stigma was negatively related to perceived SS</td>
</tr>
<tr>
<td>Zhao et al., 2011</td>
<td>China</td>
<td>N=1299 HIV-infected children (648 male, 651 female)</td>
<td>To examine the predictive value of functional measures of SS and structural measures of SS to psychosocial outcomes</td>
<td>Study generated, 25-item survey modeled after the Medical Outcome Study SS Survey</td>
<td>SS linked to psychological well-being.</td>
</tr>
</tbody>
</table>

**indicates the use of a validated measures of SS

**Physical Health**

There was limited research linking social support to the physical health of PLWHA in low- and middle-income countries. However, of the research that has been published, we are able to ascertain that social support does play a significant role. For instance, in a cross-sectional study conducted in South Africa, McInerny et al. (2008) provides evidence of a significant, positive relationship between physical functioning and social support among 149 PLWHA. In addition, a study exploring the impact of depressive symptoms and social support on CD4 cell progression and weight change among 1814 PLWHA in Ethiopia showed that strong levels of social support had a positive effect on both weight gain and CD4 cell progression; one unit increase in social support was associated with an average of 10kg increase in weight (Alemu, Haile Mariam, Tsui, Ahmed & Shewamare, 2012). In a randomized control trial assessing the effectiveness of a community-based peer health worker intervention on HIV care in Uganda, 10 AIDS clinics participated in the intervention arm and five served as the control (Chang et al., 2010). Peer health workers provided services with PLWHA both at the clinics and in the patients’ home. These tasks included providing ART counseling and support in group and individually while at the clinic and home visits consisted of health-
related discussions, reviews of symptoms, discussions on adherence, and pill counts. The intervention was associated with decreased virologic failure rates occurring 96 weeks and longer into ART, but did not affect cumulative risk of virologic failure, adherence measures, or short-term virologic outcomes. A similar intervention paired post-test counseling by trained staff with monthly home visits by community support agents focused on uptake of pre-ART care for recently diagnosed program participants in Uganda (Muhamadi et al., 2011). Following implementation of the intervention, program participants were 80% more likely to accept pre-ART care, 67.5% more likely to return for care, and the majority disclosed their serostatus to family as compared to the control group.

Table 4. Summary of Articles on Physical Health and Social Support (SS) Among PLWHA in LMIC

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Sample</th>
<th>Purpose</th>
<th>SS Measurement</th>
<th>Major Findings Related to SS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alemu et al., 2012</td>
<td>Ethiopia</td>
<td>N=1815 PLWHA (667 male, 1056 female)</td>
<td>To explore the effects of depressive symptoms and perceived SS on weight gain and CD4 cell progression</td>
<td>6 questions (5-point rating scale) from the Norbeck SS Questionnaire were used, that measured emotional and tangible support</td>
<td>SS had positive effect on weight and CD4 cell progression</td>
</tr>
<tr>
<td>McInerney et al., 2008*</td>
<td>South Africa</td>
<td>N=149 PLWHA (95.6% female)</td>
<td>To examine the effects of various psychosocial and health-related variables on PLWHA</td>
<td>19-item, validated Medical Outcome Study SS Survey</td>
<td>Significant relationships found between physical functioning and SS</td>
</tr>
<tr>
<td>Rotheram-Borus et al., 2010*</td>
<td>Thailand</td>
<td>N=409 PLWHA (72.6% female)</td>
<td>To examine the influence of family, social relationships and disclosure on the health of PLWHA</td>
<td>19-item, validated Medical Outcome Study SS Survey</td>
<td>Disclosure significantly and positively associated with SS and family functioning. SS significantly associated with health and mental health perceptions, as well as better QOL and fewer depressive symptoms</td>
</tr>
</tbody>
</table>

* indicates the use of a validated measures of SS

Quality of Life and Social Support

Social support has been linked to improved quality of life (QOL) among PLWHA in a variety of settings (Khumsaen, Aoup-Por & Thammachak, 2012; Skevington, Norweg & Standage,
2010). Indeed, in a study assessing the relationship between satisfaction with social support, hope and QOL among PLWHA in Nepal, participants’ overall satisfaction with their social support and hope was significantly and positively correlated with all domains of QOL measured (i.e., physical functioning, psychological functioning, social relationships, environmental functioning, and global functioning). Satisfaction from informational and tangible support was a better predictor of quality of life as compared to satisfaction with emotional support (Yadav et al. 2010). Khumsaen et al (2012) confirmed social support was a statistically significant predictor of QOL. When examining the relationship between personal characteristics, coping style, and social support on QOL among Thai PLWHA, they also found QOL to be related to social support, living with family members, spiritual well-being, monthly income and coping style. Additionally, Rotheram-Borus et al. (2010) found social support to be significantly associated with both better QOL and fewer depressive symptoms. This study of 409 PLWHA in Thailand also documented the significant relationship between social support and PLWHA’s self-perceptions of their physical and mental health.

The concept of health-related quality of life (HRQOL), which encompasses more physical health domains, is important to PLWHA as the disease impacts every part of their daily lives. Social support has been significantly associated with the domains of HRQOL, but Bastardo and Kimberlin (2000) found it to be correlated higher among mental and psychosocial scales than those measuring physical health (e.g., physical functioning and bodily pain).

Interestingly, Tangkawanich, Yunibhand, Thanaslip and Magilvy (2008) found an indirect effect between social support and HRQOL via self-care strategies (e.g., taking vitamins, eating healthy foods, exercise, etc.). In addition, a negative direct effect between social support and symptom experience was revealed. In an intervention providing adherence
support through peer supporters that conducted weekly home-visits in Vietnam, after 12 months, quality of life significantly improved among intervention participants that presented at clinical stages three and four at baseline (Vu et al., 2012).

**Table 5. Summary of Articles on Quality of Life (QOL) and Social Support (SS) Among PLWHA in LMIC**

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Sample</th>
<th>Purpose</th>
<th>SS Measurement</th>
<th>Major Findings Related to SS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N=118 PLWHA (generated not specified)</td>
<td>To examined the relationship between health-related QOL, SS, and measures of physical health</td>
<td>Translated the validated Interpersonal Support Evaluation List into Spanish; 40 true-false questions on tangible, appraisal and emotional SS</td>
<td>SS significantly associated with all domains of health-related quality of life, except physical functioning and bodily pain. Of all independent variables, SS explained the largest amount of variance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N=120 PLWHA (46 male, 74 female)</td>
<td>To examine the relationship between psychosocial factors and QOL</td>
<td>Thai version of the validated Personal Resource Questionnaire, which has 25 items</td>
<td>Higher levels of SS and living with family members had a significant positive relationship with QOL; SS was also a statistically significant predictor of QOL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N=422 PLWHA (188 male, 234 female)</td>
<td>To examine the relationship between SS, self-care strategies and health-related QOL</td>
<td>Thai version of the validated Personal Resource Questionnaire, which has 25 items</td>
<td>SS and self-care strategies had a positive direct effect on health-related QOL. SS had a negative effect on symptom experience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N=160 PLWHA (110 male, 50 female)</td>
<td>To examine the relationship between satisfaction with SS and QOL</td>
<td>Nepali version of the 14-item modified Sarason's SS Questionnaire</td>
<td>Satisfaction with SS correlated with all domains of QOL. Tangible an emotional SS were strong predictors of physical functioning, psychological functioning, and environmental functioning</td>
</tr>
</tbody>
</table>

*indicates the use of a validated measures of SS

**Discussion**

*Key findings from research on social support effects among PLWHA in LMIC*
The aim of this review was to identify and synthesize findings from studies that examined the influence of social support on health-related outcomes among PLWHA in LMIC. We reviewed a total of 46 studies and found that social support was examined relative to the following four categories: adherence to ART medication, mental health, physical health, and quality of life. Based on these studied, we are able to infer that social support is associated with improvement in access and adherence to ART, medication uptake, retention in care, physical functioning, CD4 cell progression, virologic suppression, body weight of PLWHA, and mortality. The concept of social support has also been associated with the following improvements in psychosocial functioning: stronger self-esteem, rates of serostatus disclosure, self-efficacy, family functioning, active coping, and health outlook. Lastly, research suggests social support may lead to reductions in HIV-related stigmatization, psychiatric disorders, depression, psychological distress, and avoidant coping (See Tables 1-5).

The key limitation of the literature on social support and HIV is that measurement of social support differs across studies, with most utilizing a composite score of several distinct components of social support in analysis. The several studies defining and exploring specific types of support did yield results that help illustrate how components of support influence the health domains we identified (See Tables 1-5 for the measures used across studies). The concept of family support was positively associated with increased access and adherence to ART, as well as reductions in depressive symptoms. Though instrumental support was an independent predictor of quality of life, there was conflicting evidence on whether it lessened or improved depression; whereas emotional support was consistently linked to reductions in depression. Informational support appeared to be the most influential of the differing types of support, as it was associated with increased mental and physical health, as well as quality
of life. As Taylor (2007) explains, informational support provides individuals with relevant information, which can thus empower them in decision-making and taking ownership of their health.

Of the 49 articles reviewed, only eight evaluated interventions that contained a distinct component of social support. Five of these interventions focused on adherence support for PLWHA, while three addressed mental health concerns. Although the majority of the interventions studied contained multiple levels (e.g., support groups combined with microfinance and home-based adherence support), none explored the specific components to provide detailed information on which aspects were most beneficial. However, based on these interventions, we can infer that interventions providing social support in the form of nutritional support, adherence support, directly observed treatment, structured peer support groups, microfinancing, and coverage of diagnostic exams and transportation, yield positive outcomes for those with HIV.

The relationship between social support and improved ART adherence is particularly significant. Although they can lengthen life and reduce the changes of onward transmission (Anglemyer, Rutherford, Baggaley, Egger & Siegfried, 2011); ART medications require a strict level of adherence to be effective and minimize drug resistance (Mills et al., 2006b). Patients that develop drug resistance must turn to a second-line ART regimen, but in LMIC these are often far more expensive than first-line regimens (World Health Organization, 2010).

*Directions for future research and intervention on social support*
The majority of social support literature from LMIC is focused on adherence, and rates of adherence are generally high (Tiyou et al., 2010). A recent meta-analysis (Mills et al., 2006b) shows that adherence rates are higher in resource-limited countries as compared to developed countries. Future studies should thus be directed toward less well understood relationships such as the association between income-generating activities, stigmatization and disclosure on health outcomes. These studies have the potential to guide future intervention efforts with significant potential.

Strengthening social support among PLWHA in LMIC cannot occur without also addressing the pervasive stigmatization and discrimination often associated with HIV in these contexts, as well as fear of disclosure of one’s HIV status. In general, research shows a cyclical pattern in which people choose not to disclose their status out of fear of stigma and violence, but that those that do disclose their status are often able to develop strong social support networks and surround themselves with people that are experiencing similar issues in regards to HIV and coping. Findings from this review suggest that those that disclose their HIV status are more likely to adhere to medication, due to increased social support. Anti-stigma campaigns are a potential solution, as more will disclose their HIV status, which may lead to increased social support and all the benefits associated with strong social support.

Multifaceted interventions aimed at increasing social support need to be developed; these interventions would benefit from financial assistance and nutritional support components. The benefits of the varying components need to be analyzed in relation to health outcomes. Indeed, effective strategies to strengthen positive social support need to ascertain what level of social support yields positive health outcomes (i.e., what is an adequate level of social
support?). The varying influence of social support on men, women, and children also needs to be examined further.

In general, the measurement of social support should be improved. Of the 46 studies we included, only 19 used validated measures (developed in high-income countries), and only 3 of the studies validated the instrument in their local settings. Furthermore, the majority of studies were cross-sectional and future study should focus on intervention effects and on trends in social support levels, to understand the dynamic nature of it.

In addition to measurement inconsistency and lack of specificity, there are key areas in need of further study. Limited research has been conducted in LMIC on social support provided by care providers. Research in the US has demonstrated the important role of care provider support on adherence and should be replicated in LMIC. Community-level studies of social support interventions are also lacking.

Despite the limitations in the research directed at social support in LMIC, it is clear that social support plays an important role relative to health outcomes among people with HIV. Researchers should leverage what we know in the development of interventions to improve it among all people living with HIV/AIDS.
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