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Spiritual Coping in People with HIV: Relationship with Medication Adherence, Safer Sexual Practices, and Substance Use

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UNIVERSITY OF MIAMI

SPIRITUAL COPING IN PEOPLE WITH HIV:
RELATIONSHIP WITH MEDICATION ADHERENCE,
SAFER SEXUAL PRACTICES, AND SUBSTANCE USE

By

Sarah M. Henry

A THESIS

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Master of Science

Coral Gables, Florida

May 2013

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Objective: The purpose of the present study was to examine whether spiritual coping (SC) was related to health behaviors, specifically medication adherence, safer sex practices, and substance use as well as depression levels in an HIV+ population over a two year period. In addition, the present study examined whether spiritual coping predicted changes in medication adherence and depression levels over time. **Methods:** This longitudinal study assessed 177 HIV+ and diverse men and women in the midrange of illness as indicated by a CD4 number between 150 and 500 and no previous AIDS-defining symptom. Spiritual coping data and safer sex data were assessed from interviews conducted at baseline assessment and at each follow-up assessment every 6 months for a period of 2 years. Linear Regression was used to examine the relationship between Spiritual Coping and baseline medication adherence, safer sex practices, substance use, and baseline depression levels. Hierarchical Linear Modeling was used to examine whether S change over time in medication adherence and depression controlling for age, gender, ethnicity, education, anti-HIV medication and baseline values for each outcome. **Results:** Spiritual Coping was not significantly related to medication adherence, substance use, safer sexual practices, or depression. Spiritual coping did not significantly predict changes in medication adherence or depression over time. However, subcodes showed that spiritual conflict, spiritual struggle and spiritual guilt were related with less

marijuana use, less cocaine use, and to less use of protection in participants reporting sexual activity with more than one partner, respectively. **Conclusions:** Negative spiritual coping strategies were related to more substance use and risky sexual behaviors in participants reporting sexual activity with more than one partner. No significant relationships were found between spiritual coping and medication adherence or depression. Findings indicate that negative spiritual coping is related to negative health behaviors. These findings suggest that future interventions aimed at reducing negative spiritual coping should be developed as they may help to reduce substance use and risky sexual behaviors in people with HIV.

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Chapter 1: Introduction

Literature regarding the effect of religiosity and spirituality on health and wellbeing has expanded greatly in recent years (Hill & Pargament, 2003). Though there are several areas left to explore, research findings have demonstrated that religion and spirituality are related to various aspects of physical health and mental wellbeing, including successful adaptation to life changes. In particular, religiosity and spirituality have been found to help people cope with adversities that are not readily amenable to change (Pargament, et al., 2005). Adversities that are not readily amenable to change include events such as the loss of loved ones and illness.

Stress and HIV

Human Immunodeficiency Virus (HIV) is an illness that causes a considerable amount of stress in those living with the condition (Ironson & Kremer, 2010). It is estimated that 1.1 million people are living with the condition in the United States alone, and approximately 33.4 million people suffer from HIV and Acquired Immunodeficiency Syndrome (AIDS) worldwide (UN AIDS Epidemic Update, 2009). This particular illness causes considerable distress because people with HIV (PWH) face social stigma, fear of rejection from friends and family, and substantial amounts of uncertainty (Seigel & Lekas, 2002). PWH, like all who live with a chronic condition, also carry the responsibility of following treatment and medication regimens along with making and maintaining necessary lifestyle changes. These behaviors are a significant part of the daily home management, or self-management, of the condition. Stress has significant adverse effects on health outcomes in PWH as it is predictive of more rapid progression to AIDS (Leserman, et al., 2002). This has been replicated in animal models, as

experimentally induced stress has been related to shorter survival in rhesus monkeys with SIDS (Capitaino, et al., 1998). Stress also negatively affects HIV progression due to its negative impact on the immune system (Ironson, et al., 2005) and interferes with people's ability to successfully self-manage the condition (Gore-Felton et al., 2008).

Depression and HIV

Stress has also been strongly linked to the onset, duration, and severity of affective disturbances such as depression (Hammen, 2005) and increases likelihood of depression relapse (Mazure, 1998). PWH are three times more likely to have an affective disorder than those who do not have HIV, even when controlling for sexual orientation and risk behavior (Ciesla, et al., 2001). Depressive symptoms have also been associated with faster progression and poor performance of health behaviors (DiMatteo et al., 2000; Ironson, O'Cleirigh, et al, 2005; Leserman et al., 2002).

Spiritual Coping in HIV

To cope with the above challenges, many rely on their spirituality (Lorenz, et al., 2005). When people turn to their spirituality to cope, they are using spiritual coping. Spiritual coping is defined as a set of cognitive-behavioral skills which focus on the connection to a higher presence that aid in meaning making, positive reframing, self-empowerment, and growth on a personal and/or spiritual level (Kremer& Ironson, 2009).

Spirituality is a powerful tool for coping because elements of spirituality play crucial roles throughout the coping process (Pargament, 1997). Several study findings have highlighted the importance of spirituality in coping with HIV-related stressors (Tarakeshwar, et al., 2005) such as the loss of a loved one to AIDS (Richards, et al., 1999), overcoming guilt and shame for engaging in risky behaviors (Kaldjian, et al.,

1998), and finding a sense of purpose in life (Siegel & Schrimshaw, 2002). Higher levels of spirituality have also been related to long-term survival with HIV (Barroso, 1999; Ironson, Stuetzle, et al., 2006; Ironson & Kremer, 2009). While there is research that examines the impact of spiritual coping on health outcomes, mental well-being, and quality of life in PWH (Gore-Felton, et al., 2008), few studies have investigated the relationship between spiritual coping and health behaviors in this population. The health behaviors that are most relevant to long-term survival with and preventing the transmission of HIV include strict adherence to medication regimens, practicing safer sex, and refraining from substance use. Since coping with stress and adversity are crucial to maintaining health and reliably performing these health behaviors in PWH and since spiritual coping is a potentially powerful coping method, this thesis aims to determine whether the use of spiritual coping is related to performing health behaviors in PWH. Specifically, this thesis will determine whether the use of spiritual coping predicts adherence to medication and substance use, as well as determine whether spiritual coping is related to practicing safe sex. In addition, this thesis will examine depression and substance use as mediators of the relationship between spiritual coping and health behaviors in PWH.

Review of the Literature

Stress and HIV

As previously mentioned, living with HIV poses stressors that are somewhat unique to this particular condition. These include living with a highly socially-stigmatized virus, incorporating having an infectious virus into one's identity, fear of rejection from social support networks, the responsibility of strictly following a highly

complex medication regimen, dealing with medication side effects, the possible losses of friends and loved ones from the condition, and disclosure of serostatus to and subsequent fear of rejection from potential romantic partners (Ironson & Kremer, 2010). The uncertainty inherent in HIV, such as uncertainty about how quickly the virus will replicate and how quickly the condition will progress to disease, has also been identified as a significant source of stress in PWH (Mercier, Reidy, and Maheu, 1999).

Stress negatively affects HIV progression (Ironson, et al., 2005; Leserman, Ironson, et al., 2008) and interferes with self-management of the condition (Gorefelton et al., 2008). Self-management of HIV requires patients to adhere strictly to medication regimens and refrain from risky behaviors such as substance use and unprotected sex. Non-adherence to medication is associated with faster progression, as well as the creation of drug-resistant virus strains and increased risk of transmission (Balfour, et al., 2006; Quinn, et al., 2000). Substance use and practicing unsafe sex are associated with increased risk of transmission and re-infection with different strains of the HIV virus (Marks, Crepaz, & Janssen, 2006; O'Leary, et al., 2005). In addition, maladaptive coping with stress has been found to increase emotional distress and possibly lead to depressive symptoms (Hammen, 2005).

Depression and HIV

Depression also has significant adverse effects on PWH. Depressive symptoms in PWH have been related to declines in immune function as indicated by decreases in CD8+ cells and NK cells (Leserman, et al., 1997). NK cells have a suppressive effect on HIV (Oliva, et al., 1998; Ullum, et al. 1999) as fewer NK cells are related to increased viral load (Ironson, et al., 2001). CD8+ T lymphocyte cells play a role in inhibiting HIV

replication in the early stages of infection (Barker, 1999). In short, depression has a negative impact on HIV progression in PWH. Since maladaptive coping has been related to the increased experience of stress which in turn leads to the increased experience of depression and since both stress and depression are related to worse health outcomes and lower performance of health behaviors in PWH, complete understanding of efficacious coping methods in this population is necessary.

Models of Coping

There are two primary models of coping with stress and adversity. The first is the transactional model of stress and coping. The second adds another layer to the transactional model and is called the meaning-making model of coping.

The Transactional Model of Stress and Coping

The concept of coping developed from the notion that people are not merely passive observers of their surroundings but also are actors upon and interpreters of those surroundings (Pargament, 1997). Interpretations of situations produce behaviors, which in turn affect the situations. This implies a constant person-environment interaction, or transaction. When a situation is interpreted as stressful or threatening, subsequent behaviors aimed at reducing that stress or threat are considered efforts to cope. Using this logic, Lazarus and Folkman (1984) developed a transactional model of stress and coping. In their model, the initial perception of a situation is the “primary appraisal”, defined as “evaluations of life events in terms of their implications for the individual’s well-being” (Pargament, 1997; Lazarus & Folkman, 1984). Primary appraisals evaluate why the situation occurred and the extent to which it is threatening, controllable, or predictable (Park, 2005). To be considered stressful, a life event must threaten or harm something of

importance, or significance, to the individual (Pargament, 1997). The “secondary appraisal” follows the primary appraisal in this model. The secondary appraisal evaluates the resources available to deal with the situation, or more simply put, what can be done about the situation. The combination of both primary and secondary appraisals contributes to the overall level of stress perceived. If few resources are perceived as available to handle the situation, the situation is judged as more stressful. Coping efforts are often aimed at increasing the resources available to handle the situation and therefore decrease distress (Ironson & Kremer, 2010).

The Meaning-Making Model of Stress and Coping

Primary and secondary appraisals are influenced by an individual’s orienting system (Pargament, 1997), or sense of global meaning (Park & Folkman, 1997). An orienting system is defined as the general way a person deals with or views the world (Pargament, 1997). Global meaning is defined as the most generalized and abstract level of meaning and contains a person’s beliefs, expectations, goals, and fundamental assumptions about the world (Park, 2005). Models of coping that include global meaning are meaning-making models of coping (Park & Folkman, 1997). Religion, defined as “a search for significance in ways related to the sacred” (Pargament, 1997) and usually done in an organized setting, and spirituality, defined as a “sense of connection to a higher presence” (Ironson & Kremer, 2011) may function as an individual’s core schema. Core schemas are comprised of beliefs about the self, the world, and their interaction (McIntosh, 1995; Park, 2005) and therefore greatly influence an individual’s orienting system and sense of global meaning. Therefore, since spirituality shapes the core schema and the core schema shapes the global meaning system, spirituality inherently influences

the primary and secondary appraisals of situations as well as the subsequent coping behaviors. It is for this reason that spirituality has been identified as a potentially powerful coping tool; it has the ability to operate on all levels of the meaning-making and transactional coping models at once.

Coping in HIV

Not only is a diagnosis of HIV considered to be a significant life stressor but also the implications of the diagnosis impose a series of subsequent stressors onto the patient with which he or she is then required to cope. Similar to other chronic diseases, differences in coping methods in PWH have been related to differences in HIV progression, mortality, mental health, and health behaviors.

Coping research in HIV has largely focused on the relationship between coping and mortality and HIV progression as measured by immune markers such as CD4+ cell and viral load counts. Ironson and Kremer (2010) thoroughly review the literature on different coping methods in HIV progression and mortality. In the studies reviewed, avoidance coping predicted faster progression to AIDS symptoms or mortality, including one study which (Ironson, O’Cleirigh, et al., 2005) was conducted after the widespread availability of HAART and controlled for medication adherence. Approach-oriented coping was related to fewer symptoms, slower HIV progression, and longer time to an AIDS diagnosis or death. The specific approach-oriented strategies found to relate to better health outcomes in HIV were as follows: maintaining a “fighting spirit” (Solano, et al., 1993), planful problem solving (Vassend & Eskild, 1998), proactive behavior (Ironson, Balbin, et al., 2005), increases in self-efficacy (Ironson, Weiss, et al., 2005), optimistic outlook (Blomkvist et al., 1994), and positive expectancies (Ickovics et al.,

2006). There is some preliminary evidence suggesting that finding meaning may be related to slower HIV progression (Bower, et al., 1998; Ickovics, et al., 2006), though further research is needed to clarify this association.

Additional coping tools and methods have been investigated as possible factors in HIV progression. Some of these include longstanding personality features, emotional expression, interpersonal coping, and spiritual coping. Longstanding personality features related to slower HIV progression include conscientiousness, openness, and extroversion (Ironson, et al., 2008). Emotional expression has been found to slow progression if it goes beyond mere venting (Ashton, et al., 2005) and works towards emotional processing and meaning making (O’Cleirigh, et al., 2002). Social support is also related to slowed HIV progression if that support is long-standing (Leserman, et al., 2002). Since spirituality has been found to play a large part in the lives of PWH, it has also been identified as a potentially powerful coping resource for this population.

Spirituality in HIV

The distinction between religion and spirituality is important to PWH because many identify as themselves spiritual but not as religious (Ironson, et al., 2010). For example, Ironson et al. (2006) found that PWH identified as being significantly more spiritual than religious. Since common notions of religion are associated with traditional institutions, it is possible that more PWH identify as spiritual because of the stigma and shame some of these institutions frequently attach to the condition (Ironson & Kremer, 2010; Pargament, 2004). In support of this, Cotton et al. (2006) found that, after the HIV diagnosis, 25 percent of their sample of PWH felt alienated by their place of worship and 10 percent changed worship locations all together. Spirituality also plays an important

role in the lives of PWH. In a large, nationally representative sample (Lorenz, 2005), 85 percent of PWH identified spirituality as being “somewhat” or “very” important to them while only 65 percent of the same population identified religion as being of the same importance. These findings not only demonstrate that PWH tend to identify as more spiritual than religious, but also show that the majority of PWH consider spirituality to be an important part of their lives.

Study findings have demonstrated that many PWH find turning to their spirituality to be an effective coping method (Coleman, et al., 2006; Cotton et al., 2006). Spirituality is also an efficacious method for coping with the HIV diagnosis itself. Ironson et al. (2006) found that 45% of PWH in their sample experienced an increase in spirituality and/or religiousness in the year following their HIV diagnosis while only 12% experienced a decrease in spirituality. For some, this increase actually transformed their spirituality and, in turn, their global belief system (Kremer & Ironson, 2009). Those who undergo such a spiritual transformation have improved health outcomes, including decreased viral load (Simoni, et al., 2006; Ironson & Kremer, 2009), increased CD4+ cell count, and decreased mortality (Ironson & Kremer, 2009).

Spiritual Coping in HIV

Study findings indicate that PWH draw on their spirituality to help them cope with the stress of the illness (Trevino, et al., 2010). PWH have indicated that spirituality gives them hope, provides meaning to life, empowers them, fosters a feeling of connectedness both to their community and to a higher presence, creates a sense of peace, and ameliorates their suffering (Ironson, et al., 2002; Ironson, Stuetzle, et al., 2006; McCormick, et al., 2001; Park & Folkman, 1997; Tarakeshwar, et al., 2006). Spirituality

also influences the appraisal of stressors by influencing one's perception of the stressful situation (Ironson & Kremer, 2010).

Models of Coping and Spirituality

As previously mentioned, spirituality has the ability to act on all levels of the transactional model of coping simultaneously. It is for this reason that spirituality is viewed as a powerful coping resource.

The Primary Appraisal

The primary appraisal of a stressor is the evaluation of how threatening or harmful the stressor is to the individual. The primary appraisal of a stressor can be influenced by spirituality if the stressor is deemed more manageable because God is helping the person or if the stressor is deemed as a part of the path God has chosen for the individual (e.g. God intended for me to get HIV as part of a divine plan). These are positive ways in which a primary appraisal can deem a stressor less stressful. The primary appraisal of a stressor, however, can be negatively influenced by spirituality if the stressor is deemed a punishment from God. This is one way in which spiritual coping can be maladaptive.

The Secondary Appraisal

The secondary appraisal is the evaluation of the resources a person has readily available with which to handle a stressor. Spirituality can be seen as a resource for managing a stressor if God is viewed as providing the strength with which to handle the issue at hand. Feeling as though one is a vessel for spiritual energy or that one contains "the divine spirit within" (Ironson & Kremer, 2010) is another potential resource

available for managing the stressor. In sum, spirituality can help a person to feel more capable of handling a stressful situation.

Spiritual Coping and Health Outcomes in HIV

Trevino, et al. (2010) examined the relationship between spiritual coping and health outcomes in PWH. They found that those who engaged in positive spiritual coping had better quality of life and better well-being over time than those who exhibited spiritual struggle. Those who exhibited spiritual struggle had faster HIV progression and lower quality of life. Therefore, positive spiritual coping is related to more positive outcomes in PWH.

Health Behaviors in HIV

Medication Adherence

Strictly adhering to medication regimens considerably increases the life expectancies of PWH along with decreasing the risk of transmission because of decreased viral load and decreased risk of viral mutation. HIV is a virus that mutates quickly, and “new generations” of the virus may not respond to available medical treatments. If someone is infected with or develops a drug-resistant strain of HIV, available medical treatments will not help him or her. Less than near-perfect medication adherence opens the door for virus mutation, a primary reason for the importance of medication adherence in HIV. Medication adherence also lowers the amount of virus found in the blood, called viral load. When the viral load is lowered, the risk of transmitting the virus to others is also lowered, though that risk can never be eliminated. HIV medications, however, pose several adverse side effects that affect treatment adherence. Major side effects that lead to

decreased adherence and treatment cessation in PWH include leucopenia, anemia, gastrointestinal upset, and transfusion (Mehta, et al., 1997).

Safer Sex

The Center for Disease Control estimates that approximately 53,000 new HIV infections occur in the United States every year (www.cdc.gov/hiv/). Of those 53,000 new infections, approximately 80% of them are contracted via unsafe sexual practices. At least half of that 80% is transmitted by persons who are aware of their HIV status (Marks, Crepaz, & Janssen, 2006). Therefore, unsafe sexual practices are a primary mechanism of HIV transmission. It is for this reason that the practice of safe sex in PWH is of the utmost importance.

Substance Use

Substance use has been consistently related to poorer decision making and increased engagement in risky behaviors, such as unprotected sex. In addition, certain methods of substance use, most notably drug injection, increase the risk of transmission and acquisition of the virus because of the increased likelihood of blood-to-blood contact. Approximately 31% of men and 57% of women with HIV contract the virus via injection drug use. 1 in 8 PWH screen positive for drug dependence (www.rand.org, 2007).

Approximately 40% of people with HIV use illicit drugs other than marijuana (www.rand.org, 2007). The use of amphetamines has been consistently associated with increased HIV incidence (Buchacz, et al., 2005) due to increased sexual arousal, impaired decision making, and the increased practice of unprotected sex while using these drugs. Cocaine has also been related to increase rate of HIV progression (Cook, et al., 2008).

Alcohol, another substance associated with the practice of unsafe sex, may increase host susceptibility to viral transmission (Poonia, et al. 2006) and increase the progression rate of the condition to disease status (Samet, et al., 2007; Baum et al., 2010). Approximately 8% of people with HIV are heavy alcohol users (www.rand.org, 2007).

It is therefore important that PWH refrain from substance use, which for some means significant changes to their lifestyle. Such lifestyle changes often cause considerable amounts of stress in PWH. In order to adequately perform or refrain from the behaviors mentioned above, it is important for PWH to adaptively cope with this stress.

Coping and Health Behaviors in HIV

Avoidant coping strategies tend to be associated with greater involvement in risk behaviors such as unprotected sex and substance use. They are also related to lower medication adherence (Power, et al., 2003; Weaver, et al., 2005). One exception to this was the finding that positive mood states, typically associated with cognitive coping, were associated with increased risky sexual behavior in men with HIV (Kalichman, et al., 1997). Social support has been related to increased medication adherence, fewer risk-behaviors, and less substance use. Positive reframing and a greater sense of self-efficacy have been related to both better medication adherence and decreased incidence of unprotected sex (Gonzalez, et al., 2004). Finally, action-taking (seeking professional counseling, involvement in skills training) has also been shown to decrease incidence of unprotected sex (Ironson & Hayward, 2008).

Spirituality and Health Behaviors in HIV

Increases in spirituality have also been related to safer sex practices, decreased substance use (Ironson, et al., 2006), and increased medication adherence (Simoni, et al., 2006). However, spirituality has also been related to medication refusal (Kremer, et al., 2006). Spirituality has also been related to fewer depressive symptoms, less psychological distress, and better stress management in PWH (Braxton et al., 2007; Gray & Cason, 2002; Ironson & Kremer, 2010; Perez et al., 2009). Psychological well-being and mastery of stress are of the utmost importance to PWH because the lack of these has deleterious effects on both physical health outcomes and health behaviors (see below). In sum, spirituality is not only important to PWH but also positively effects health outcomes, both physical and psychosocial, and health behaviors.

Psychosocial Factors in Medication Adherence

Stress and Adherence

Many thought the introduction of highly active antiretroviral treatment (HAART) would reduce the amount of stress and emotional distress experienced by PWH because of the extended survival and increased quality of life the new medications offered (Siegel & Lekas, 2002). However, study findings have shown that emotional distress actually increased after HAART was introduced (Lightfoot, et al., 2005; Siegel & Schrimshaw, 2005). It is possible that distress increased because HAART is stressful. Also, high levels of cumulative stressful life events are related to lower medication adherence (Leserman, Ironson, et al., 2006). To be efficacious, HAART requires PWH to maintain near perfect medication adherence to a highly complex regimen that can sometimes consist of twenty or more pills per day. As previously noted, the consequences of poor adherence are not

only faster progression towards disease status due to increased viral loads but also the development of drug resistant HIV strains (Balfour, et al., 2006). Increased viral load simultaneously increases the possibility of infecting others (Quinn, et al., 2000).

Depression and Adherence

Depression also interferes with the ability to adhere to HAART and increase the likelihood of engaging in high-transmission risk behaviors, such as drug use and unprotected sex. Depression not only interferes with HAART adherence but has actually been identified as a primary predictor of poor adherence in PWH (Starace, et al., 2002). Other factors related to poor adherence include confusion about the medication treatment plan (Stone, et al., 2001), difficulty integrating medications into one's daily life (Gifford, et al., 2000), negative perceptions about treatment effectiveness, side effects, and toxicity (Catz, et al., 2000), low perceived social support (Singh, et al., 1999), and decreased perceived quality of life (Carrieri, et al., 2003). Many of these factors could be related to symptoms of depression such as cognitive impairment, sadness, and anhedonia. Other affective disorders, such as generalized anxiety disorder and panic disorder, have been related to poor adherence as well (Tucker, et al., 2003).

Substance Use and Adherence

Substance and alcohol use are also significantly related to lower adherence rates (Arnsten, et al., 2002; Cook, et al., 2001). Of note, the tendency to use alcohol or drugs to cope with stress was identified as a factor related to non-adherence (Arnsten, et al., 2002; Power, et al., 2003).

Factors related to high adherence rates include positive attitude towards medication, high levels of perceived self-efficacy, not living alone (Godin, 2005),

positive states of mind, greater levels of perceived social support (Gonzalez, et al., 2004), and greater perceived partner support (Power, et al., 2003).

Psychosocial Factors in Safer Sex

Depression and Safer Sex

Depression and loneliness (Parsons, et al., 2003) and dysthymia are associated with unsafe sexual practices (Rogers, et al., 2003). It has been proposed that depressive disorders may lead to high-risk sex via pessimistic thinking e.g. “I have nothing left to lose”, (Gold, Skinner, & Ross, 1994), or via maladaptive coping skills (Folkman, et al., 1992). In partial support of the latter, avoidance coping was found to be related to unprotected sexual behavior (Semple, et al., 2000) and interventions aimed to increase positive coping strategies have been shown to decrease high-risk sex behavior (Mausbach, et al., 2007).

Substance Use and Safer Sex

Substance and alcohol use, sometimes used as an avoidant coping strategy, have been consistently associated with unsafe sexual practices and increased risk of transmission in PWH (Halkitis & Parsons, 2002; O’leary, et al., 2005; Stall, et al., 2001). Specifically, stimulants such as cocaine and methamphetamines (especially among men who have sex with men) and alcohol have been related to increased risky sexual behaviors and increased transmission incidence (Buchacz, et al., 2005). Substance use also has been related to increased risk of opportunistic infection and subsequent HIV progression (Lucas, et al., 2005).

Other factors associated with high-risk sexual behavior include a greater number of sexual partners (Darrow, et al., 1998), sexual sensation seeking (Kalichman, 2002), a

greater number of casual sexual encounters with strangers or sex workers (Parsons & Halkitis, 2002), age (Crepaz, et al., 2000), lower education (Denning, et al., 2005), and socioeconomic status (Darrow, et al., 1998). Predictors of long term safe sex practices include having fewer sexual partners, having received professional counseling, involvement in HIV-related organizations, greater levels of perceived social support, and having received social skills training relating to HIV-specific issues (Reilly, et al., 2010).

Psychosocial Factors in Substance Use

Several studies have investigated the role of substance use in HIV acquisition, transmission, and progression in addition to the relationship between substance use and high risk behaviors in HIV patients. Injection drug use has been related to viral acquisition via needle sharing. As demonstrated above, substance use has been related to high risk sexual behavior, which in turn increases the risk of HIV acquisition and transmission. These studies have regarded substance use as related to or a predictor of the outcome of interest. Very few studies have investigated possible predictors of substance use in PWH. One exception is a study conducted by Myers, et al. (2009) that investigated the psychosocial predictors of substance dependence in HIV positive women. Drug dependence was related to greater perceived burden and depression, while alcohol dependence was related to depression and greater perceived social undermining.

Summary and Conclusions

In summary, PWH experience a great deal of stress as a result of the living with the condition. Partially creating this stress are the lifestyle changes that the condition requires. These lifestyle changes include the performance of certain health behaviors such

as adhering strictly to medication regimens, practicing safer sex, and refraining from substance use.

The experience of stress stems from transaction that occurs between the environment or situation and a person's perceptions of that environment or situation. Because it is assumed that stress causes discomfort and that people wish to minimize discomfort, it follows that people take action to reduce their experienced levels of stress when it is perceived. These actions are efforts to cope with the stressor. Lazarus and Folkman (1984) development a model of coping based on the idea that stress results from a transaction between the individual and his or her environment. This model, named the transactional model of coping, consists of 3 major components: primary appraisal, secondary appraisal, and coping behaviors.

Park and Folkman (1997) theorized that the primary and secondary appraisals made by a person are influenced by their orienting system or global beliefs. Integrating this concept, they created a second model of coping, named the meaning-making model of coping. Spirituality may function as a person's orienting system or shape his or her global beliefs.

PWH use different methods for coping with these stressful experiences. Different coping methods have different effects not only on health outcomes but also on the performance of the aforementioned health behaviors.

The majority PWH have indicated that spirituality is an important part of their lives. In fact, many PWH experience an increase in spirituality during the year following their diagnosis. Greater spirituality has also been related to practicing safer sex, better medication adherence, and less substance use. PWH have also indicated that spirituality

is an important resource for coping with the illness. PWH who use positive spiritual coping have better quality of life and greater well-being than those who engage in negative spiritual coping.

PWH have substantial amounts of adversity with which to cope. Not only does the condition cause a great deal of stress, but also PWH are three times as likely to have an affective disorder as those who do not have HIV (Cisela, et al., 2001). Stress and affective disorders such as depression are detrimental to both the performance of health behaviors and health outcomes. Depression is notably related to substance use, which is also implicated in lower performance of health behaviors and worse health outcomes. Spirituality has been related to both lower levels of depression and less substance use (Perez, et al., 2009; Ironson, et al., 2006).

In conclusion, coping with stress in PWH is related to better health and higher performance of health behaviors. Maladaptive coping results in not only worse health outcomes and poorer psychological health but also poor performance of health behaviors. Performance of health behaviors is essential for reducing transmission of the virus and mortality rates in those who have the virus. Spirituality, considered important to many PWH, is considered a potentially highly powerful resource for effectively coping with stress. Spirituality is related to lower levels of depression and reduced substance use. Spiritual coping is also related to better health outcomes in PWH. Therefore, spiritual coping may be related to the performance of health behaviors in PWH.

This thesis aims to examine the relationship between spiritual coping and three HIV-specific health behaviors: medication adherence, safe sex, and substance. Because depression and substance use are related not only to spirituality but also to medication

adherence and the practice of safer sex, this thesis will examine whether depression and substance use play a mediating role in the relationship between spiritual coping and the practice of safer sex and medication adherence.

Chapter 2: Aims and Hypotheses

The main objective of this thesis is to understand the effect of spiritual coping on health behaviors both over time and cross-sectionally in PWH. The health behaviors to be examined include adherence to medication, substance use, and safe sex practices. The effect of positive spiritual coping and negative spiritual coping on health behaviors will be examined. There are six main hypotheses to be tested: 1) Spiritual coping will predict adherence to medications over time; 2) Spiritual coping will predict substance abuse over time; 3) Spiritual coping will be related to safer sex practices; 4) Spiritual coping will be related to depression; 5) Depression and substance use mediate the relationship between spiritual coping and medication adherence; and 6) Depression and substance use mediate the relationship between spiritual coping and safer sex practices.

Aim 1: To determine whether spiritual coping is related to patient adherence to medication regimens cross-sectionally and over time

1. Scores on a continuous measure of spiritual coping are related to medication adherence
2. Those who engage in negative spiritual coping have worse adherence to medications over time than those who engage in positive spiritual coping

Hypothesis 1: Spiritual coping is related to better medication adherence

Aim 2: To determine whether spiritual coping is related to levels of substance use cross-sectionally and over time

1. Scores on a continuous measure of spiritual coping are related to substance use
2. Those who engage in negative spiritual coping have higher levels of substance use over time than those who engage in positive spiritual coping

Hypothesis 2: Spiritual coping is related to less substance use

Aim 3: To determine whether spiritual coping is related to the practice of safer sex in patients with HIV

1. Scores on a continuous measure of spiritual coping is related to self-reported sexual activity
2. Scores on a continuous measure of spiritual coping are related to the practice of safer sex
3. Those who engage in positive spiritual coping practice safer sex more than those who engage in negative spiritual coping

Hypothesis 3: Spiritual coping is related to the practice of safer sex cross-sectionally

Aim 4: To determine whether spiritual coping is related to depression cross-sectionally and over time in patients with HIV

1. Scores on a continuous measure of spiritual coping are related to levels of depression
2. Those who engage in positive spiritual coping experience less depression than those who engage in negative spiritual coping

Hypothesis 4: Spiritual coping is related to depression cross-sectionally and over time

Aim 5: To determine whether depression and substance use mediate the relationship between spiritual coping and medication adherence cross-sectionally and over time

1. Scores on a continuous measure of spiritual coping are related to depression, substance use, and medication adherence

2. Scores on a continuous measure of spiritual coping are related to medication adherence after accounting for the effects of depression and substance use.

Hypothesis 5: Depression and substance use mediate the relationship between spiritual coping and medication adherence cross-sectionally and over time.

Aim 6: To determine whether depression and substance use mediate the relationship between spiritual coping and safer sex practices cross-sectionally

1. Scores on a continuous measure of spiritual coping are related to depression, substance use, and safer sex practices
2. Scores on a continuous measure of spiritual coping are related to safer sex practice after controlling for depression and substance use.

Hypothesis 6: Depression and substance use mediate the relationship between spiritual coping and safer sex practices.

Chapter 3: Methods and Proposed Analyses

Methods

Subjects

There were a total of 177 participants in this study. Participants were part of a larger longitudinal study (Ironson, O’Cleirigh, et al., 2005) and were enrolled on a paid volunteer basis. For recruitment methods and time frame, see Ironson, O’Cleirigh, et al., 2005. Of the 177 participants, 111 were male, 66 were female, 65 were African-American, 53 were Caucasian, and 51 were Hispanic. Of the 111 men, 89 identified as gay. 38 of the 66 women were African-American. Of the 89 gay men, only 9 were African-American males.

The participants were interviewed about how they were coping with HIV and with stressors in their lives. Follow-up interviews at 6-month intervals asked participants about the most stressful event that had occurred in the past 6 months in an effort to identify how they were affected by and coping with significant life events as they occurred. Questions specifically asked about how participants were coping with these events, what enabled them to keep going in the face of HIV, if they experienced positive results from being HIV-positive, and what role spirituality played in coping with HIV and other life traumas.

Because participants were part of a larger parent study, inclusion/exclusion criteria, study design, study procedures, and psychometrics utilized have been published in Ironson, O’Cleirigh, et al., 2005. As such, the following description has been quoted from the aforementioned study. It should be noted that the data for this particular study covers only follow-up assessments through year 4 of the study.

As stated in Ironson, O’Cleirigh, et al., 2005:

Inclusion/exclusion criteria

Subjects were included in this study if they were HIV positive and had CD4 cells between 150 and 500 at study entry, thus capturing people in the midrange of disease who we hypothesized would be most vulnerable to the possible impact of psychosocial factors on HIV disease. Subjects were excluded if they had ever experienced an AIDS-defining (Category C) symptom, ever had CD4 cells below 75, were under age 18, had other life-threatening illnesses (e.g., cancer), were actively psychotic or suicidal, had dementia or current alcohol or drug dependence or current IV use

Design:

This study used a longitudinal design where participants were assessed every 6 months for a period of 2 years. The accrual period lasted 2.5 years, and the study period was from 1997 to 2002.

Procedures:

At baseline, subjects completed written informed consent, psychosocial questionnaires, a clinical assessment interview, and blood draw for CD4 and VL assay. Follow-up visits, repeated every 6 months, included the questionnaire battery, brief interview, and blood draw. Study procedures, including informed consent, were approved by the institutional review board.

Questionnaires & Measures

Participants volunteered their demographic information, medical history, and current psychosocial functioning using self-report questionnaires as well as directly to research staff during interviews.

Adherence

Included in interviews with participants was the AIDS Clinical Trials Group (ACTG) Adherence Measure (Chesney et al., 2000). The ACTG Adherence Measure (AACTG) assesses the extent to which participants have complied with instructions on how to take their anti-HIV medications. It has been shown to have good reliability (Cronbach’s $\alpha > 0.80$) and validity (Reynolds, et al., 2007). The AACTG asks for

medication type, number of missed medication doses in the past four days, number of days within the past four days that all medication doses were missed, frequency with which medication was not taken as directed in the past four days (e.g. participant failed to take medication at proper intervals or under proper conditions such as with or without food), reasons for missing medication doses/not taking medication as directed, and medication side effects participants experienced within the past four weeks. We conceptualized adherence to medication as the proportion of missed medication doses within the previous three days each time the participants were seen for study follow-up. Missed doses were calculated from only three of the four previous days in effort to minimize reporting error.

Safer Sex

The practice of safer sex was measured during the interview. The questions that assessed the practice of safer sex include “Do you currently have a partner?”, “Are you sexually active?”, “Are you currently practicing safer sex?”, “What are you doing to protect yourself?”, and “Is your partner HIV positive?” The presence of sexual activity was categorically coded for (1 = sexually active; 0 = not sexually active).

For those participants who reported being sexually active, interviewers were encouraged to probe for methods of sexual protection, such as condom use, and for the degree of monogamy in romantic relationships. Because the use of protection and number of sexual partners are related to HIV transmission risk, number of sexual partners was further coded with the Monogamy Scale and the frequency with which protection was used during sexual activity was measured with the Protection Scale. Both monogamy and protection were scored on a 5 point Likert scale. Table 1 provides a full description of the

Monogamy scale and table 2 provides a full description of the Protection scale. See Tables 1 and 2 for complete details.

Substance Use

Methods for assessing participants' drug and alcohol use histories can be found in Ironson, O'Cleirigh, et al., 2005. Subsequent substance use was assessed via self-report at baseline and each follow-up with a self-report measure. The self-report measure asked participants to report the frequency with which they had used a list of common substances within the past month. Frequency options included No Use, Once or Twice, About Once a Week, Several Times a Week, and About Every Day. Participants were also asked to report the approximate amount of substance they used per day.

Psychosocial Measures

Depression

The Beck Depression Inventory (BDI-I) was given to participants as a self-report measure of depressive symptoms they experienced within the past week. This measure has also demonstrated good reliability (Pearson $r = 0.93$) and validity (Beck et al., 1961).

Spiritual Coping

Qualitative Content Analysis

The coding agenda used to code participant interviews in this study was developed with qualitative content analysis and was operationalized by Heidemarie Kremer, Marietta Suarez, Jose Guerra, Sarah Henry, and Gail Ironson (www.coding-coping.wikispaces.com). Qualitative content analysis is defined as “a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns” (Hsieh & Shannon,

2005). Qualitative content analysis was chosen because it allows for simultaneous quantitative and qualitative operations (Mayring, 2003). An advantage of qualitative content analysis is its ability to make replicable and valid inferences from qualitative data by allowing themes or categories to emerge from the data instead of from previously conceived concepts and theories. This advantage, however, poses a challenge in that researchers must be careful to properly identify all key concepts and categories to ensure that the data accurately informs research findings. Although it is limited in its ability to understand the nuances of human experience, qualitative content analysis is most useful for developing categories and/or building conceptual models (Hsieh & Shannon, 2005).

Development of Codes for Spiritual Coping

Originally, there were 11 separate factors associated with spiritual coping that were coded for in the interviews. The factors associated with spiritual coping were derived from a thorough review of existing literature on spiritual coping in HIV (Ironson & Kremer, 2010) as well as from the interviews themselves without applying any pre-existing theoretical framework. This allowed the data to inform the coding agenda. As data analysis progressed, additional factors associated with spiritual coping emerged that the original coding agenda did not adequately capture. Table 3 provides a full list of the original spiritual coping factors and a description of each factor. Spiritual practices, spiritual community, and connectedness were among the most common factors coded for in interview transcriptions. Table 6 provides a full updated list of the spiritual coping factors and a description of each factor.

An overall rating on the spiritual coping scale was then given to each interview. This score was determined by how many and how frequently factors of spiritual coping

were mentioned throughout the interview. The spiritual coping rating was originally measured on a 5-point Likert scale that identified how positively or negatively each participant used spiritual coping overall to cope with stress. This scale was expanded to a 9 point likert scale with the intention of increasing variability in the overall spiritual coping ratings. Table 4 provides a full description of the original Spiritual Coping Scale. Table 5 provides a full description of the updated 9-point likert Spiritual Coping Scale.

Participant interviews were tape recorded, compiled, and transcribed. Transcribed interviews included not only the baseline interview but also summaries of follow-up interviews as well as additional information from clinical notes and participant essays on past traumatic experiences. Transcribed interviews were in-depth, sometimes exceeding 20 pages in length. Once all participant interviews, clinical notes, and essays were compiled and transcribed, they were then entered into the qualitative software program Atlas.ti™ and were coded for coping methods used over time by participants to handle life stressors, including stressors associated with HIV.

Four researchers independently coded all interviews, rated overall use of spiritual coping, and identified the presence or absence of factors of spiritual coping.

Training of Raters

Four raters, Nicole Wright, Leona Zatlan, Alejandra Grana, and Maureen Myrttil, rated the interview transcriptions for this study. All raters were undergraduate students trained by Sarah Henry (author) and Marietta Suarez on the updated coding agenda.

It was originally planned that two raters, Sarah Henry (author) and Marietta Suarez, both graduate students, would be used in the ratings of the interview transcriptions for this study, however, one of the graduate student raters left her position

during data analysis. In addition, the students showed better inter-rater reliability than the graduate student raters.

Inter-rater Reliability

To establish inter-rater reliability of the original coding agenda, 10 raters, all trained by Dr. Heidemarie Kremer and Marietta Suarez, each coded the same 10 randomly selected interviews. Inter-rater reliability between the 10 raters was established using the Cronbach's Alpha (Cronbach, 1951) test of reliability for ordinal scales and nominal scales ($\alpha = 0.86$). In addition, we examined inter-rater reliability between the two graduate student raters using Cohen's Kappa (Cohen, 1960) for nominal scales ($\alpha = 0.73$) and Kendall's Tau *B* for ordinal scales.

To establish inter-rater reliability of the revised coding agenda, 4 raters, all trained by Sarah Henry and Marietta Suarez, each coded the same 9 randomly selected interviews. Inter-rater reliability between the 4 raters was established using the Cronbach's Alpha (Cronbach, 1951) test of reliability for ordinal scales and nominal scales. For data on inter-rater reliability, see Table 7.

Proposed Analyses

Cross-sectional Analyses

The cross-sectional analyses of aims 1 (spiritual coping is related to medication adherence), 2 (spiritual coping is related to substance use), 3 (spiritual coping is related to self-reported sexual activity and safer sex), 4 (spiritual coping is related to depression), 5 (depression and substance use mediate the relationship between spiritual coping and medication adherence) and 6 (depression and substance use mediate the relationship between spiritual coping and safer sex) used Linear Regression (LR) (Pedhazur, 1997).

Within these analyses, it was determined if the use of spiritual coping is related to the practice of medication adherence, substance use, sexual activity, safer sex practices, and depression cross-sectionally and whether depression and substance use mediate the relationship between spiritual coping and medication adherence and safer sex. LR was chosen because it allowed us to calculate the degree to which spiritual coping is related to safer sex practices. It also allows us to control for important variables that differ for each participant such as age, gender, level of education, and ethnicity. For illustrative purposes, the outcome measure below is medication adherence. The LR models that were used to understand the relationship between substance use, sexual activity, safer sex practices, and depression was the same as the equations below for medication adherence, substituting the different outcome variables for medication adherence. Any differences that arose upon data analysis was documented and adjusted for.

Proposed Regression Equations for Testing Relationships to Outcome Variables

$$Y(\text{medication adherence})_i = a_i + \beta_1(\text{age})_i + \beta_2(\text{gender})_i + \beta_3(\text{ethnicity})_i + \beta_4(\text{education})_i + \beta_5(\text{spiritual coping})_i + e_i$$

Where:

Y_i = Medication adherence for participant i

a_i = Mean of the dependent variable in the population in the absence of spiritual coping

β_{5i} = Regression coefficient representing the effect of Spiritual Coping on Medication Adherence for participant i

β_{1i} - β_{4i} = Effect of the a priori covariates on change in medication adherence

e_i = Error term for participant i

The test of significance of the β_5 coefficient determines whether spiritual coping is significantly related to medication adherence. In order to test whether depression mediates the relationship between spiritual coping and medication adherence, spiritual coping and depression must first be significantly related to the outcome variable

independently. Mediation by depression is signified if the relationship between spiritual coping and medication adherence is no longer significant after adding depression into the model as a mediator but depression continues to be significantly related to adherence.

The LR models that were used to determine whether depression mediates the relationship between substance use and spiritual coping as well as between safer sex practices and spiritual coping were the same as the equations below for medication adherence, substituting the different outcome variables for medication adherence. Any differences that arose upon data analysis were documented and adjusted for.

Proposed Regression Equations for Testing Mediation

$$Y(\text{medication adherence})_i = a_i + \beta_1(\text{age})_i + \beta_2(\text{gender})_i + \beta_3(\text{ethnicity})_i + \beta_4(\text{education})_i + \beta_5(\text{spiritual coping})_i$$

$$Y(\text{medication adherence})_i = a_i + \beta_1(\text{age})_i + \beta_2(\text{gender})_i + \beta_3(\text{ethnicity})_i + \beta_4(\text{education})_i + \beta_5(\text{DEP})_i$$

$$Y(\text{medication adherence})_i = a_i + \beta_1(\text{age})_i + \beta_2(\text{gender})_i + \beta_3(\text{ethnicity})_i + \beta_4(\text{education})_i + \beta_5(\text{spiritual coping})_i + \beta_6(\text{DEP})_i + e_i$$

$$\text{DEP}^* = \text{Scores on BDI}$$

Longitudinal Analyses

The longitudinal analyses of aims 1 (spiritual coping is related to medication adherence over time), 2 (spiritual coping is related to substance use over time), 4 (spiritual coping is related to depression over time), and 5 (depression mediates the relationships between spiritual coping and medication adherence) used Hierarchical Linear Modeling (HLM) (Bryk & Raudenbush, 2002; Raudenbush et al., 2002) to explore the associations between spiritual coping and medication adherence, substance use, and depression over four years. Within these analyses, it was determined if the use of spiritual coping is related changes in medication adherence, substance use, and depression. HLM was chosen because it allowed for the prediction of the slope of medication adherence,

substance use, and depression over time. HLM also allowed us to control for age, gender education, and ethnicity. These demographic variables differ between participants. Medications prescribed were also controlled for due to the possibility of them varying over time. Outcome measures were adherence to medication, substance use, and depression.

Variance in medication adherence, substance use, and depression was separated into two levels. Those attributes that differ within subject, such as amount of time between assessments since baseline, type of HIV medication (no medication, combination therapy, or HAART), and the interaction between elapsed time and type of HIV medication were evaluated at the first level of analysis. Including a variable that modeled the amount of time between assessments created the structure needed to model the slope and intercept.

Those attributes that differ between subject, such as age, ethnicity, gender, and education level, were evaluated at the second level of analysis (coded 1 = male, 0 = female), race (coded 1 = non-Hispanic, Caucasian, 0 = other), and education (coded 0 = less than high school, 1 = some high school, 2 = high school graduate, 3 = trade-school or some college, 4 = college graduate, 5 = graduate degree).. These variables were chosen due to prior research demonstrating their relationship to different coping styles. HIV disease progression often impacts the ability to work; therefore, education level was used as a proxy for SES to account for the effect of disease on income. The predictors spiritual coping and depression were included in level 2 to determine the main effects of spiritual coping and depression on health behaviors. We centered all continuous variables and we dummy coded (with zero as the lowest level) all categorical variables.

Proposed equations for analyses are below. The HML models described use medication adherence as the outcome variables for illustrative purposes. The HLM models that were used to test whether spiritual coping is related to substance use and depression were predicted to be the same as the equations above for medication adherence. Any differences that arose upon data analysis were documented and adjusted for.

Proposed HLM Equations for Testing Relationships to Outcome Variables

Level 1:

$$Y_{ti} = \beta_{0i} + \beta_{1i}(\text{months since baseline})_{ti} + \beta_{2i}(\text{antiretroviral1})_{ti} + \beta_{3i}(\text{antiretroviral2})_{ti} + \beta_{4i}(\text{antiretroviral1} \times \text{time})_{ti} + \beta_{5i}(\text{antiretroviral2} \times \text{time})_{ti} + e_{ti}$$

Where:

Y_{ti} = Medication adherence for participant i at time point t

β_{0i} = Medication adherence for the ith participant

β_{1i} = Slope representing change in medication adherence for participant i

$\beta_{2i}, \beta_{3i}, \beta_{4i}, \beta_{5i}$ = Slopes for dummy coded HIV medication variables and the interaction of antiretroviral medications and months since baseline, allowing us to control for changes in medication adherence possibly resulting from differences in medication.

e_{ti} = Error term for participant i at time t

In order to examine individual differences in level 1 change parameters, level 2 equations are needed.

Level 2:

$$\beta_{0i} \text{ (intercept)} = \gamma_{00} + u_0$$

$$\beta_{1i} \text{ (slope of medication adherence)} = \gamma_{10} + \gamma_{11}(\text{baseline medication adherence}) + \gamma_{12}(\text{age})_i + \gamma_{13}(\text{gender})_i + \gamma_{14}(\text{ethnicity})_i + \gamma_{15}(\text{education})_i + \gamma_{16}(\text{spiritual coping})_i + u_1$$

$$\beta_{2i}, \beta_{3i} = \gamma_{20}, \gamma_{30} \text{ (antiretroviral 1 or 2),}$$

$$\beta_{4i}, \beta_{5i} = \gamma_{40}, \gamma_{50} \text{ (antiretroviral 1 or 2} \times \text{time)}$$

Where:

γ_{00} = Group average of medication adherence

γ_{10} = Average change in medication adherence each time point

γ_{20} and γ_{30} = Average effect on level of medication adherence across patients from antiretroviral 1 or 2

γ_{40} and γ_{50} = Average effect on change in medication adherence across patients from antiretroviral 1 or 2

γ_{11} – γ_{15} = Effect of the a priori covariates on change in medication adherence

γ_{16} = Effect of individual differences on medication adherence slope (γ_{10}) attributable to spiritual coping

$u_{0, 1}$ = unexplained individual variance related to the estimation of the γ coefficients.

In order to examine whether depression mediates the relationship between spiritual coping and medication adherence and substance use, spiritual coping had to first be significantly related to the health behavior independently, and depression had to be related to the health behavior. Mediation of depression is indicated when the relationship between spiritual coping and health behaviors weakens to non-significance when depression is added into the model.

Proposed HLM Equations for Testing Mediation

Mediation:

$$\beta_{1i} \text{ (slope of medication adherence)} = \gamma_{10} + \gamma_{11} \text{ (baseline medication adherence)}_i + \gamma_{12} \text{ (age)}_i + \gamma_{13} \text{ (gender)}_i + \gamma_{14} \text{ (ethnicity)}_i + \gamma_{15} \text{ (education)}_i + \gamma_{16} \text{ (spiritual coping)}_i + u_1$$

$$\beta_{1i} \text{ (slope of medication adherence)} = \gamma_{10} + \gamma_{11} \text{ (baseline medication adherence)}_i + \gamma_{12} \text{ (age)}_i + \gamma_{13} \text{ (gender)}_i + \gamma_{14} \text{ (ethnicity)}_i + \gamma_{15} \text{ (education)}_i + \gamma_{16} \text{ (DEP)}_i + u_1$$

$$\beta_{1i} \text{ (slope of medication adherence)} = \gamma_{10} + \gamma_{11} \text{ (baseline medication adherence)}_i + \gamma_{12} \text{ (age)}_i + \gamma_{13} \text{ (gender)}_i + \gamma_{14} \text{ (ethnicity)}_i + \gamma_{15} \text{ (education)}_i + \gamma_{16} \text{ (spiritual coping)}_i + \gamma_{17} \text{ (DEP)}_i + u_1$$

DEP* = Scores on BDI

Mediation is established if spiritual coping is no longer significantly related to medication adherence after adding depression to the equation, but depression remains significantly associated with medication adherence. The HLM models that were used to determine whether depression mediates the relationship between substance use and spiritual coping were predicted to be the same as the equations above for medication

adherence. The HLM models that were used to determine whether substance use mediates the relationship between spiritual coping and medication adherence were also predicted to be the same as the equations above with depression replaced by substance use. Any differences that arose upon data analysis were documented and adjusted for.

Subsequent Analyses

Positive Response Bias on Medication Adherence Questionnaire

In effort control for possible positive bias of self-report responses on the AACTG, we conducted a secondary analysis that excluded those participants who reported >95% medication adherence rates but had a detectable viral load. Bias is a systematic error that tends to push reported scores towards one extreme end. Medication adherence questionnaires in PWH tend to demonstrate positive response bias meaning that participants tend to over-report their levels of medication adherence (Knobel, et al., 2002). Failing to account for systematic reporting bias in medication adherence would skew the significance tests of the relationship between spiritual coping and medication adherence. A possible explanation for a positive reporting bias is that participants might want others to think they are taking good care of their health and adequately managing their condition.

Ethnic and Minority Differences in Spiritual Coping

Previous research on spiritual coping in PWH has found that women and minorities are more likely to use spiritual coping to cope with stress and adversity (Tarakeshwar, Hansen, et al., 2005). To evaluate whether this pattern persists in the current study, we conducted subgroup analyses to see if the use of spiritual coping differs by gender and ethnicity. We examined the means for spiritual coping in the two largest

minority groups to see if there is a significant difference. We hypothesized our two largest minority groups would be African-American females and gay men. Moderator analyses using demographic information were conducted as needed. Also, denominational affiliation is reported in percentages by gender, ethnicity, and sexual orientation.

Chapter 4. Results

Sample Characteristics

Participants ($n = 177$) came from a larger longitudinal study (Ironson, O’Cleirigh, et al., 2005). Demographic and medical information are located in the cited publication. Demographic information relevant to this particular study (gender, ethnicity, and education) is located in Table 8. At baseline, 77% of participants reported taking antiretroviral medications. At the two year follow-up, 90% of participants reported taking antiretroviral medications. Mean BDI-II scores for each time point can be found in Table 9. Participants varied on substance use, both in type of substance as well as frequency with which each individual substance was used. This is demonstrated by the descriptive information on baseline substance use in Table 10. Descriptive information for participant use of specific aspects of spiritual coping can be found in Table 11.

Testing of the Hypotheses

The basic Linear Regression and HLM models as well as equations and explanations can be found in the “Methods” section on pages 29-34.

Prediction to Medication Adherence

Table 12 and Table 13 contain the results and significance tests for basic model used to predict medication adherence change while controlling for antiretroviral medications and time since baseline. SC was not significantly related to medication adherence at baseline ($\beta = -0.011, p = 0.393$). Education level was positively related to medication adherence ($\beta = -0.041, p = 0.001$). The use of SC was not significantly related to medication adherence over time ($\gamma_{11} = -0.0004, t(145) = -1.024, p = .308$). There was no significant change in slope of medication adherence over time. There was, however,

significant individual variation in medication adherence change over time ($\chi^2 (131) = 162.94, p = .03$). Because SC was not related to medication adherence, analyses to see if depression mediated the relationship between SC and medication adherence were not conducted.

Interpretation

These findings do not support the hypothesis that SC is related to medication adherence and predicts medication adherence over time. Because SC was not significantly related to medication adherence, hypothesis 5 (depression and substance use mediate the relationship between SC and medication adherence) was not tested.

Spiritual Coping Subcodes and Medication Adherence

Table 14 contains the significance tests for the cross-sectional relationship between the spiritual coping subcodes and medication adherence. There were no significant relationships between the subcodes and medication adherence; however, the relationship between Spiritual Meaning and medication adherence while not statistically significant does show a trend ($\beta = -0.092, p = 0.089$) such that those individuals who find more spiritual meaning in their lives are more adherent to medication regimens.

Table 15 contains the significance tests for the predictive ability of the spiritual coping subcodes on the change in medication adherence over time. The SC subcodes did not significantly predict changes in depression scores over time. There was, however, a predictive trend between Spiritual Meaning and medication adherence ($\gamma_{11} = -0.0031, t (145) = -1.838, p = .068$) indicating that those individuals who find more spiritual meaning in their lives may be more adherent to medication regimens over time.

Relationship to Substance Use

Table 16 contains the basic model results and significance tests for the relationship between SC and substance use. A Linear Regression (LR) was performed using the average of self-reported substance use over two time points (baseline and follow-up) as a measure of substance use. Five separate substances were tested for: Alcohol, Marijuana, Cocaine, Opiates, and Tranquilizers. SC was not significantly related to any of the substances tested, though significance level for Alcohol ($\beta = -0.139, p = 0.075$) shows a possible negative trend indicating that participants who engaged in more spiritual coping were less likely to use alcohol. Female gender ($\beta = -0.192, p = 0.027$) and ethnicity ($\beta = -0.157, p = 0.041$) were significantly related to less marijuana use but no other covariates were significantly related to substance use.

Interpretation

These findings do not support the hypothesis that SC is related to substance use. Because SC was not significantly related to substance use, hypothesis 6 (depression mediates the relationship between SC and substance use) was not tested.

Spiritual Coping Subcodes and Substance use

Table 17 contains the significance tests for the relationship between all SC subcodes and substance use divided by substance. There was a significant positive relationship between spiritual conflict and marijuana use ($\beta = 0.158, p = 0.042$), indicating that those who experiences greater levels of spiritual conflict were more likely to use marijuana. There was a positive trend identified between the absence of spiritual coping and marijuana use ($\beta = 0.131, p = 0.085$). This indicates that those individuals who did not engage in any kind of spiritual coping may have been more likely to use

marijuana. There was a negative trend identified between spiritual comfort and marijuana use ($\beta = -0.138, p = 0.080$). This indicates that those who found comfort in their spirituality may have been less likely to use marijuana. There was an additional negative trend identified between spiritual empowerment and marijuana use ($\beta = -0.141, p = 0.073$). This indicates that those participants who felt empowered by their spirituality may have been less like to use marijuana.

There was a significant negative relationship identified between spiritual struggle and cocaine use ($\beta = -0.158, p = 0.041$). This relationship was in the opposite direction than expected as this indicates that those individuals who experienced greater struggle with their spirituality were less likely to use cocaine. This relationship should be replicated in future research. There was a positive trend identified between spiritual meaning and tranquilizer use ($\beta = 0.129, p = 0.099$). This trend was in the opposite direction than expected as this indicates that those individuals who found greater meaning through their spirituality may have been more likely to use tranquilizers. Further replication of this trend in future research is recommended.

There were no trends or significant relationships identified between the SC subcodes and alcohol use or opiate use.

Safer Sex

Table 18 contains the basic model results and significance tests for the relationship between SC and safer sex practices. Safer sexual practices were conceptualized as two separate behaviors. The first was the frequency with which protection was used during sexual encounters and the second was the degree to which

participants were monogamous. A LR was performed using a summary rating of safer sexual behaviors of all participant time points.

SC was not significantly related to either the use of protection (Protection) or to the degree to which participants were monogamous (Monogamy). Only female gender ($\beta = -0.781, p = 0.001$) and higher education ($\beta = 0.173, p = 0.006$) were significantly related to Monogamy. No other covariates were significantly related to safer sexual practices. This indicates that being female is related to having fewer sexual partners while higher education is related to having a greater number of sexual partners.

Interpretation

These findings do not support the hypothesis that SC is related to safer sexual behaviors. Because SC was not significantly related to safer sexual practices, hypothesis 6 (depression and substance use mediate the relationship between SC and safer sexual behaviors) was not tested.

Spiritual Coping Subcodes and Safer Sex

Table 20 contains the significance tests for the relationship between all SC subcodes and safer sexual practices. No significant relationships were identified.

Post-Hoc Analysis

A post-hoc analysis was conducted to examine the relationship between SC and safer sexual behaviors in only those participants who reported sexual activity with more than one person (a rating on the monogamy scale > 1). Table 19 contains the significance tests for the relationship between SC and both the monogamy and protection rating scales. When these participants were excluded from analyses, SC was not significantly related to the use of protection ($\beta = -0.183, p = 0.182$) nor was SC significantly related to

monogamy ($\beta = -0.115, p = 0.348$). Only older age was significantly related to Monogamy in sexually active participants ($\beta = 0.037, p = 0.032$).

Table 21 contains the significance tests for the relationship between all SC subcodes and safer sexual practices in sexually active participants. There was a negative trend between Spiritual Gratitude and Monogamy, suggesting that those sexually active participants who express greater spiritual gratitude may tend to have fewer sexual partners ($\beta = -0.541, p = 0.068$). There was also a negative trend between Spiritual Growth and Monogamy, suggesting that those sexually active participants who experience Spiritual Growth may tend to have fewer sexual partners ($\beta = -0.541, p = 0.063$).

There was a significant positive relationship between Spiritual Guilt and protection, indicating that those sexually active participants who express Spiritual Guilt tend to engage in unprotected sex more frequently ($\beta = -0.815, p = 0.028$).

Prediction to Depression

Table 22 and Table 23 contain the results and significance tests for model used to predict change in depression while controlling for antiretroviral medications and time since baseline. SC was not significantly related to depression at baseline ($\beta = -0.581, p = 0.185$). Only higher education was significantly related to lower levels of depression at baseline ($\beta = -1.139, p = 0.012$). The use of SC was not significantly related to depression change over time ($\gamma_{11} = -0.017, t(160) = -0.911, p = .364$). There was no significant change in slope of depression over time. Older age significantly predicted lower levels of depression over time ($\gamma_{11} = -0.008, t(160) = -2.239, p = .026$). Male gender significantly predicted lower levels of depression over time ($\gamma_{11} = -0.171, t(160) = -2.288, p = .023$).

Higher education also significantly predicted lower levels of depression over time ($\gamma_{11} = -0.048$, $t(160) = -2.186$, $p = .030$). No other covariates significantly predicted depression levels over time. There was, however, significant individual variation in depression change over time ($\chi^2(158) = 274.679$, $p < .001$).

Interpretation

These findings do not support the hypothesis that SC is significantly related to depression and predicts levels of depression over time.

Depression and Spiritual Coping Subcodes

Table 24 contains the significance tests for the cross-sectional relationship between the spiritual coping subcodes and baseline depression. There were no significant relationships between the subcodes and depression; however, the relationship between Spiritual Meaning and depression while not statistically significant does suggest a possible trend ($\beta = -0.131$, $p = 0.087$) such that those individuals who find more spiritual meaning in their lives experience lower levels of depression.

Table 25 contains the significance tests for the predictive ability of the spiritual coping subcodes on the change in depression over time. The SC subcodes did not significantly predict changes in depression scores over time. There was, however, a predictive trend between Spiritual Struggle and depression over time ($\gamma_{11} = -0.105$, $t(145) = -1.685$, $p = .093$) although in the opposite direction than expected. This indicates that those individuals who experience more spiritual struggle in their lives are possibly less depressed over time.

Chapter 5. Discussion

Medication Adherence

The hypothesis that spiritual coping would be related to medication adherence at baseline and predict medication adherence over time was not supported by our data. In addition, the spiritual coping subcodes were also non-significantly related to medication adherence at baseline and did not show predictive ability to medication adherence over time. Interestingly, this finding is discordant with a previous finding by Simoni, et al. (2006) where increases in spirituality were related to increased medication adherence. Simoni et al. (2006), however, did not assess the degree to which the participants' sense of spirituality played a role in their ability to cope with adversity, although spirituality has been related to better stress management (Perez, et al., 2009; Braxton, et al., 2007).

Despite the lack of significant relationships between SC and medication adherence, there were trends identified between spiritual meaning and medication adherence both at baseline and over time. Specifically, greater spiritual meaning in one's life showed a non-significant trend towards better medication adherence both cross-sectionally and over time.

Substance Use

The hypothesis that spiritual coping would be related to substance use was not supported by our data. There were five substances included in analyses that investigated the relationship between spiritual coping and substance use. Those included: alcohol, marijuana, cocaine, tranquilizers, and opiates. We excluded amphetamines and hallucinogens from analysis due to low numbers of participants who reported using these substances. Because amphetamines have specifically been identified as a factor

associated with increased risky sexual behavior and increased risk of HIV transmission (Poonia, et al., 2006), further research investigating the relationship between spiritual coping and amphetamine use is needed.

Alcohol

There was a trend identified between spiritual coping and alcohol use such that those who engage in more positive spiritual coping may be less likely to use alcohol. This trend is consistent with a finding by Cotton, et al., (2006) in which spirituality was related to less alcohol use. Interestingly, no subcodes of spiritual coping were significantly related to alcohol use.

Marijuana

There was a significant positive relationship between spiritual conflict (a subcode of spiritual coping) and marijuana use, indicating that those individuals who expressed some conflict with their spirituality (such as believing that homosexuality was a sin in the eyes of God yet self-identifying as homosexual) were more likely to use marijuana. Very few studies have investigated possible predictors of substance use in PWH and those that have been conducted do not investigate the role of spirituality and spiritual coping in substance use. Therefore, this is a unique finding that should be investigated further in future research. In addition, there was a positive trend identified between the absence of spiritual coping and marijuana use such that those individuals who did not use their spirituality in any way to cope with adversity may have been more likely to use marijuana. Again, due to the lack of available research identifying predictive factors associated with substance use in PWH, this possible relationship requires further research. In addition, there is a lack of research investigating the role of negative spiritual

coping strategies and substance use in PWH, which further highlights the need for additional investigation.

There were two non-significant trends additional trends between the SC subcodes and marijuana use. Both spiritual comfort and spiritual empowerment showed trends towards less marijuana use. These trends are consistent with similar findings by Pence, et al., (2008) in which religious coping was related to less drug and alcohol use, although this finding did not identify the specific aspects of religious coping that were most salient for decreases in substance use.

Cocaine

There was no significant relationship identified between SC and cocaine use. There was, however, a significant negative relationship identified between spiritual struggle and cocaine use, indicating that those individuals who experience less spiritual struggle were more likely to use cocaine. This result is in the opposite direction than expected as spiritual struggle was hypothesized to be associated with more negative health behaviors. It is possible that this finding was influenced by the small number of individuals in our sample who experienced spiritual struggle as well as the small number of individuals who reported cocaine use. *Tranquilizers*

There was no significant trend identified between SC and tranquilizer use. There was, however, a significant positive relationship identified between spiritual meaning and tranquilizer use. This result is in the opposite direction than expected as spiritual meaning was hypothesized to be associated with more positive health behaviors. It is possible that this finding was also influenced by the small number of individuals in our sample who

found meaning through their spirituality and the small number of individuals who reported tranquilizer use.

Opiates

There were no significant relationships identified between SC and opiate use or between the SC subcodes and opiate use. In addition, no trends were identified.

Safer Sex

The hypothesis that spiritual coping would be related to safer sexual practices, specifically the use of protection and fewer numbers of sexual partners, was not supported by our data. In addition, there were no significant relationships identified between either the use of protection or the number of sexual partners and the SC subcodes. Upon reviewing the data, many of our participants reported either not being sexually active at all or being in completely monogamous relationships.

Safer Sex Post-Hoc Analysis

A post-hoc analysis was conducted with only those participants who identified themselves as being sexually active with more than one person (a rating on the monogamy scale greater than 1). Within this subset of participants (n=65), there were no significant relationships identified between spiritual coping and the use of protection or the number of sexual partners.

There was a negative trend between spiritual gratitude and monogamy, suggesting that those sexually active participants who experience greater levels of spiritual gratitude may have fewer sexual partners. It has been suggested in prior research (Tarakeshwar, et al., 2006) that a greater sense of spiritual gratitude results from the

spiritual reflection some PWH experience after diagnosis, though prior research has not associated this increased gratitude with any specific health behaviors in PWH.

There was an additional negative trend between spiritual growth and monogamy, suggesting that those sexually active participants who experience spiritual growth may have fewer sexual partners. It has been established that many PWH experience an increase in spirituality after their diagnosis. Increases in spirituality and spiritual transformations in PWH have been associated with less substance use, sustained recovery from addiction, and improved quality of life (Kremer & Ironson, 2009) as well as improved health outcomes (Simoni, et al., 2006). Increases in spirituality, however, have yet to be associated with specific sexual behaviors in PWH. The trend between spiritual growth and having fewer sexual partners in PWH should be investigated further in future research.

There was a significant positive relationship identified between spiritual guilt and protection, suggesting that those sexually active participants who experienced spiritual guilt were more likely to engage in unprotected sex. Spiritual guilt was conceptualized as an aspect of negative spiritual coping. Prior research on negative spiritual coping in PWH has investigated the effect of spiritual struggle on outcomes in PWH (Trevino, et al., 2010) and the effect a negative view of God has on disease progression in PWH (Ironson, et al., 2011) but no prior research has specifically examined the relationship between risky sexual behavior and negative spiritual coping, especially spiritual guilt. Further investigation into this relationship is recommended.

Depression

The hypothesis that spiritual coping would be related to depression at baseline and predict depression over time was not supported by our data. However, spiritual meaning showed a non-significant trend towards lower levels of depression at baseline.

Interestingly, depression is a primary predictor of medication adherence such that greater levels of depression are related to lower medication adherence (Starace, et al., 2002) and our data found a trend that spiritual meaning may also related to better medication adherence at baseline. Unlike medication adherence, spiritual meaning did not show any trend with levels of depression over time.

There was a negative predictive trend between spiritual struggle, an aspect of negative spiritual coping, and depression over time. Specifically, this suggests that those individuals who experience more spiritual struggle over time could possibly show decreases in levels of depression over time. This finding is in the opposite direction than expected as spiritual struggle has been shown to predict depressive symptoms in PWH as well as decreased in CD4 cell count (Trevino, et al., 2010). The discrepancy in findings may be the result actually measuring different things as the definition of spiritual struggle has not been widely agreed upon. For example, Trevino, et al (2010) included anger towards God as a part of spiritual struggle while we separated anger towards God into a separate category labels “spiritual anger”.

Conclusions

Although the overall spiritual coping was not significantly related to health behaviors in PWH, there were interesting relationships and trends identified between the health behaviors examined and different aspects of spiritual coping.

Medication Adherence

The trend identified between spiritual meaning and medication adherence is congruent with previous research that demonstrates a predictive relationship between meaning in life and medication adherence in women with HIV (Westling, et al., 2007). This study, however, did not specifically relate meaning in life related to spirituality. It is possible that the trend was not significant because of the small number of participants that found meaning through their spirituality in our sample (15% of the sample, see table 3). Therefore, this trend requires further investigation.

Substance Use

The negative trend between spiritual coping and alcohol use suggests that engaging in positive spiritual coping may be related to less alcohol use. Because alcohol use has been associated with increased disease progression in PWH and increases the chances of disease transmission (Samet, et al., 2007; Baum, et al., 2010), identifying factors that are associated with decreased use of alcohol has clinical relevance.

In addition, the use of positive aspects of spiritual coping may be related to less substance use, as indicated by the trends between spiritual comfort and spiritual empowerment with less use of marijuana. To further support the notion that positive spiritual coping may be related to less substance use, two negative aspects of spiritual coping demonstrated trends with increased use of marijuana, specifically spiritual conflict and the absence of spiritual coping.

There were, however, two unexpected findings that related aspects of spiritual coping to the use of substances. Specifically, higher levels of reported spiritual struggle were related to lower levels of reported cocaine use. This finding may have been skewed

due to small sample size as only 11.3% of our sample (n = 20) reported using cocaine at any point in their life. Also, spiritual meaning (previously trended with increased medication adherence in the present study) was associated with increased use of tranquilizers. Our sample had both low numbers of people who reported using tranquilizers (n = 17, 9.3%) and low numbers of those reporting finding meaning in life through their spirituality (n = 28, 15.9%). As a result, these findings could have been influenced by our specific sample and therefore not representative of the general population.

Although the aforementioned findings are just trends, there is little to no research that investigates the specific relationship between spiritual coping and substance use in PWH, especially research that seeks to predict factors associated with substance use. Much of the available literature utilizes substance use as a predictor for other outcomes such as medication adherence, longevity, depression, and quality of life in PWH, to name a few. Therefore, these identified trends represent potential pathways that would provide researchers with insight as to what entices and deters PWH to and from the use of substances, which is a clinically relevant matter.

Safer Sex

There were no significant relationships identified between safer sexual behaviors and spiritual coping nor the spiritual coping subcodes when our complete sample was analyzed. When the sample was restricted to only those participants who reported being sexually active with more than one partner, two positive aspects of spiritual coping demonstrated a negative trend with the monogamy rating scale while one aspect of negative spiritual coping demonstrated a significant positive relationship with the

protection rating scale. Specifically, spiritual gratitude and spiritual growth may be related to having fewer sexual partners while spiritual guilt is related to less use of protection in sexually active PWH.

Depression

A trend was identified between spiritual meaning and depression suggesting that those who find meaning through their spirituality may have lower depression levels. Because depression is a primary predictor of medication adherence and because spiritual meaning demonstrated a trend with medication adherence in our data, it is possible that these three factors are related though further research is needed to clarify any possible relationships.

Medication Adherence

PWH are required to adhere to medication regimens almost perfectly in order for medications to be effective at suppressing viral replication as well as to prevent disease mutation and subsequent drug resistance. Many PWH, however, are not strictly adherent to medication regimens for a variety of reasons ranging from adverse side effects to forgetfulness. If medication adherence rates increased, the net effect would be lower transmission rates, less disease mutation, and less drug resistance. Though our finding that spiritual meaning and medication adherence are related is only a trend, it is possible that interventions aimed towards developing and exploring spiritual meaning in the lives of PWH would ultimately increase medication adherence over time. In addition, though only a trend in our data, spiritual meaning was associated with decreased levels of depression in PWH. It is possible that the aforementioned intervention strategies would

ultimately lower depression levels in PWH, which could in turn help them to adhere to medication regimens better.

Substance Use

Positive aspects of spiritual coping demonstrated varying levels of association with lower levels of substance use in the present study. Because substance use is associated with poorer outcomes in PWH, including increased rates of disease progression (alcohol specifically) as well as increased transmission risk, addressing substance use in a clinical setting is important for PWH. Our findings suggest that including positive spiritual coping strategies in clinical interventions may help decrease substance use in PWH. Our findings also suggest that identifying and working towards changing negative spiritual coping strategies in PWH may decrease substance use as well.

Safer Sex

Risky sexual behavior is the primary method for disease transmission and acquisition. Therefore, understanding the factors that are associated with increased risky behavior in sexually active PWH is of the utmost importance to reducing HIV disease incidence. Due to the significant relationship between spiritual guilt and less use of protection, identifying and addressing spiritual guilt in a clinical setting could be relevant for decreasing risky sexual behaviors in PWH.

Limitations

There were several limitations in the present study. The primary limitation is that the interviews from study participants were coded by undergraduate students and there was only one coder per interview. For this reason, our data is considered preliminary and

future publications will be based on consensual ratings between two or more people, one of whom will be a graduate level rater. The four undergraduate students did, however, demonstrate good interrater reliability on many, though not all, of the codes in the coding agenda.

A second limitation is the limited number of participants who reported engaging in many of the spiritual coping subcodes as well as small numbers reporting substance use. These small numbers may have affected the significance level of many analyses conducted in this study and may have resulted from the social response bias, thus skewing our data towards an under-reporting of substance use.

A third limitation was the limited variability we encountered with the safer sexual behaviors rating scales. The limited variability may be the result of participant social response bias thereby skewing our data towards an over-reporting of monogamous relationships and an over-reporting of the use of protection.

A fourth limitation was that a large number of statistical analyses were run with few significant results. The overall SC rating scale was not significantly related to nor did it significantly predict any examined health behaviors in PWH. It is possible that this is due to limited variability in the overall SC ratings as most participants reported engaging in positive spiritual coping and few reported behaviors consistent with negative spiritual coping.

Future Directions

In a future study investigating the role of spiritual coping on health behaviors in PWH, it would be beneficial to do a factor analysis on all the subcodes of spiritual coping in effort to identify any latent variables that may be impacting health behaviors in PWH.

For example, it is possible that our subcodes of spiritual conflict and spiritual struggle are different aspects of the same construct.

A future study would also benefit from a larger sample size which would hopefully increase variability in reported substance use, reported sexual behaviors, and overall levels of spiritual coping. The limited amount of variability may have contributed to the high number of non-significant results in the present study.

Amphetamine use, especially methamphetamine use, has been associated with increased sexual risk behavior and increased disease transmission in PWH. Our current study, however, was unable to analyze the relationship between spiritual coping and amphetamine use due to having too few people reporting amphetamine use in our sample. A future study should examine the relationship between spiritual coping and health behaviors in amphetamine users with HIV in effort to understand factors related to health behaviors in this population.

Conclusions

In conclusion, the majority of the relationships between spiritual coping and medication adherence, substance use, and safer sex practices in PWH investigated in this study were found to be non-significant. There were, however, several trends were identified that may suggest that positive spiritual coping is related to positive health behaviors while negative spiritual coping is related to negative health behaviors. There was a significant negative relationship between spiritual guilt and protection use during sexual encounters such that those who experienced spiritual guilt were less likely to use protection, though this relationship was only seen in those participants who reported sexual activity with more than one partner. Further investigation should work to assess

whether a significant relationship exists between identified trends. Overall, spirituality may play an important role in helping PWH cope with adversity as well as helping them to take better care of themselves and prevent disease transmission to others.

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Table 1: Monogamy Rating Scale Description

Monogamy Rating Scale	Description
1 = Monogamous	The participant only has 1 sexual partner.
2 = Mostly Monogamous	The participant is mostly with 1 sexual partner at a time, at any given point.
3 = Ambiguous	The participant may be in monogamous relationships at times, but polygamous when single.
4 = Mostly Polygamous	The participant may be in an open relationship with a partner, date multiple people at once, etc.
5 = Polygamous	The participant has multiple sexual partners at any given time.
99 = Missing; Not applicable	Data missing; The participant did not report engaging in sexual activity

Table 2: Protection Rating Scale Description

Protection Scale	Description
1 = Protected Sex	The participant only engages in sexual practices using protection.
2 = Mostly Protected Sex	The participant may engage in unprotected sexual practices, but very seldom.
3 = Ambiguous	The participant engages in both unprotected and protected sexual practices equally.
4 = Mostly Unprotected Sex	The participant seldom uses protection when engaging in sexual practices.
5 = Unprotected Sex	The participant does not use any protection when having sex.
99 = Data missing; Not Applicable	Data missing; The participant did not report engaging in sexual activity

Table 3: Original Spiritual Coping Rating Scale

Spiritual Coping Scale Description

1 = Very Negative	Detrimental spiritual coping, no effective spiritual practices, no connectedness, sense of meaning and purpose in life decreases
2 = Negative	Maladaptive spiritual coping, no effective spiritual practices, no connectedness, no meaning making, no positive reframing
3 = Ambiguous	Ambiguous spiritual coping, connectedness to a higher presence, some positive reframing but no spiritual growth, no empowerment
4 = Positive	Adaptive spiritual coping, meaning making, positive reframing, spiritual growth
5 = Very Positive	Constructive spiritual coping, spiritual transformation, long-lasting positive change in attitudes, beliefs as a result of spiritual beliefs, spiritual practices, and self-views
99 = Unknown	Not enough information to rate

Table 4: Original Spiritual Coping Sub-Codes

Spiritual Coping Sub-code	Description
Spiritual Struggle	Participant starts questioning or is being troubled by religious/spiritual beliefs
Connectedness	The participant feels connected to something greater than himself
Spiritual Practices	The participant engages in spiritual practices such as meditation, prayer, contemplation, body-mind practices (e.g. yoga, relaxation techniques)
Spiritual Meaning	The participant feels like life is meaningful through a spiritual connection.
Spiritual Positive Reframing	The participant re-thinks their situation in a positive light - this positive reframing is heavily influenced by spiritual beliefs.
Spiritual Empowerment	The participant feels empowered through spirituality to improve his or her situation
Spiritual Growth	Marked, noticeable changes in ways of coping that demonstrate the individual has long-lasting positive changes in the use of effective coping strategies, attitudes, beliefs, and self-views that are predominantly derived from the participant's spiritual beliefs
Feelings of Peace and Safety	Spirituality enables feelings of peace and safety in the face of major challenges and uncertainties
Respect for Own Body	Spirituality engenders a greater respect for one's body, belief that one's body is "a gift from God", or the belief that the "body is the temple of the soul."
Spiritual Community	The participant is a member of a spiritual community such as church group, meditation classes, or bible study
Surrender/Centrality	Spirituality is the participant's main driving force/motivation

Table 5. Revised Spiritual Coping Scale

Rating	Definition
-4	Detrimental spiritual coping, anger towards spiritual presence, feeling of being punished by spiritual presence, blaming negativity in life on spiritual presence. Warranted if you have coded Spiritual Anger at some point. Participants who overall have very negative life experiences, yet hold spiritual presence accountable for their life. Surrender may be present, but if so, it is used in a negative way (as an avoidance strategy).
-3	Severe spiritual struggle. Inconsistency and confusion in spiritual beliefs such that sometimes believes in God, sometimes questions the existence of God. This participant would demonstrate a spiritual “searching” without finding a satisfactory spiritual “home”. Must have coded Spiritual Struggle at some point to apply this code.
-2	Presence of spiritual struggle. Participant demonstrates confusion about specific beliefs, but does not question the existence of some kind of “higher presence”. Must have coded Spiritual Conflict at some point to apply this rating.
-1	Feeling the necessity to be more spiritually engaged but not taking any action. Must have coded Spiritual Guilt to apply this code.
0	Ambiguous spiritual coping. It is very hard to judge whether participants use spiritual coping in an effective or in a negative way. They use both positive and negative codes simultaneously. They might experience spiritual struggles at times and be very engaged and positive in their use of spiritual coping at other times.
1	Participant expresses some connection to a higher presence, maybe expresses some type of inconsistent spiritual practice, but does not elaborate (e.g. “I believe in God” but doesn’t say much else)
2	Participant expresses a clear connectedness to an higher presence, exhibits reasonable consistency with spiritual practices,
3	Either spiritual meaning or spiritual growth MUST be coded in order to get this rating. If participant exhibits an increase in spirituality since HIV diagnosis, they would be categorized here.

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- 4 Spiritual transformations or spirituality is a central component in the participant's life. Spiritual surrender MUST be coded in order to get this rating.
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Table 6: Revised Spiritual Coping Sub-Codes

Spiritual Coping Sub-code	Description
Spiritual Struggle	Participant starts questioning or is being troubled by religious/spiritual beliefs
Connectedness	The participant feels connected to something greater than himself
Spiritual Practices	The participant engages in spiritual practices such as meditation, prayer, contemplation, body-mind practices (e.g. yoga, relaxation techniques)
Spiritual Meaning	The participant feels like life is meaningful through a spiritual connection.
Spiritual Positive Reframing	The participant re-thinks their situation in a positive light - this positive reframing is heavily influenced by spiritual beliefs.
Spiritual Empowerment	The participant feels empowered through spirituality to improve his or her situation
Spiritual Growth	Marked, noticeable changes in ways of coping that demonstrate the individual has long-lasting positive changes in the use of effective coping strategies, attitudes, beliefs, and self-views that are predominantly derived from the participant's spiritual beliefs
Spiritual Comfort	Spirituality enables feelings of comfort the face of major challenges and uncertainties
Respect for Own Body	Spirituality engenders a greater respect for one's body, belief that one's body is "a gift from God", or the belief that the "body is the temple of the soul."

Spiritual Community	The participant is a member of a spiritual community such as church group, meditation classes, or bible study
Surrender/Centrality	Spirituality is the participant's main driving force/ motivation
Spiritual Anger	Participant expresses anger or hostility towards God or towards their identified spiritual community
Spiritual Guilt	Participant expresses worry that they are not doing the things necessary to please God
Spiritual Gratitude	Participant expresses a sense of gratitude towards God, being thankful to God
Spiritual Conflict	Participant begins to question previously held spiritual beliefs, expresses discontentment with spiritual community, or behaves in ways that contrast with spiritual beliefs
Spiritual Disengagement	The participant fully disengages from religious or spiritual practices and affiliation

Table 7. Inter-rater Reliability between 4 Student Raters for Revised Spiritual Coping Scale and Subcodes

Code	Cronbach's Alpha
Spiritual Coping Rating Scale	0.923*
Connectedness	0.809*
No Spiritual Coping	0.860*
Respect for own body	N/A
Spiritual Anger	N/A
Spiritual Comfort	0.931*
Spiritual Community	0.571
Spiritual Conflict	0.905*
Spiritual Disengagement	0.718*
Spiritual Empowerment	0.889*
Spiritual Gratitude	0.90*
Spiritual Growth	0.889*
Spiritual Guilt	0.833*
Spiritual Meaning	0.80*
Spiritual Practices	0.776*
Spiritual Reframing	N/A
Spiritual Struggle	0.940*
Surrender	0.736*

*Values above 0.7 indicate reliable codes between raters. Only those subcodes on which reliability was achieved were included in subsequent analyses.

Table 8. Descriptive Demographics of Participant Sample

<i>Demographics</i>	<i>n</i>	<i>%</i>
<i>Gender</i>		
Male	124	70.5
Female	52	29.5
<i>Ethnicity</i>		
Caucasian	52	29.7
African American	65	37.1
Hispanic	51	29.1
Other*	7	4.1
<i>Education</i>		
Less than High School	30	17.2
High School Graduate	24	13.8
Some College/Trade School	70	40.2
College Graduate	35	20.1
Graduate Degree	15	8.6

*Other includes Asian American, American Indian, Haitian, Biracial, and other

Table 9. BDI-II Scores at each time point

<i>Time Point</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>
Baseline	176	11.35	8.89
Time 1 (6 months)	154	9.54	8.52
Time 2 (1 year)	139	9.67	9.37
Time 3 (1 year 6 months)	125	8.76	8.27
Time 4 (2 years)	120	8.76	8.96

Table 10. Substance Use Frequency at Baseline

<i>Substance</i>	<i>No use n (%)</i>	<i>Once or Twice n, (%)</i>	<i>About once a week n, (%)</i>	<i>Several Times a week n (%)</i>	<i>About every day n (%)</i>	<i>System Missing n (%)</i>
LSD	170 (96.0)	0	0	0	0	7 (4.0)
Barbituates	167 (94.4)	0	0	1 (0.6)	2 (1.1)	7 (4.0)
Alcohol*	84 (47.5)	30 (16.9)	27 (15.3)	23 (13.0)	8 (4.5)	5 (2.8)
Marijuana*	120 (67.8)	27 (15.3)	6 (3.4)	10 (5.6)	9 (5.1)	5 (2.8)
Cocaine*	150 (84.7)	11 (6.2)	5 (2.8)	4 (2.3)	0	7 (4.0)
Nitrates	155 (87.6)	8 (4.5)	5 (2.8)	1 (0.6)	0	8 (4.5)
Tranquilizers*	146 (82.5)	11 (6.2)	2 (1.1)	4 (2.3)	7 (4.0)	7 (4.0)
Opiates*	154 (87.0)	3 (1.7)	2 (1.1)	6 (3.4)	5 (2.8)	7 (4.0)
Amphetamines	167 (94.4)	2 (1.1)	1 (0.6)	0	0	7 (4.0)

*For accurate statistical analysis, at least 5% of the sample must have engaged in use of the substance. Subsequent analyses were run only for those substances denoted by the asterisk.

Table 11. Participant Use of Specific Aspects of Spiritual Coping

<i>Spiritual Coping Subcode</i>	<i>n</i>	<i>%</i>
Connectedness	161	91.5
No Spiritual Coping	9	5.1
Spiritual Comfort	79	44.9
Spiritual Conflict	48	27.3
Spiritual Disengagement	15	8.5
Spiritual Empowerment	71	40.3
Spiritual Gratitude	63	35.8
Spiritual Growth	59	33.5
Spiritual Guilt	27	15.3
Spiritual Meaning	28	15.9
Spiritual Practices	130	73.9
Spiritual Struggle	48	27.3
Surrender	37	21

Table 12. Cross-Sectional Relationship between Spiritual Coping and Medication Adherence at Baseline

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Spiritual Coping	-0.011	0.012	-0.078	-0.858	0.393
Age	0.000	0.002	-0.013	-0.139	0.890
Gender	-0.113	0.047	-0.235	-2.437	0.016
Ethnicity	-0.024	0.018	-0.121	-1.352	0.179
Education	-0.041	0.012	-0.321	-3.401	0.001

Table 13. Basic Model including Coefficients and Significance Tests for Level 1 and Level 2 Covariates in Prediction of Medication Adherence Slope over 2 Years

	Coefficient	Standard Error	<i>t</i> Ratio	<i>df</i>	<i>p</i>
Fixed effects					
MedAd intercept, β_0					
Intercept, y_{00}	1.098	0.153	7.169	150	.000
MedAd slope (per month), β_1					
Average slope, γ_{10}	-0.0235	0.0160	-1.476	145	0.142
Spiritual Coping, y_{11}	-0.0004	0.0004	-1.024	145	0.308
Age, γ_{12}	-0.0001	0.0001	-1.630	145	0.105
Gender, γ_{13}	0.0001	0.0016	0.069	145	0.946
Ethnicity, γ_{14}	-0.0002	0.0005	-0.521	145	0.603
Education, γ_{15}	-0.0011	0.0005	-2.025	145	0.044
Antiretroviral 1 increment, β_2					
Average increment, γ_{20}	-1.009	0.156	-6.461	519	0.000
Antiretroviral 2 increment, β_3					
Average increment, γ_{30}	-1.014	0.155	-6.533	519	0.000
Antiretroviral 1 increment over time, β_4					
Average increment over time, γ_{40}	0.031	0.015	2.084	519	0.037
Antiretroviral 2 increment over time, β_5					
Average increment over time, γ_{50}	0.029	0.015	1.929	519	0.054
Random effects					
	SD	Variance	df	χ^2	<i>p</i> Value
Intercept, U_0	0.141	0.019	136	237.68	0.000
Slope, U_1	0.006	0.0001	131	162.94	0.030
Error, R	0.182	0.033			

Table 14. Cross-Sectional Relationship between SC Subcodes and Medication Adherence
(n = 122)

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Connectedness	-0.031	0.067	-0.042	-0.466	0.642
No Spiritual Coping	0.027	0.081	0.030	0.338	0.736
Spiritual Comfort	-0.032	0.040	-0.075	-0.798	0.427
Spiritual Conflict	-0.002	0.043	-0.005	-0.052	0.959
Sp. Disengagement	-0.094	0.081	-0.103	-1.157	0.250
Sp. Empowerment	-0.006	0.040	-0.014	-0.157	0.876
Sp. Gratitude	-0.052	0.042	-0.117	-1.221	0.225
Sp. Growth	-0.027	0.040	-0.060	-0.674	0.501
Sp. Guilt	0.034	0.055	0.056	0.621	0.536
Sp. Meaning	-0.092	0.054	-0.151	-1.716	0.089
Sp. Practices	-0.009	0.044	-0.020	-0.214	0.831
Sp. Struggle	-0.051	0.041	-0.107	-1.227	0.222
Surrender	-0.028	0.049	-0.053	-0.579	0.564

Table 15. Prediction from Spiritual Coping Subcodes to Medication Adherence Slope

Predictor	Main Analyses ($n = 168$)		
	γ_{11} γ coefficient	t Ratio	p
Connectedness	-0.003497	-1.340	0.182
No Spiritual Coping	-0.000644	-0.298	0.766
Spiritual Comfort	-0.000680	-0.415	0.678
Spiritual Conflict	-0.000347	-0.238	0.812
Sp. Disengagement	-0.002707	-1.552	0.123
Sp. Empowerment	-0.000757	-0.512	0.609
Sp. Gratitude	-0.001579	-0.912	0.364
Sp. Growth	-0.000142	-0.100	0.921
Sp. Guilt	0.030294	0.437	0.662
Sp. Meaning	-0.003091	-1.838	0.068
Sp. Practices	0.001218	0.871	0.385
Sp. Struggle	0.001352	0.782	0.435
Surrender	-0.000119	-0.063	0.950

Table 16: Linear Regression for Spiritual Coping Predicting Substance Use

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Alcohol (n=172)					
Spiritual Coping	-0.104	0.058	-0.139	-1.789	0.075
Age	-0.013	0.010	-0.098	-1.243	0.216
Gender	-0.328	0.223	-0.126	-1.471	0.143
Ethnicity	-0.102	0.089	-0.086	-1.145	0.254
Education	0.096	0.061	0.131	1.567	0.119
F(5) = 2.706, <i>p</i> = 0.022*, R ² = 0.075					
Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Marijuana (n=172)					
Spiritual Coping	-0.027	0.053	-0.040	-0.506	0.613
Age	-0.015	0.010	-0.125	-1.572	0.118
Gender	-0.455	0.204	-0.192	-2.229	0.027*
Ethnicity	-0.168	0.081	-0.157	-2.062	0.041*
Education	-0.023	0.056	-0.035	-0.414	0.679
F(5) = 2.059, <i>p</i> = 0.073, R ² = 0.058					
*significant at the 0.05 level					
Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Cocaine (n=171)					
Spiritual Coping	0.047	0.031	0.120	1.506	0.134
Age	0.003	0.006	0.039	0.477	0.634
Gender	0.086	0.119	0.064	0.722	0.471
Ethnicity	-0.016	0.047	-0.026	-0.338	0.736
Education	-0.015	0.032	-0.041	-0.472	0.638
F(5) = 0.934, <i>p</i> = 0.461, R ² = 0.028					
Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Opiates (n=171)					
Spiritual Coping	-0.022	0.046	-0.039	-0.489	0.626
Age	0.012	0.008	0.122	1.511	0.133
Gender	-0.176	0.175	-0.088	-1.006	0.316
Ethnicity	-0.097	0.070	-0.108	-1.398	0.164
Education	-0.071	0.048	-0.127	-1.491	0.138
F(5) = 1.395, <i>p</i> = 0.229, R ² = 0.041					

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Tranquilizers					
(n=171)					
Spiritual Coping	0.073	0.103	0.097	0.704	0.484
Age	0.004	0.019	0.029	0.206	0.837
Gender	-0.561	0.535	-0.159	-1.047	0.299
Ethnicity	-0.117	0.113	-0.135	-1.038	0.303
Education	0.011	0.128	0.013	0.084	0.933
F(5) = 0.575, <i>p</i> = 0.719, R ² = 0.047					

Table 17. Relationship between SC Subcodes and Substance Use

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Alcohol (n=172)					
Connectedness	-0.440	0.323	-0.105	-1.364	0.174
No Spiritual Coping	0.566	0.403	0.106	1.402	0.163
Spiritual Comfort	-0.073	0.188	-0.031	-0.391	0.696
Spiritual Conflict	-0.026	0.208	-0.010	-0.127	0.899
Sp. Disengagement	-0.097	0.320	-0.023	-0.304	0.762
Sp. Empowerment	-0.069	0.191	-0.029	-0.362	0.718
Sp. Gratitude	-0.039	0.196	-0.016	-0.199	0.842
Sp. Growth	-0.197	0.192	-0.079	-1.028	0.306
Sp. Guilt	0.082	0.251	0.025	0.326	0.745
Sp. Meaning	-0.156	0.246	-0.048	-0.633	0.528
Sp. Practices	0.153	0.211	0.056	0.727	0.469
Sp. Struggle	0.149	0.199	0.056	0.748	0.456
Surrender	-0.096	0.227	-0.033	-0.424	0.672
Marijuana (n=172)					
Connectedness	-0.254	0.293	-0.067	-0.865	0.388
No Spiritual Coping	0.632	0.365	0.131	1.734	0.085
Spiritual Comfort	-0.297	0.169	-0.138	-1.760	0.080
Spiritual Conflict	0.381	0.186	0.158	2.045	0.042*
Sp. Disengagement	-0.475	0.288	-0.125	-1.651	0.101
Sp. Empowerment	-0.309	0.172	-0.141	-1.804	0.073
Sp. Gratitude	0.158	0.177	0.070	0.890	0.375
Sp. Growth	0.076	0.174	0.034	0.437	0.662
Sp. Guilt	-0.214	0.227	-0.071	-0.943	0.347
Sp. Meaning	-0.193	0.223	-0.066	-0.868	0.387
Sp. Practices	-0.042	0.191	-0.017	-0.219	0.827
Sp. Struggle	-0.054	0.180	-0.023	-0.299	0.765
Surrender	-0.167	0.206	-0.064	-0.814	0.417

*significant at the 0.05 level

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Cocaine (n=171)					
Connectedness	0.132	0.172	0.061	0.768	0.444
No Spiritual Coping	0.288	0.214	0.105	10.344	0.181
Spiritual Comfort	0.104	0.100	0.085	1.046	0.297
Spiritual Conflict	0.023	0.111	0.016	0.204	0.838
Sp. Disengagement	-0.360	0.168	-0.120	-1.545	0.124
Sp. Empowerment	-0.062	0.101	-0.050	-0.616	0.539
Sp. Gratitude	0.091	0.105	0.071	0.874	0.384
Sp. Growth	0.117	0.103	0.090	1.139	0.256
Sp. Guilt	-0.067	0.133	-0.039	-0.506	0.613
Sp. Meaning	0.011	0.131	0.006	0.081	0.935
Sp. Practices	0.163	0.111	0.116	1.466	0.145
Sp. Struggle	-0.217	0.105	-0.158	-2.064	0.041*
Surrender	0.002	0.121	0.002	0.020	0.984

*significant at the 0.05 level

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Tranquilizers (n=171)					
Connectedness	-0.185	0.258	-0.056	-0.717	0.474
No Spiritual Coping	0.283	0.323	0.068	0.878	0.381
Spiritual Comfort	-0.113	0.150	-0.061	-0.753	0.453
Spiritual Conflict	-0.009	0.166	-0.004	-0.055	0.956
Sp. Disengagement	-0.127	0.255	-0.039	-0.499	0.618
Sp. Empowerment	0.031	0.152	0.016	0.201	0.841
Sp. Gratitude	0.009	0.158	0.005	0.057	0.954
Sp. Growth	0.030	0.155	0.015	0.195	0.846
Sp. Guilt	0.265	0.199	0.103	1.334	0.184
Sp. Meaning	0.323	0.195	0.129	1.659	0.099
Sp. Practices	-0.115	0.168	-0.054	-0.685	0.495
Sp. Struggle	0.021	0.160	0.010	0.134	0.890
Surrender	0.197	0.181	0.087	1.091	0.277

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Opiates (n=171)					
Connectedness	-0.071	0.251	-0.022	-0.282	0.778
No Spiritual Coping	0.013	0.314	0.003	0.042	0.967
Spiritual Comfort	-0.051	0.14	-0.028	0.349	0.728
Spiritual Conflict	-0.245	0.160	-0.120	-1.529	0.128
Sp. Disengagement	-0.141	0.247	-0.044	-0.571	0.569
Sp. Empowerment	-0.145	0.148	-0.078	-0.981	0.328
Sp. Gratitude	-0.054	0.153	-0.028	-0.351	0.726
Sp. Growth	-0.091	0.150	-0.047	-0.604	0.546
Sp. Guilt	0.218	0.193	0.086	1.127	0.262
Sp. Meaning	0.079	0.191	0.032	0.416	0.678
Sp. Practices	0.081	0.164	0.039	0.496	0.621
Sp. Struggle	-0.157	0.155	-0.077	-1.013	0.312
Surrender	-0.064	0.176	-0.029	-0.364	0.716

Table 18: Spiritual Coping and Sexual Behavior in People with HIV

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Protection					
Spiritual Coping	-0.011	0.038	-0.022	-0.281	0.779
Age	-0.009	0.007	-0.109	-1.358	0.176
Gender	-0.167	0.146	-0.099	-1.1460	0.254
Ethnicity	-0.059	0.058	-0.078	-1.015	0.312
Education	0.056	0.039	0.121	1.429	0.155
Monogamy					
Spiritual Coping	0.014	0.061	0.017	0.228	0.820
Age	-0.005	0.011	-0.034	-0.455	0.650
Gender	-0.781	0.232	-0.272	-3.364	0.001**
Ethnicity	0.033	0.093	0.025	0.350	0.727
Education	0.173	0.062	0.218	2.770	0.006**

**significant at the 0.01 level

Table 19: Spiritual Coping and Sexual Behavior in Sexually Active People with HIV
n = 65

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Monogamy					
Spiritual Coping	-0.089	0.094	-0.115	-0.946	0.348
Age	0.037	0.017	0.266	2.192	0.032*
Gender	-0.771	0.473	-0.212	-1.632	0.108
Ethnicity	0.098	0.103	0.110	0.956	0.343
Education	0.094	0.106	0.121	0.377	0.377
Protection					
Spiritual Coping	-0.106	0.078	-0.183	-1.351	0.182
Age	-0.002	0.014	-0.019	-0.143	0.887
Gender	0.473	0.395	0.173	1.197	0.236
Ethnicity	-0.055	0.086	-0.082	-0.644	0.522
Education	0.106	0.089	0.181	1.196	0.236

*significant at the 0.05 level

Table 20. Relationship between SC Subcodes and Safer Sexual Behaviors

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Monogamy (n=173)					
Connectedness	-0.145	0.336	-0.031	-0.432	0.666
No Spiritual Coping	0.622	0.418	0.106	1.488	0.139
Spiritual Comfort	-0.108	0.195	-0.041	-0.555	0.580
Spiritual Conflict	-0.151	0.213	-0.052	-0.706	0.481
Sp. Disengagement	-0.259	0.331	-0.056	-0.784	0.434
Sp. Empowerment	-0.003	0.197	-0.001	-0.018	0.986
Sp. Gratitude	-0.150	0.203	-0.055	-0.739	0.461
Sp. Growth	-0.127	0.199	-0.046	-0.639	0.524
Sp. Guilt	-0.260	0.263	-0.070	-0.988	0.325
Sp. Meaning	-0.223	0.259	-0.062	-0.861	0.390
Sp. Practices	0.192	0.217	0.065	0.887	0.376
Sp. Struggle	0.007	0.206	0.002	0.032	0.974
Surrender	-0.185	0.235	-0.058	-0.786	0.433

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Protection (n=173)					
Connectedness	-0.154	0.210	-0.057	-0.732	0.465
No Spiritual Coping	-0.126	0.264	-0.037	-0.478	0.633
Spiritual Comfort	-0.015	0.122	-0.010	-0.122	0.903
Spiritual Conflict	0.026	0.134	0.015	0.196	0.845
Sp. Disengagement	-0.129	0.207	-0.048	-0.624	0.534
Sp. Empowerment	0.121	0.123	0.078	0.979	0.329
Sp. Gratitude	0.102	0.128	0.064	0.800	0.425
Sp. Growth	-0.142	0.124	-0.088	-1.140	0.256
Sp. Guilt	0.055	0.166	0.026	0.335	0.738
Sp. Meaning	-0.198	0.162	-0.094	-1.226	0.222
Sp. Practices	0.003	0.136	0.002	0.025	0.980
Sp. Struggle	-0.028	0.129	-0.017	-0.218	0.827
Surrender	-0.027	0.148	-0.015	-0.185	0.854

Table 21. Relationship between SC Subcodes and Safer Sexual Behaviors in Sexually Active Participants

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Monogamy (n=65)					
Connectedness	0.158	0.374	0.048	0.421	0.675
No Spiritual Coping	0.017	0.420	0.005	0.040	0.968
Spiritual Comfort	-0.270	0.273	-0.117	-0.989	0.327
Spiritual Conflict	0.007	0.284	0.003	0.026	0.980
Sp. Disengagement	-0.564	0.487	-0.133	-1.159	0.251
Sp. Empowerment	-0.279	0.294	-0.120	-0.949	0.346
Sp. Gratitude	-0.541	0.291	-0.218	-1.860	0.068
Sp. Growth	-0.541	0.286	-0.224	-1.891	0.063
Sp. Guilt	-0.001	0.448	0.000	-0.002	0.999
Sp. Meaning	-0.424	0.382	-0.130	-1.108	0.272
Sp. Practices	0.127	0.309	0.048	0.410	0.683
Sp. Struggle	0.239	0.299	0.091	0.799	0.428
Surrender	-0.232	0.388	-0.074	-0.598	0.552
Protection (n=173)					
Connectedness	0.118	0.315	0.048	0.374	0.710
No Spiritual Coping	-0.176	0.354	-0.064	-0.497	0.621
Spiritual Comfort	0.111	0.232	0.064	0.481	0.632
Spiritual Conflict	0.297	0.237	0.159	1.258	0.213
Sp. Disengagement	-0.053	0.415	-0.017	-0.127	0.899
Sp. Empowerment	0.197	0.248	0.113	0.792	0.431
Sp. Gratitude	0.047	0.252	0.025	0.186	0.853
Sp. Growth	-0.328	0.244	-0.181	-1.343	0.185
Sp. Guilt	0.815	0.362	0.278	2.249	0.028*
Sp. Meaning	-0.411	0.321	-0.167	-1.281	0.205
Sp. Practices	0.008	0.261	0.004	0.032	0.975
Sp. Struggle	0.139	0.252	0.071	0.551	0.583
Surrender	-0.053	0.328	-0.023	-0.163	0.871

*significant at the 0.05 level

Table 22: Linear Regression Spiritual Coping Predicting BDI-II Scores at Baseline

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Spiritual Coping	-0.581	0.437	-0.104	-1.330	0.185
Age	0.023	0.078	0.023	0.288	0.774
Gender	-2.235	1.666	-0.115	-1.342	0.181
Ethnicity	-0.600	0.666	-0.069	-0.901	0.369
Education	-1.139	0.449	-0.212	-2.535	0.012*

*significant at the 0.05 level

Table 23. Basic Model including Coefficients and Significance Tests for Level 1 and Level 2 Covariates in Prediction of Depression Slope over 2 Years

	Coefficient	Standard Error	<i>t</i> Ratio	<i>df</i>	<i>p</i>
Fixed effects					
Dep intercept, β_0					
Intercept, y_{00}	9.762	1.271	7.684	165	0.000
Dep slope (per month), β_1					
Average slope, γ_{10}	0.513	0.251	2.046	160	0.042
Spiritual Coping, γ_{11}	-0.017	0.019	-0.911	160	0.364
Age, γ_{12}	-0.008	0.003	-2.239	160	0.026*
Gender, γ_{13}	-0.171	0.074	-2.288	160	0.023*
Ethnicity, γ_{14}	-0.019	0.034	-0.558	160	0.577
Education, γ_{15}	-0.048	0.022	-2.186	160	0.030*
Antiretroviral 1 increment, β_2					
Average increment, γ_{20}	0.600	1.585	0.378	634	0.705
Antiretroviral 2 increment, β_3					
Average increment, γ_{30}	0.997	1.489	0.838	634	0.403
Antiretroviral 1 increment over time, β_4					
Average increment over time, γ_{40}	-0.025	0.109	-0.228	634	0.820
Antiretroviral 2 increment over time, β_5					
Average increment over time, γ_{50}	-0.046	0.076	-0.603	634	0.546
Random effects					
	SD	Variance	df	χ^2	<i>p</i> Value
Intercept, U_0	6.792	46.139	163	393.315	0.000
Slope, U_1	0.316	0.099	158	274.679	0.000
Error, R	6.587	43.423			

*significant at the 0.05 level

Table 24. Cross-Sectional Relationship between SC Subcodes and Baseline Depression
(n = 174)

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>
Connectedness	-1.396	2.426	-0.044	-0.575	0.566
No Spiritual Coping	2.379	3.033	0.060	0.784	0.434
Spiritual Comfort	-0.711	1.400	-0.040	-0.508	0.612
Spiritual Conflict	-0.187	1.540	-0.010	-0.122	0.903
Sp. Disengagement	1.210	2.392	0.039	0.506	0.614
Sp. Empowerment	-1.273	1.412	-0.071	-0.902	0.369
Sp. Gratitude	-1.832	1.453	-0.100	-1.261	0.209
Sp. Growth	-0.780	1.436	-0.042	-0.543	0.588
Sp. Guilt	0.207	1.875	0.008	0.111	0.912
Sp. Meaning	-3.144	1.828	-0.131	-1.720	0.087
Sp. Practices	-0.588	1.566	-0.029	-0.375	0.708
Sp. Struggle	-0.890	1.487	-0.045	-0.598	0.550
Surrender	-0.149	1.702	-0.007	-0.088	0.930

Table 25. Prediction from SC Subcodes to Depression Slope

Predictor	Main Analyses ($n = 168$)		
	γ_{11} γ coefficient	t Ratio	p
Connectedness	0.082748	1.042	0.300
No Spiritual Coping	0.067215	0.506	0.613
Spiritual Comfort	0.000772	0.013	0.990
Spiritual Conflict	-0.005938	-0.087	0.931
Sp. Disengagement	-0.038561	-0.327	0.744
Sp. Empowerment	0.012541	0.204	0.839
Sp. Gratitude	-0.061057	-1.013	0.313
Sp. Growth	-0.051934	-0.924	0.357
Sp. Guilt	-0.091091	-1.183	0.239
Sp. Meaning	-0.058610	-0.786	0.433
Sp. Practices	-0.096034	-1.126	0.262
Sp. Struggle	-0.105482	-1.685	0.093
Surrender	-0.034168	-0.459	0.646