PSYCHOSOCIAL FACTORS AND ANTIRETROVIRAL MEDICATION ADHERENCE AMONG PEOPLE LIVING WITH HIV WHO ATTEND SUPPORT GROUPS

A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS

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The Centers of Disease Control and Prevention (CDC, 2010) estimate that at the end of 2008 there were 682,668 Americans living with an HIV diagnosis, and 490,696 Americans living with a diagnosis of AIDS. It has been about 28 years since the first cases of the Human Immunodeficiency Virus (HIV) and its more severe counterpart the Acquired Immune Deficiency Syndrome were first discovered (Catz & Kelly, 2001). HIV is a virus which attacks the CD4 cells (or helper T cells) in the body causing drastic damage to the body’s immune system and AIDS is a syndrome that occurs after a great deal of a person’s CD4 cells have been destroyed, leaving persons living with HIV or AIDS (PLWHA) extremely vulnerable to viruses and infections. A non-infected person has a CD4 count in the range of 500-1,000 cells per mm3. Once a person has fewer than 200 cells/ mm3 they are classified as having AIDS. Even something typically as harmless as a cold can kill someone with AIDS (CDC, 2010).

Research has demonstrated that the HIV virus replicates itself very rapidly, with up to 10,000 billion particles produced and destroyed daily (Ho, Neumann, & Perelson, 1995). Because of the rapid replication cycle of HIV it can quickly replicate to become drug resistant (Catz, 2001). However, pharmaceuticals have been developed which target HIV at multiple points during its replication cycle, and which tend to be highly effective whenever multiple types of antiretroviral (ART) medications are combined together in a regimen, which are known as highly active antiretroviral therapies (HART; Catz, 2001). While HART regimens are not effective for every PLWHA (Catz, 2001) for the majority of patients who maintain proper adherence they are capable of suppressing plasma viral load to undetectable levels, increasing CD4 levels, improving clinical outcomes,
decreasing AIDS related mortality (Carpenter et al., 1998; Antiretroviral Therapy Cohort Collaboration, 2008). In order to reduce the likelihood of drug resistance it is recommended that individuals who are taking ART medications miss no more than 5% of prescribed dosages, but previous research suggests that on average PLWHA take about 70% of their prescribed dosages, and only about 5% of individuals achieve the recommended adherence level (DiMatteo, et al., 2002).

This advance in medical technology has two important implications. One is that individuals who live longer may be more likely to transmit the disease to other individuals, increasing the rate of HIV or AIDS incidence in the community (Catz, 2001). A second important implication is that living longer lives means that there is an increased chance that a PLWHA will be productive members of society. Improving adherence rates among PLWHA is extremely important in helping PLWHA to live longer life spans, and to live productive and fulfilling lives. There are several previous studies which suggest that optimism plays an important role in medication adherence (Gonzalez, 2004; Holmes & Pace, 2002, Milam, 2006). However the results of these studies are inconsistent as to whether optimism is always beneficial to PLWHA. The fields of positive psychology and positive health have contributed a great deal to our understanding of the relationships between physical health and positive outlook.

**Positive Psychology**

The purpose of positive psychology is to change the focus of psychology from solely fixing what is wrong with people to also building strengths in individuals (Seligman, 2002). According to Seligman prior to World War II psychology had the
three distinct goals which were to cure mental illness, increase productivity and job satisfaction among workers, and to identify and nurture high talent (2002). However after World War II the Veterans Administration and the National Institutes of Health were created which tended to provide funding primarily for researching topics related to pathology. As a result the field of psychology has become primarily driven by the goal of correcting pathology, and the other two original goals of psychology have been largely neglected. The field of positive psychology was developed to address these two neglected goals of psychology.

According to Aspinwall et al. (2010) research is considered to fall into the domain of positive psychology if it investigates factors associated with positive human functioning, psychological health, or adaption to illness or other types of adversity. While many researchers do not specifically use the terms “positive psychology” there has been a dramatic increase in empirical research in these three areas since the establishment of positive psychology (Aspinwall, 2010). For instance researchers have discovered that interventions can be used which build positive states and reduce depression (Seligman, Rashid, & Parks, 2006; Seligman, Steen, Park, & Peterson, 2005), that a brief raising of positive mood can enhance creative thinking (Fredrickson, 2005) and for physicians improve speed and accuracy at diagnosis (Isen, 2005) Some other commonly researched topics are positive effect, meaning, mastery, personal growth, forgiveness, gratitude, hope, optimism, and spirituality, and the relationship of these constructs with physical and mental health (Aspinwall, 2010).
One type of research which investigates positive human functioning, and incorporates many of these positive factors is the study of signature strengths. One of the main premises of positive psychology is that human beings have the potential to possess personal strengths and virtues, and that by identifying these strengths and virtues and finding ways to utilize them in our day to day life human beings can achieve lasting and authentic happiness. According to Seligman, signature strengths are strengths of character for which a person feels pride (2002). Additionally strengths are highly buildable in that they are capable of being developed over time by exercising personal responsibility and willpower. Seligman and his colleagues conducted a literary analysis of various historical literatures from different cultures and time periods to identify a list of 24 signature strengths that have been revered throughout history and throughout virtually all of the world’s cultures. According to Seligman (2002) optimism is an important strength that humans can possess, and that it is also related to hope, and future-mindedness, in that each of these strengths represent a positive stance towards the future.

Positive health is one branch of positive psychology, is grounded in the same theoretical origins as positive psychology, and purports that focusing on health as opposed to illness will both save lives, and reduce the costs associated with medical care (Seligman, 2008). Like positive psychology the research in this domain focuses mainly on positive affect as well as various personality characteristics and their relationship with health. For instance having a positive emotional style (PES) has been shown to be preventive against the onset of the common cold. (Cohen, Alper, Doyle, Treanor, & Turner, 2006). Additionally positive affect and positive explanatory styles have been
found to be protective against stroke (Ostir, Markides, Peek, & Goodwin, 2001), rapid progression of HIV (Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000), and general mortality rates in the elderly (Cohen & Pressman, 2006; Maruta, Colligan, Malinchoc, & Offord, 2000). One particular characteristic that has been extensively researched in relation to physical health is that of optimism (Giltay, Geleijnse, Zitman, Hoekstra, & Schouten, 2004; Kubzansky, Sparrow, Vokonas, & Kawachi, 2001).

**Optimism**

Optimists are people who tend to expect that good rather than bad things will happen to them (Scheier & Carver, 1985). There is considerable evidence that indicates that optimism affects the ways in which individuals cope with stressors. An optimistic nature has been found to have been associated with more effective coping with stress (Scheier and Carver, 1985), the flexible use of adaptive coping strategies to stressors, regardless of the stressor (Solberg Nes & Segerstrom, 2006), a higher likelihood of perceiving benefit from adversity (Tennen, & Affleck, 1998), and a more positive evaluations of one’s capability to manage the demands of a potentially traumatic event (Benight & Bandura, 2004). Research indicates that optimism is a strong predictor of perceived control for PLWHA, but not for HIV negative individuals (Taylor, 1992). Additionally AIDS specific optimism was found to be predictive of better health behaviors (getting a proper diet, getting enough sleep, exercising) among PLWHA (Taylor, 1992).

There have been a variety of studies which suggest that higher levels of optimism are associated with lower rates of mortality for several types of health conditions.
including cardiovascular disease (Giltay et al., 2004), coronary heart disease, (Kubzansky, Vokonas, & Kawachi, 2001) and recovery after a major coronary event (Leedham, Meyerowitz, Muirhead, & Frist, 1995; Scheier et al., 1989). One study of 412 PLWHA, who were on an ART regimen, revealed that optimism is associated with higher levels of Cd4 counts (Milam, 2004). However, Milam’s (2006) research with PLWHA suggests that there is a curvilinear relationship with Cd4 counts, suggesting that there may be a point of diminishing levels of return for optimism and Cd4 counts. Similarly results of one study suggests that for individuals who have cancer cognitive-behavioral optimism interventions are more effective for individuals who have lower levels of optimism (Antoni, 2001).

Taylor and Brown (1988) have stated that optimism about the future, even when it is unrealistic, is generally adaptive as it promotes qualities normally associated with mentally healthy personalities, such as feelings of self-worth, perseverance and creativity in the pursuit of goals, and the ability to effectively manage stress. Indeed research conducted with PLWHA suggests that unrealistic optimism can be adaptive as it has been associated with lower mortality rates (Reed et al., 1994). To investigate this relationship a measure was administered that assessed the degree to which the participants had realistic or unrealistic expectations of how their disease would progress by asking questions like “I tried to accept what might happen” (p. 102), or “I prepare myself for the worst” (p. 102). Higher scores reflected higher levels of realistic coping, and lower scores reflect unrealistically positive coping. The participants who had lower scores on this measure lived an average of nine months longer than the participants who scored
high. Even after controlling for psychological distress (emotions of hopelessness, anger, anxiety, guilt, and depression) the results were still the same. Moreover, when the participant’s unrealistically optimistic beliefs were later disconfirmed by subsequent illness, the participants did not appear to fare worse for their overly optimistic beliefs. It should be noted that the data collection of this study occurred before the development of ART medications, and that the development of medications may impact the relationship between optimism and health for PLWHA.

The relationship between optimism and medication adherence for PLWHA seems to be a complicated one as some previous studies has indicated that optimism yields higher levels of adherence (Gonzalez, 2004; Milam, 2008), while other studies have suggested that at optimism can have a negative impact on adherence (Holmes & Pace, 2002). Additionally research by Man (2001) seems to suggest that moderate levels of optimism may be most likely to result in higher levels of medication adherence. She developed a writing based optimism intervention for PLWHA and found that for individuals with low levels of optimism at baseline the intervention was positively related to medication adherence, but that for individuals who had high levels of optimism at baseline, the intervention had a negative effect on adherence rates. Holmes & Pace (2002) measured participant’s optimism about their disease prognosis rather than dispositional optimism. Additionally they classified participants into two groups, with those who reported expecting to live only a few years or less as being pessimistic, and those who reported that they expected to “many years but not into old age” (p.676) , or “well into old age” (p. 676) as being optimistic. The majority of the participants
responded that they would live many years or would live well into old age, and were therefore classified as being optimists. If in fact moderate levels of optimism are ideal for medication adherence rates it is possible that Holmes & Pace (2002) found result that contradicted previous research because they selected a measure of optimism that did not allow for classification of moderate levels of optimism, and because their the majority of their participants tended to have higher rather than lower levels of optimism. Moreover, if moderate levels of optimism are indeed related to higher levels of medication adherence among PLWHA it would also help to explain Milam’s (2004) findings that optimism has a curvilinear relationship with CD4 counts for PLWHA, because ART medications have been shown to substantially increase CD4 counts of PLWHA (Carpenter, et al., 1998).

Because the previous research on optimism and medication adherence has yielded inconsistent results additional research on this topic is necessary to better understand the relationship between these variables. Additionally, to the best of this author’s knowledge no previous studies have examined the ways that personal growth and optimism may interact to impact antiretroviral medication adherence.

Personal Growth

Many individuals who experience challenging and life changing events, including living with HIV or AIDS report that they have experienced some benefits or personal growth as a result of contracting the disease (Goggin, 2001; Littlewood, et al. 2008; Miliam, 2006, 2004). Personal growth refers to positive changes that occur in someone’s life as a result of experiencing a traumatic or challenging life changing event. However,
Research has indicated that the majority of individuals who experience a trauma or a major life changing event report that they experience both positive and negative aspects of the situation (Collins, Taylor, & Skokan, 1990; Lehman et al., 1993; Taylor et al., 1992; Updegraff, Taylor, Kemeny, & Wyatt, 2002). It has been proposed that individuals who acknowledge both the positive and negative aspects of a situation tend to be the most well-adjusted (Taylor, 1991). Empirical research indicates that this is true for some types of adjustment, but not for others (Chen, Wong, & Tsang, 2006). In a study of individuals with severe acute respiratory syndrome it was found that participants who acknowledged both the pros and cons had higher ratings of personal growth and healthy lifestyle, whereas acknowledging only the benefits resulted in higher scores on measures of interpersonal appreciation, and societal solidarity (Chen, et al., 2006).

Previous literature has described many types of personal growth including posttraumatic growth (Tedeschi & Calhoun, 1995), benefit finding (McMillen, Zuravin, & Rideout, 1995) stress-related growth (Park, Cohen, & Murch, 1996) and perceived benefits (Milam, 2004). This paper will focus on the types of growth which have been previously demonstrated to occur with PLWHA, which are posttraumatic growth, benefit finding and stress-related growth. It should be noted however that in previous research these terms have often been used interchangeably (Helgeson, 2006). For this paper the terms posttraumatic growth, stress related growth, and benefit finding will be used whenever discussing the specific measure associated with that construct (i.e. posttraumatic growth will be used to describe growth assessed by the Posttraumatic Growth Inventory).
There are two complementary theories which address how some individuals experience personal growth from a life threatening medical illness (Littlewood, Vokonas, & Kawachi, 2008). The theory of cognitive adaptation for instance, proposes that perceiving benefits in response to a chronic stressor, such as HIV or AIDS, can be viewed as a cognitive strategy to counteract negative impact of the disease (Taylor 1983, 2000). According to Littlewood et al. (2008), this strategy can help such individuals to find meaning in their lives, gain mastery, and maintain self-esteem in face of a serious illness which thereby reduces distress and indirectly contributes to improving physical health. From this perspective the benefits or growth that one experiences from his or her illness can be seen as an adaptive illusion that helps to lessen the emotional impact of traumatic events (Littlewood et al., 2008). In addition to experiencing illusionary benefits it is also possible that PLWHA may experience actual benefits from obtaining an HIV positive status.

The conservation of resources theory proposes that individuals who are experiencing a crisis are more likely to pursue and procure recourses because more resources are often consumed whenever one is dealing with a trauma (Cheng, 2006). According to this theory personal resources (such as self-esteem and autonomy) and social resources are considered to be especially important resources which are considered to be central aspects of one’s identity (Hobfoll, Freedy, Lane, & Geller, 1990). It has been theorized that PLWHA may experience actual as well as perceived benefits as a result of their disease status (Littlewood et al., 2008). For example an individual who has been recently diagnosed with HIV may more actively pursue social support after learning
of his diagnosis. Likewise an individual may find that by being involved in advocacy activities they may increase their self-esteem and other personal resources. It should also be noted that in some locations PLWHA may be entitled to governmental housing, medical, disability, or counseling benefits as a result of their HIV status (Littlewood et al., 2008). In this case the acquisition of HIV would also provide actual rather than merely perceived benefits.

Prati & Pietrantoni (2009) conducted a meta-analysis of different types of personal growth by conducting a literature of articles published between 1990 and 2006 using the following terms: posttraumatic grow, benefit finding, perceived benefit, perception of benefits, stress-related growth, positive by-products, positive life change, adversarial growth, and thriving. They also found additional relevant studies by examining the references lists of articles, and by contacting the authors of unpublished studies. Studies were included in the meta-analysis if the study measured positive change as a result of exposure to a stressful event regardless of the severity of the event, or whether it was a chronic or temporary event. 175 studies were included in the meta-analysis, 43 of which were related to chronic illness, and six studies were of PLWHA (Carrico, et al., 2006; Luszczynska, Sarkar & Knoll, 2007; Milam, 2004, 2006; Siegel, et al, 2005; Updegraff et al, 2005). The researchers found that optimism was one of the constructs most frequently associated with personal growth. However, only moderate relationships were typically found.
Personal Growth and Health

A qualitative meta-analyses of various types of personal growth (PTG, benefit finding, thriving and positive changes) suggests that the type of personal growth that is experienced whenever an individual has a chronic and life threatening illness is likely very unique from other types of stress or trauma related personal growth (Hefferon et al., 2009). Specifically individuals who have a chronic illness were more likely to report a “new awareness, and heightened importance of the body, and increase in taking responsibility for one’s health, monitoring one health, listening to their own body, vicarious health behaviors, cessation of risky behaviors, and a new positive identification with their own body” (Hefferon, Grealy & Mutrie, 2009 p.343). Additionally several qualitative studies included in another meta-analysis of personal growth and chronic illness revealed that the participants reported making positive changes in health behavior, such as improving nutrition, or cessation of smoking or drug use (Barskova, 2009). As a result, personal growth may have indirect health benefits, but there is also research which suggests that it may have direct benefits on mental (Barskova and Oesterreich, 2009) and physical health (Hefferon, Grealy, & Mutrie, 2009).

According to Barkskova and Oesterreich (2009) individuals who have higher levels of personal growth are more likely to have positive attitudes and beliefs they are also more likely to interpret stressful events as challenging rather than as stressors. As a result individuals who exhibit personal growth are less likely to get stressed on a day to day basis and tend to have lower levels of cortisol production. On a day to day basis high levels of cortisol can have many negative consequences on the human body, including a
lowered immune system, and higher rates of depression. Additionally previous research suggests that among individuals who have HIV/AIDS and have recently lost a loved one personal growth is correlated with greater immune system functioning, and lower rates of AIDS-related mortality (Heffron, et. al, 1998). Finally, Barskova and Oesterreich (2009) mention a third way, although not very well researched, that personal growth could affect health. As the authors note, personal growth often strengthens social relationship with family members and friends which may have positive psychological and physical consequences.

**Comparison of Constructs**

It is not entirely clear whether or not benefit finding and posttraumatic growth are identical or merely similar constructs. Some researchers report that these two constructs are similar but distinct from one another (Sears, Stanton, & Denoff-Burg, 2003), while other researchers report that the constructs are identical and the terminology is interchangeable (Helgeson, 2006). Tenneck and Affleck (2002) define benefit finding as the identification of benefit from adversity. This definition does not distinguish whether the person experiencing the benefits is experiencing long lasting changes in character or philosophy, or merely acknowledging benefits that they are experiencing. In contrast the Posttraumatic growth inventory proposes to measure perceived changes that are positive and enduring (Sears, et al., 2003). In spite of the proposed theoretical differences between constructs one meta-analyses (Prati & Peitranoti, 2009) which examined the relationships between optimism, social support, acceptance coping, and reappraisal coping as they relate to benefit finding and posttraumatic growth found that these
predictors yielded identical effect sizes for both benefit finding measure and the posttraumatic growth inventory. While Prati and Peitranoti (2009) acknowledged that there may be other predictors that distinguish benefit finding from growth that their study does not suggest that the two constructs are distinct from one another.

**Posttraumatic Growth**

Posttraumatic growth (PTG) is one of most common measures of personal growth utilized with chronically ill populations (Barskova, & Oesterreich, 2009). In 1996 Tedeschi and Calhoun first coined the term Posttraumatic growth, and developed a scale to measure this construct, known as the Posttraumatic Growth Inventory (PTGI). In order to develop the scale Tedeschi and Calhoun conducted a review of previous literature regarding perceived benefits that occur in response to traumatic events. This literature review included a variety of studies whose participants had experienced a variety of traumatic events, including burn patients, survivors of a sinking ship, cancer patients, and mothers of newborns with perinatal problems, rape victims, and bereaved respondents. Tedeschi and Calhoun then developed 34 items which they felt reflected the benefits which were described in the previous studies. They found that the perceived benefits fell into one of three broad categories of change: changes in self-perception, changes in interpersonal relationships, and changes in philosophy of life. Finally they administered the PTGI to 604 participants (199 male, and 405 female) and completed a principle component analysis which produced six factors: “new possibilities, relating to others, personal strength, spiritual change, and appreciation of change” (p.459). It should be noted that the participants in this study were all undergraduate students who were
asked to think about a stressful event (that was not necessarily traumatic). In this sample it was also found that, extraversion, optimism and being female were modestly related to PTG. In addition having an overall higher PTGI women were found to have higher scores on the dimensions of relating to other and personal strength.

More recently different versions of the PTGI have been validated with individuals who live with HIV or AIDS (Milam, 2006). In the interests of brevity Milam created a shorter version of the PTGI by including only the items which loaded the highest in the development of the original PTGI. Milam’s version of the PTGI contains only eleven items, refers specifically to life changes as a result of having HIV or AIDS, and was adapted to allow the participants to state negative as well as positive life changes. Milam tested his measure on 886 participants who had HIV or AIDS from 6 different health clinics and also administered optimism, pessimism, viral load, and health behaviors. Consistent with research by Tedeschi and Calhoun (1996) women and optimistic individuals tended to have higher levels of PTG. Additionally PTG was associated with lower levels of pessimism, depressive symptoms, viral load and alcohol use.

**Posttraumatic Growth and Signature Strengths**

In 2008, Peterson, Park, Pole, D’andrea and Seligman conducted a study examining the association between character strengths and posttraumatic growth. Peterson et al. (2008) explains that the components of posttraumatic growth identified by Tedeschi and Calhoun (1996) correspond to various strengths assessed by the character strength survey: “improved relationships with others (kindness, love), openness to new possibilities (curiosity, creativity, love of learning), greater appreciation of life
(appreciation of beauty, gratitude, zest), enhanced personal strength (bravery, honesty, perseverance), and spiritual development (religiousness) (p. 214)). They found each of the twenty-four character strengths were modestly, but significantly correlated with overall scores on the PTGI. Correlations ranged from .09 to .35 ($\eta^2$ ranged from .00 to .03) with the strongest relationships being religiousness (.35), gratitude (.33), and kindness (.30). Additionally, they found a positive relationship between the number of potentially traumatic events that were experienced and participant’s scores on the strengths and virtues scale with the only exceptions being the strengths of gratitude, hope, and love. Peterson et al. did not indicate what percentage of their participants had experienced chronic or one-time traumatic events. It is difficult to tell to what extent these results would generalize to a chronically ill population. Additionally, because individuals with HIV or AIDS often experience stigma it seems likely that different character strengths may become more or less predictive of posttraumatic growth (or other types of growth) in this population.

**Benefit finding**

Unlike the PTGI, many of the benefit finding measures were originally developed to be utilized with chronically ill individuals (Morh, & Dick, 1999; Antoni, et al., 2001; Littlewood, et al., 2008). The benefit finding measures have primarily been used among individuals who have cancer (Antoni, et al., 2001) or multiple sclerosis (Morh, & Dick, 1999). Research with individuals with multiple sclerosis has found the dimensions of benefit finding to be a deepening of relationships, an enhanced appreciation of life, and an increase in spiritual interest (Morh & Dick, 1999). Whereas a study with cancer
populations found that the dimensions were an acceptance of life’s imperfections, becoming more cognizant of the role of other people in one’s life, and developing a sense of purpose in one’s life (Antoni, 2001). It seems likely that the dimensions may have more variability as the result of being utilized for different populations. Additionally it should be noted that unlike the PTGI benefit finding measures have not been found to have been associated with higher levels of benefits among women or younger individuals (Barkskova & Oesterreich, 2009).

**Subjective happiness**

Subjective happiness is the extent, to which a person perceives that they are happy or unhappy and refers to the enduring levels of happiness that a person feels as opposed to assessing only momentary affect or attitudes about the past (Lyubomirsky & Lepper, 1997). Naturalistic research tends to suggest that to what extent a person is happy or unhappy may depend more upon internal factors than what adverse or fortuitous events a person encounters (Brickman et al., 1978). This idea is further supported by research indicating that optimism is moderately associated with subjective happiness (Lyubomirsky & Lepper, 1997). Although it would stand to reason that happiness would be positively associated with personal growth to the best of my knowledge there has been no previous research investigating the existence or magnitude of this relationship, nor how these variables relate to medication adherence. According to Lymbomirsky & Lepper (1997) because people’s values vary from one individual to another, global measures of subjective happiness may give the best measure of one’s overall level of happiness.
Summary

In summary research on optimism and medication adherence has yielded inconsistent results, and the relationship between optimism and medication adherence deserves further empirical investigation to gain a better understanding of this relationship. It appears that optimism may have a curvilinear relationship with medication adherence, but that benefit finding and posttraumatic growth have a linear relationship with medication adherence, such that higher levels of person growth mean higher levels of medication adherence. To date no previous studies have examined the relationship between all three of these variables to gain a better understanding of whether these variables may interact to influence medication adherence. For instance, it may be the case that if an individual has high levels of personal growth, and high levels of optimism, that their optimism may be more realistic, and may therefore may be associated with better medication adherence. By understanding the ways in which these three variables are related is important because it can help medical doctors and mental health professionals to better design interventions to help PLWHA to better adhere to their medications, as well as to experience better health outcomes independent of medication adherence (Taylor, 1992).

It was hypothesized that consistent with previous research posttraumatic growth, benefit finding, subjective happiness and optimism will be positively correlated with medication adherence. Further it was hypothesized that whenever optimism was partialled out of the analysis that posttraumatic growth, benefit finding scale, and
subjective happiness would continue to have a positive relationship with medication adherence that is independent of optimism.

Method

Participants

Ten PLWHA were recruited from either Brothers United, or the Damien Center, two support groups for PLWHA which are located near downtown Indianapolis. Both organizations are located in lower income areas of town. In addition to providing support groups both organizations provide care coordination and use of a food pantry to PLWHA. One difference between these two organizations is that Brother’s United primarily serves men who have sex with men (MSM) of color, whereas the Damien Center tends to provide services to a more heterogeneous group of individuals. All participants had been diagnosed with HIV or AIDS, were at least 18 years of age, and had been prescribed antiretroviral medication. For more information about sample characteristics please see the results section.

Measures

Demographics

The demographic information collected included the participant’s age, gender, education, length of time since diagnosis, employment status, insurance status, relationship status, and sexual orientation. In addition the following disease specific demographic data were collected: the most recent date of CD4 testing and self-reported results (if known), the date and self-reported results of the last viral load testing (if
known), AIDS status, transmission route of contracting HIV, and the HIV/AIDS resources previously utilized. Seventy percent of participants provided surveys with missing data for one or more of the demographic questions. Of these seven individuals, two were missing data regarding the date (month and year) of their most recent CD4 test, three individuals were missing data for regarding their CD4 count, and four individuals were missing data regarding their viral load count. Additionally two individuals marked “prefer not to answer” regarding income information. Full demographic measures are listed in Appendix E.

**Posttraumatic Growth Inventory**

Miliam’s (2006) abbreviated, 11 item, version of the posttraumatic growth inventory was utilized to measure PTG as it had already been validated for use with HIV or AIDS positive populations. Unlike the original PTGI (Tedeschi & Calhoun, 1995) this measure allows participants to indicate negative as well as positive change. Negatively worded items were reverse scored. A single score was computed by averaging scores across all eleven items, with higher scores indicating higher levels of PTG. Both the original PTGI (Tedeschi & Calhoun, 1995) and the abbreviated version (Miliam, 2006) have demonstrated good internal reliability ($α=0.91$). In the current study yielded an $α$ of 0.85($n=9$). Refer to appendix A for the full measure.

**Benefit Scale**

The current study utilized a 17 item measure of perceived benefits originally developed by Antoni et al. for use with cancer patients (2001) and later adapted by for
use with individuals who have HIV or AIDS (Littlewood, et al., 2008). Both previous studies have found that this measure yields a single factor. Antoni et al. (2001) found that the internal reliability averaged .95 over all assessments, and the current study yielded an α of .90 (n=10). A single score was obtained by summing scores from the 17 items, and higher scores were representative of higher levels of benefit finding. Please refer to appendix B for more information.

Optimism and Pessimism

Optimism and pessimism was assessed with the Revised Life Orientation Test (LOT-R, Scheier, et al., 1994). Previous research has demonstrated that optimism and pessimism are two separate factors of the LOT-R and that the subscales yield Cronbach alphas of .70, and .74. In the current study we originally summed the total score of the reverse scored, and positively worded items. However, when both the optimism and pessimism subscales were scored it yielded an α of only .52 (n=10). Because of the low internal consistency we used only the items associated with pessimism in the final analysis. The pessimism scale consisted of three items that were negatively worded which were summed to obtain an overall score. The Cronbachs alpha for the pessimism subscale was .89 (n=10). Please see appendix C for the full measure.

Happiness

Overall subjective happiness was measured with the General Happiness measure (Lyubomirsky & Lepper, 1997). This 4 item measure was developed and validated in 14 previous studies in a variety of populations (Lyubomirsky & Lepper, 1997). This measure has also demonstrated good internal consistency with alphas ranging from 0.79
to 0.94. Re-test reliability ranged from 0.55 to 0.90 (M= 0.72, no SD provided), indicating moderate to excellent test-retest reliability depending on the sample. The fourth item was reverse coded, and all items were averaged to obtain a single composite score. Composite scores range from one to seven and higher scores reflect higher levels of happiness. In the current study the measure yielded an α of .85 (n= 10). Please refer to appendix D for more information.

**Medication adherence**

Medication adherence was assessed through a self-report measure previously validated by Miliam (2006). Participants were asked to report how many times a day they have been told to take each medication, how many pills they are supposed to take each time, and how many pills they missed within the last 7 days. Seven day adherence was determined by dividing the total number of pills missed by the total number of pills that the participant was prescribed to take in the previous week. No reverse coded items were included. Following Milliam (2006) I also coded adherence as being in the optimal range (when at least 95% of the prescribed pills are taken) or below the optimal range (when less than 95% of the prescribed pills are taken).

**Procedure**

To facilitate recruitment we contacted support group leaders from Brothers United and the Damien Center who each agreed to let us attend a support group meeting at their organization. During the support group meeting we orally provided information about the study, gave the participants a written document similar to informed consent forms, and distributed paper surveys to the participants at the meetings. The written document contained every element of a standard informed consent form except that it did not
contain the participant’s signature. Had we required a signature it would have been the only piece of identifying information collected from participants and we believed that by not including this information we could better protect the participant’s rights to confidentially. This study was approved by the Ball State Institutional Review Board. The participants did not receive any financial incentives or compensation for participation.

**Statistical Analysis**

Bivariate correlational procedures were used to assess the relationship between the PTG, benefit finding, subjective happiness, medication adherence and pessimism. Partial correlation techniques were used to assess the relationships of PTG, benefit finding and subjective happiness with medication adherence while controlling for pessimism scores. Additionally t test analysis were run to investigate whether participants who achieved optimal adherence differed from participants who did not achieve optimal adherence in regards to the participant’s benefit finding scores, PTG scores, subjective happiness scores, and pessimism scores. All of these analyses were analyzed using SPSS.

**Results**

**Participant characteristics**

The mean age of participants was 36 ($SD = 11.22$). More than half (60%) of the participants reported that they earn less than $10,000 dollars a year, 20% reported that they earned more than $10,000 a year, and 20% of the sample selected “prefer not to answer”. The majority of the sample reported that they had attended college (60%), while the remaining 40% stated that they had received a high school diploma or GED equivalent. All of the participants in the study identified as either male (80%) or
transgender (20%). Almost half of the participants identified as gay (40%), and the remaining participants identified as straight (30%), bi-sexual (10%), or other (20%). The majority of the participants reported that they were unmarried, and also had not participated in commitment ceremony (70%). Information on ethnicity was not collected to increase the anonymity of responses in this small sample.

All of the participants reported that they contracted HIV through sexual contact. The mean time since diagnosis was 106 months (SD = 88.34). Three of the participants did not provide data regarding their CD4 count. The remaining seven participants had a mean CD4 count of 273 copies/ML (SD = 123.65), and three participants (43%) reported CD4 counts below 200. Four participants did not provide information regarding viral load and the remaining six participants had a mean viral load score of 3673 (SD = 3800.59). One participant reported viral loads in the undetectable range (less than 50). Seventy percent of the sample had been previously diagnosed with AIDS.

Nine of the ten participants provided data regarding medication adherence. Among those nine individuals the number of pills participants were prescribed to take per day ranged from one to seven pills. However the majority of participants were prescribed to take either one pill a day (33.3%) or two pills a day (33.3%). The mean number of pills reported to have been missed in the week prior to completing the survey was 1.5 pills (SD = 2.41), and participants had a mean adherence rate of taking 85% (SD = .33) of pill prescribed. The majority of the participants (66.7%) reported adherence levels of 95% or higher, and were coded as achieving optimal adherence, while the remaining 33.3% of participants had adherence rates below 95% coded as having below optimal adherence.
Correlations between predictor variables

Because the LOT-R scale did not demonstrate good internal consistency in our sample (α=.52) we decided to only include items in the analysis from the pessimism subscale which demonstrated much a higher internal consistency (α=.89). As expected the Benefit finding scale and the APTG scale correlated strongly together (r=.80, p=.005). There was virtually no correlation between pessimism scores and scores on the General Happiness measure (r=.03, p=.93).

Predictors of medication adherence

The hypothesis was that PTG, benefit finding, subjective happiness, and optimism would each be positively correlated with medication adherence. Due to the low internal consistency of the LOT-R only the pessimism subscale of the LOT-R was used. The APTG scale (r=.00, p=.98) and the General Happiness scale (r=.06, p=.88) had virtually no correlation with medication adherence. The Benefit Finding scale had a small negative correlation with medication adherence (r= -.16, p=.68), and the Pessimism scale yielded a moderate negative correlation with medication adherence (r= -.56, p=.12).

The participant’s responses were coded so that participants who reported taking at least 95% of their prescribed ART doses in the past week were coded as achieving optimal adherence while participants who reported taking less than 95% of prescribed dosages were coded as having below optimal adherence. The hypothesis was that participants who reported having optimal medication adherence would have post-traumatic growth scores, benefit finding scores, subjective happiness scores, and pessimism scores that significantly differed from participants who did not report having optimal adherence. Specifically it was expected that benefit finding, posttraumatic growth
and happiness would be related to higher medication adherence while pessimism was expected to predict lower medication adherence. A t test was used to analyze these relationships. The t values ranged from -.55 to 2.0 and all p values were less than .05

**Partial Correlations**

The original hypothesis had been that whenever optimism was partialled out of the analysis post-traumatic growth, benefit finding and subjective happiness would continue to have a positive relationship with medication adherence that was independent of medication adherence. Because the LOT-R did not yield sufficient internal consistency (α= .52) I ran the analysis using the three items of the LOT-R designed to measure pessimism. These items demonstrated good internal reliability in the sample (α=.89). The hypothesis was not supported by the partial correlation analysis. After partialing out pessimism the benefit finding scale yielded small but positive correlations with medication adherence (r=.16, p=.69). In contrast after partialling out pessimism the APTG scale yielded a small negative correlation with medication adherence (r=.14, p=.72). The General Happiness scale had virtually no correlation with medication adherence (r=.00, p=.99).

**Discussion**

Originally the study was designed to investigate the complex relationships that exist between optimism, benefit finding, posttraumatic growth, subjective happiness and medication adherence. However, as previously mentioned the optimism score yielded a low internal consistency (α= .52) for the overall measure and as a result only items from the pessimism subscale were included in the analysis as these items demonstrated greater internal consistency (α=.89, n=10). It was expected that benefit finding, posttraumatic
growth, and subjective happiness would be positively correlated with medication adherence while pessimism would be negatively correlated with medication adherence. It was also expected that after pessimism was partialled out of the analysis benefit finding, posttraumatic growth, and subjective happiness would continue to have a significant relationship with medication adherence. The data did not support my hypothesis as there were no significant correlations between the four psychosocial factors, and medication adherence. The correlations also continued to be non-significant after partialling out pessimism.

There are a number of reasons why the results of this study may have differed from previous research. One important reason is that participants in the current study reported having adherence rates that were substantially higher (mean of 85%, $SD = .33$) than the rates reported in previous research (DiMatteo, et al., 2002, Miliam, 2006). It seems likely that individuals who use of support groups may have higher rates of medication adherence as medication management is a topic likely to be addressed in a support group setting. Indeed the group facilitator at Brother’s United explained that discussing issues related to medication adherence is a very important part of the group. Additionally it is also possible that individuals who use support groups may have been more motivated to effectively manage the disease prior to joining the support group, and this higher level of motivation may result in higher medication adherence. All in all only three of the nine participants with valid data missed any of their prescribed dosages in the week prior to sampling. This lack of variability in combination with a small sample size may have contributed to the study’s non-significant results.
In addition to having a higher medication adherence than previous studies (DiMatteo, et al., 2002) the sample in this study also differed from previous research in regards to benefit finding, posttraumatic growth and subjective happiness. The participants in the present study had a mean APTGS score of 3.97 (SD=.78), which is slightly lower than the mean APTGS score of 4.09 (SD= .072) reported in previous research conducted with PLWHA (Miliam, 2006). In contrast the participants in the present sample had mean BFS scores of 5.85 (SD=1.12) which was higher than the scores reported in previous research (Littlewood et al., 2008; Antoni et al., 2001). Previous research with PLWHA yielded mean BFS scores of 3.6 (SD=0.95, Littlewood et al., 2008), and previous research with cancer patients (Antoni et al., 2001) yielded mean BFS scores of 3.8 (SD= 0.96) for the intervention group and 3.13 (SD=0.82) for the control group. Previous research (Littlewood, 2008) indicated that African Americans tend to score higher on the BFS compared to Caucasians (M = 3.8 vs. 3.5), t(220) = 2.53, p < 0.02. As previously mentioned information regarding participant’s race was not collected to help ensure participant anonymity. However, the Brother’s United organization primarily serves people of color. The author estimated that approximately half of the participants were African American, though this estimation is merely anecdotal.

The General Happiness measure yielded substantially lower mean scores than those reported in previous research. The present study yielded a General Happiness mean of 3.4. (SD = 1.54 ), whereas previous research (Lyubomirsky, 1997) conducted with a variety of populations yielded General Happiness scores ranging from 4.02 (SD=0.93) to 5.62 (SD= 0.62). The samples utilized by Lyubomirsky (1997) included several samples
of US college students, a US high school sample, a US adult community sample, a
Russian adult community sample, and a US retired community sample. Thus the
differences in General Happiness scores were likely due to the fact that samples utilized
in previous research (Lyubomirsky, 1997) most likely consisted primarily of healthy
individuals.

**Implications**

If indeed the results of this study accurately represent the relationships between
benefit finding, posttraumatic growth, happiness, pessimism, and medication adherence
then there are a number of implications that may be drawn from this study. In terms of
clinical practice the results of this study suggest that when working with PLWHA
promoting benefit finding, posttraumatic growth, subjective happiness, and decreasing
pessimism may not be very effective ways of improving medication adherence.

Because previous research has indicated that optimism interventions can be
effective at increasing medication adherence among PLWHA (Mann, 2001) when
comparing this with the previous research it may imply that perhaps there is more to
being optimistic than merely lacking pessimism. Alternatively the differences in results
may have occurred because Mann used an entirely female sample, or because Mann’s
study occurred eleven years ago at a time when ART regimens tended to be much more
complex. Mann reported that the participants in her study were prescribed a mean of
13.9 ($SD = 0.98$) pills per day in the intervention group and a mean of 14.4 ($SD = 1.15$)
pills per day in the intervention group. Thus the results of this study may also imply that
optimism and pessimism may not be as important in increasing medication adherence
among PLWHA who are not female, or who do not take a large number of ART pills per day.

In addition to the efficacy of optimism and personal growth interventions to improve medication adherence of PLWHA it also calls into question the extent that the positive health and positive psychology philosophies should be applied to medication adherence for PLWHA. Positive health and Positive Psychology are both grounded in the philosophy that individuals will be more healthy and happy by focusing on the things that are going right in their lives rather than focusing on the things that are going wrong in a person’s life. However it may be the case that this philosophy does not apply as well to PLWHA and medication adherence as experiencing more severe illness may serve to motivate PLWHA to achieve better adherence in taking their medications. An additional possibility is that the philosophy and interventions associated with positive psychology and positive health may be useful whenever a physician or mental health professional works with an individual who lacks confidence that they will be able to properly adhere to their ART medication, as such interventions tend to focus largely on an individual’s strengths rather than weaknesses. On the other hand such interventions may be less applicable if the person living with HIV or AIDS is struggling with having low motivation to adhere. If this is the case perhaps providing the client or patient with health education regarding the possible negative effects of not achieving proper medication adherence, or providing the individual with Motivational Interviewing may be more effective techniques.

Although the present study does not compare PLWHA who attend support groups to PLWHA who do not attend support groups, given the group members high scores on
medication adherence it appears likely that providing support groups may be an effective way of helping PLWHA to improve their medication adherence. There are a number of reasons why support groups may help PLWHA to increase their medication adherence. One study indicated that PLWHA who attended support groups reported lower levels of emotional distress, greater levels of social contact, and were less likely to endorse avoidant coping strategies than PLWHA who did not attend support groups (Kalichman, Sikkema, & Somlai, 2010). Additionally it seems likely that HIV support groups may provide the group members with feelings of social accountability if the group members are asked to report their current successes and fallback with regards to medication adherence. The present study seems to suggest that for individuals who lead support groups for PLWHA it may not necessarily be beneficial to medication adherence for the group facilitators to focus on encouraging group members to identify positive aspects of having HIV, discussing ways of improving overall happiness, or to invest time into reframing pessimistic comments. Of course these topics may still be worth exploring for other reasons such as improving psychological well-being.

Limitations

As previously mentioned the study was primarily limited by its small sample size. This sample size may have been increased by sampling from a variety of sources including support groups, medical centers, and consumers of HIV care coordination services. However, several strategies were attempted aimed at increasing the number of recruitment sites which proved to be fruitless. For instance the State Department of Health as contacted in attempts to use local care coordinators to facilitate data collection by distributing surveys to PLWHA, but they declined to become involved. Instead they
provided a list of Indiana organizations which serve PLWHA. Each of the local organizations on the list were contacted, but the majority of organizations declined to become involved in the study. On whole support group leaders tended to be more amenable to facilitating participant recruitment. Originally a third support group for PLWHA was planned for inclusion as the group facilitator had expressed an interest in the study. However, the group facilitator for the support group stated that she had to have the research approved by an administrator at the hospital, and subsequently she stopped returning phone calls and emails. Additionally one organization, called the Kristen Center, was currently preparing to offer three new support groups for PLWHA within a few months. While the group leader was amenable to allowing us to recruit from the support groups including these support groups in the study would have required substantially postponing the data collection period.

Alternatively recruiting participants from online support groups and message boards for PLWHA may have potentially increased the sample size. However this method of data collection was not chosen as this would have excluded individuals from my study who are of lower socioeconomic status and do not have access to a computer. The sample size could have been increased by conducting this type of research in a larger city that offered more support groups for PLWHA, or by sampling from a larger geographic region than the Indianapolis area. The sample size also could have been increased by visiting the support groups multiple times to recruit group members who were absent at the time of sampling. Finally it may have been possible to gain a larger sample by using any of the previously described strategies, and by offering participants monetary incentives for participation. However, if funding was secured to provide
monetary incentives it is likely that the participants would have had to provide identifying information in order to prove to the funding agency that the participants received the monetary incentive. This would have resulted in increased risks to confidentiality. It also should be noted that all of group members present during the recruitment sessions were eligible and consented to participation.

The present study also had other limitations. As previously mention most of the participants in the research had high levels of medication adherence rates which were much higher than the ART medication adherence rates reported in previous research (DiMatteo, et al., 2002). Therefore it is hard to say how these findings would generalize to PLWHA with less favorable rates of medication adherence. If a larger sample had been obtained that was not limited to PLWHA who attend support groups or if we had included support groups designed for people recently diagnosed with HIV or AIDS then there may have been more variability and generalizability in regards to medication adherence. Additionally the results of the study may only generalize to males and individuals who identify as being transgender. Lastly medication adherence, viral load, and CD4 count were all measured through participant self-report. Self-report of medication adherence is less likely to be accurate than using medication event monitoring system (MEMS) technology which uses special medication bottles embedded with microchips in the cap to monitor when the medication bottles are opened and closed. However, the present study lacked sufficient funding sources to utilize MEMS technology. Additionally if the research had been conducted in a medical setting it is possible that the patient’s records could have been utilized to obtain the patients viral
load and CD4 counts, which likely would have meant more accuracy and less missing data in for these items.

Future Research

In terms of future research it would be beneficial for researchers to obtain a larger sample size and to include groups in the research which may have more variability in regards to medication adherence. The latter may be achieved by including support groups in the study that cater to a variety of individuals, including PLWHA who have recently been diagnosed with HIV or AIDS, survivor groups for individuals who have been diagnosed with HIV or AIDS for several years, and groups for women. It should be noted that while support groups targeting these specific subpopulations were not available in the Indianapolis area at the time of data collection that the Kristen Center was currently working on organizing support groups targeting these populations which may be available within a matter of months.

It would also be beneficial for researchers to continue to examine the relationship between optimism and medication adherence given that among the psychosocial variables optimism yielded the strongest correlation with medication adherence. Research suggests that pessimism and optimism may be two partially independent dimensions rather than optimism and pessimism being polar opposites on a unidimensional continuum (Chang, Maydeu-Olivares, & D’Zurilla, 1997). Therefore it is recommended that in future studies researchers use separate measures for optimism and pessimism. To the best of this author’s knowledge the only separate measures for optimism and pessimism that are currently available are the Extended Life Orientation Test Optimism Scale (ELOT optimism) and the Extended Life Orientation Test Pessimism Scale (Chang, Maydeu-
Olivares, & D’Zurilla, 1997). The optimism scale is a 15 item measure which includes seven items from the Life Orientation Test (LOT, items 1,3,4,5,8, 9, and 12) and eight items from the Optimism and Pessimism Scale (OPS, items 2,5,17,20,23,31,47 and 49). The ELOT Optimism scale yielded a cronbach’s alpha of 0.77, and the ELOT Pessimism Scale yielded a Cronbach’s alpha of 0.89.

Additionally it may be beneficial for future researchers to examine how PLWHA who are involved in support groups differ from PLWHA who are not in support groups in regards to benefit finding, posttraumatic growth, subjective happiness, optimism, and medication adherence. Given the high rates of medication adherence in the present study it seems likely that PLWHA who attend support groups may have higher rates of medication adherence compared to individual who do not attend support groups. Moreover it may be beneficial to conduct a longer study with repeated measures that assesses participant’s optimism, benefit finding, posttraumatic growth, subjective happiness, and medication adherence levels prior to starting a support group and again after being involved in a support group for a specified amount of time to assess the changes in medication adherence, and psychosocial factors over time.
References


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doi: 10.1037/0022-3514.57.6.1024


doi: 10.1037/0278-6133.22.5.487


doi: 10.1037/0003-066X.60.5.410


Appendices

Appendix A. Abbreviated Posttraumatic Growth Scale

Please use the following indicate to what degree you have experienced changes that may have occurred in your life since you were diagnosed with HIV.

Appreciation for the value of my own life

(highly negative change) 1 2 3 4 5 (highly positive change)

Priorities about what is important in my own life

(highly negative change) 1 2 3 4 5 (highly positive change)

Involvement in things that interest me

(highly negative change) 1 2 3 4 5 (highly positive change)

My understanding of spiritual matters

(highly negative change) 1 2 3 4 5 (highly positive change)

Direction for my life

(highly negative change) 1 2 3 4 5 (highly positive change)

My sense of closeness with others

(highly negative change) 1 2 3 4 5 (highly positive change)
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<tr>
<th>domain</th>
<th>rating</th>
<th>(highly negative change)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>(highly positive change)</th>
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<td>Willingness to express my emotions</td>
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<td>Handling my difficulties</td>
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<td>My religious faith</td>
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<td>My own inner strength</td>
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Appendix B. Benefit finding scale

Having HIV disease…….

1) …has lead me to be more accepting of things.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

2) …has taught me how to adjust to things I cannot change.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

3) …has helped me take things as they come.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

4) …has brought my family closer together.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

5) …has made me more sensitive to family issues.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

6) …has taught me that everyone has a purpose in life.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

7) …has shown me that all people need to be loved.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

8) …has made me realize the importance of planning for my family’s future.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

9) …has made me more aware and concerned for the future of all human beings.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

10) …has taught me to be patient.
    1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)
11) …has lead me to deal better with stress and problems.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

12) …has lead me to meet people that have become some of my best friends.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

13) …has contributed to my overall emotional and spiritual growth.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

14) …has helped me become more aware of the love and support available from
    other people.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

15) …has helped me realize who my real friends are.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

16) …has helped me become more focused on priorities, with a deeper sense of
    purpose in life.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)

17) …has helped be become a stronger person, more able to cope effectively with
    future life challenges.
   1 (not a lot)  2 (a little)  3 (moderately)  4 (quite a bit)  5 (extremely)
Appendix C. Revised life orientation test LOT-R

1. In uncertain times, I usually expect the best.  
0 (strongly disagree) 1 2 3 4 (strongly agree)

2. It's easy for me to relax.
0 (strongly disagree) 1 2 3 4 (strongly agree)

3. If something can go wrong for me, it will.
0 (strongly disagree) 1 2 3 4 (strongly agree)

4. I'm always optimistic about my future.
0 (strongly disagree) 1 2 3 4 (strongly agree)

5. I enjoy my friends a lot.
0 (strongly disagree) 1 2 3 4 (strongly agree)

6. It's important for me to keep busy.
0 (strongly disagree) 1 2 3 4 (strongly agree)

7. I hardly ever expect things to go my way.
0 (strongly disagree) 1 2 3 4 (strongly agree)

8. I don't get upset too easily.
0 (strongly disagree) 1 2 3 4 (strongly agree)

9. I rarely count on good things happening to me.
0 (strongly disagree) 1 2 3 4 (strongly agree)

10. Overall, I expect more good things to happen to me than bad.
0 (strongly disagree) 1 2 3 4 (strongly agree)
These items belong to the pessimism subscale

These items belong to the optimism subscale

Filler items
Appendix  D  General Happiness Scale

1. In General I consider myself:
   1- Not a very Happy Person  2 3 4 5 6 7- A very happy person

2. Compared to most of my peers, I consider myself:
   1- Less Happy  2 3 4 5 6 7- More Happy

3. Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?
   1- Not at all  2 3 4 5 6 7- A great deal

4. Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterization describe you?
   1- A great deal  2 3 4 5 6 7- Not at all
Appendix E. Demographics

When were you diagnosed? ___/___(mm/yy) □ I don’t know

When was the last time your CD4 count was tested? ___/___(mm/yy) □ I don’t know

What is your CD4 count per µL __________ □ I don’t know

When was the last time your Viral load was tested? ___/___(mm/yy) □ I don’t know

What is your Viral load __________ copies/ mL

Have you ever been diagnosed with AIDS? □ Yes □ No □ Not sure

What is your age? ______

What is your gender □ Male □ Female □ Transgender

What is the highest level of education that you have received?
□ Less than high school □ High school diploma or GED □ College or trade school

Are you married, or have you had a commitment ceremony? □ Yes □ No

What do you consider your sexual orientation to be?
□ Straight □ Bisexual □ Gay □ Other

How did you contract HIV? □ Prefer not to answer
□ Other □ Sexual contact □ Intravenous drug use

Are you employed? □ Yes, full-time □ Yes, part-time □ No

Please check which of the following HIV services you have use?
☐ Care coordination  ☐ Defa funds  ☐ Direct emergency funding  ☐ Financial assistance

What is your income per year?  ☐ Prefer not to answer

☐ Less than $10,000 a year  ☐ More than $10,000 a year

Do you have health insurance?  ☐ Yes  ☐ No