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Interactive Effects of Ethnic Identity and a Cognitive Behavioral Stress Management Intervention on Subjective and Objective Stress in Low-Income Minority Women Living with HIV

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INTERACTIVE EFFECTS OF ETHNIC IDENTITY AND A COGNITIVE
BEHAVIORAL STRESS MANAGEMENT INTERVENTION ON SUBJECTIVE AND
OBJECTIVE STRESS IN LOW-INCOME MINORITY WOMEN LIVING WITH HIV

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Corina Reyes Lopez

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The HIV/AIDS epidemic is more prevalent among minority ethnic groups, with mortality rates highest among African-American women. Additionally, low-income minority women with a positive HIV diagnosis experience a variety of stressors that influence their psychological and physical well-being. Research has found that ethnic identity, an intrapersonal resiliency factor, is associated with lower perceived stress in low-income minority women living with HIV, in part through greater levels of coping self-efficacy and social support. Given the benefits of group-based interventions in reducing stress in HIV positive populations, it is important to understand whether ethnic identity influences the efficacy of these interventions in reducing stress in minority women with HIV. The present study examined the interactive effects of ethnic identity and a group-based targeted Cognitive Behavioral Stress Management (CBSM) intervention on objective and subjective stress indicators at post-intervention and at 6-month follow-up.

It was hypothesized that women with greater ethnic identity randomized to CBSM would experience more reductions in self-reported and physiological stress (urinary-free norepinephrine) than those in the control group and women with a lower ethnic identity. I

also hypothesized that women with greater ethnic identity affirmation and ethnic identity search, assigned to CBSM would report more reduction in self-reported and physiological stress than those in the control group and women with lower ethnic identity subscale scores. Finally, it was hypothesized that the ethnic identity X intervention interaction effect on stress outcomes would work through CBSM-associated changes in social support and coping self-efficacy.

Women (n=123) were approximately 38 years old, predominantly African-American (87%), on disability (51%), diagnosed with HIV an average of 7.6 years, and earning an average yearly income of $5,000-10,000. Participants underwent a 24-hour urine collection procedure, completed the Multigroup Ethnic Identity Measure (MEIM), Impact of Events Scale (IES), and Perceived Stress Scale (PSS), and were randomized to a 10-week targeted CBSM (i.e. relaxation, CBT, and interpersonal skills training) or psychoeducational control group, and completed the IES, PSS and provided 24-hour urine samples at post-intervention and at 6-month follow-up. Targeted components in CBSM addressed issues relevant for minority women with HIV and introduced coping strategies that HIV positive women of color draw upon, including flexibility, spirituality, endurance, and positive thinking.

Latent growth modeling revealed a significant ethnic identity X intervention interaction in explaining decreases in subjective stress. Post-hoc analyses indicated that for women with moderate to higher reports in ethnic identity, CBSM was associated with lower perceived stress and IES intrusive thoughts after the intervention compared to women in the control group. For women lower in ethnic identity CBSM and control

groups did not differ on self-reported stress. No significant moderation effects were found for norepinephrine output. Subscale analyses revealed that the ethnic identity X intervention interaction effects on PSS and IES outcomes were also apparent using ethnic identity affirmation to delineate hi/low ethnic identity groups, but not when women were classified on the basis of ethnic identity search. Findings suggest that women with high ethnic identity may benefit more psychologically (self-reported stress) but not physiologically (using 24-hour urinary norepinephrine) than low ethnic identity women from group-based interventions that teach them additional skills to deal with stress. Future research should continue to investigate cultural resiliency factors influencing stress and explore candidate mediating psychosocial resources that may account for the buffering effects of ethnic identity on perceptions of stress in low-income minority women with HIV.

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CHAPTER 1: INTRODUCTION

Ethnic minorities living in the United States are a vulnerable population that experience major mental and physical health problems in disproportionate amounts. Even after controlling for education, mental and physical health history, socioeconomic status, and attitudes toward healthcare systems, significant disparities continue to exist in the utilization and the quality of mental health services that are available for communities of different ethnic, racial, or cultural groups (National Institute of Mental Health, 1999). When compared to Non-Hispanic Whites, Non-Hispanic Blacks and Hispanics have less access to health care, and when resources are available oftentimes the quality of service is poor (U.S. Department of Health and Human Services, 2001). Furthermore, minority communities experience disproportionately greater levels of poverty and social stressors directly linked to mental health disorders (U.S. Department of Health and Human Services, 2001).

The HIV/AIDS epidemic is one example of an illness that has had a disproportionate impact on minority communities. Current statistics suggest that HIV/AIDS is more prevalent among minority ethnic groups, with mortality rates highest among African-Americans (CDC, 2007). Specifically, newly-infected African-American women have a mortality rate that is 15 times as high as Caucasian women and four times as high as Latina women (CDC, 2007). Low-income minority women with a positive HIV diagnosis are a group in need of particular consideration given that they experience additional burdens. These include stigma or stress from minority and low socioeconomic status, along with the stigma from having an HIV positive diagnosis. These stressors have

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shown to be long term, overwhelming, and can negatively impact women's well-being (Kang et al., 2006; Galvan et. al. 2008; Sandelowski et al., 2004). The advancement and availability of treatments for HIV/AIDS, such as highly active antiretroviral therapy, have made the disease a manageable chronic illness. However, women with HIV who access these resources continue to report more health-related stress, stress from stigma, and maladaptive coping mechanisms (e.g. avoidant coping) than women who do not receive or benefit from these treatments (Siegel & Schrimshaw, 2005). This suggests that although medical advancements have conferred physical health benefits, particularly extending the survival of individuals with HIV, the psychosocial health of minority women living with HIV (WLWH) is still in need of improvement.

Ethnic Identity

Ethnic identity is one protective factor that has garnered attention as a potential protective resource for minority women dealing with multiple stressors. Ethnic identity has been defined as the degree to which an individual considers themself as belonging to their ethnic group and includes feelings of pride, secure attachment, and positive views of one's ethnic group (Phinney, 1992; Phinney & Alipuria, 1996). Recent studies have suggested two central components to ethnic identity that make significant contributions to its effects: Ethnic Identity Affirmation and Ethnic Identity Search. Ethnic identity affirmation refers to an individual's sense of belonging to their ethnic group, while ethnic identity search includes seeking information about one's own ethnic group (Phinney 1992).

Ethnic identity has been used interchangeably with acculturation, racial identity, and cultural orientation in some literature. Research has also provided a variety of measurement tools for these constructs, including the Africentric Scale (Grills & Longshore, 1996), Acculturation Scale (Landrine & Klonoff, 1994), and Multigroup Ethnic Identity Measure (Phinney, 1992; Resnicow & Ross-Grady, 1997) to name a few. Although diversity exists within ethnic, racial, and cultural groups, each source of diversity is distinctive in important ways that should be addressed. For example, although ethnic identity may co-exist with racial identity (e.g. Italian-Americans among Europeans, or Korean-Americans among Asians), racial identity is distinct in that it has a fundamental social identification that ascribes characteristic advantages and disadvantages to groups based on observable physical attributes (Helms & Talleyrand, 1997). Ethnic identity is similar to acculturation (adoption of social traits and behavioral patterns of the surrounding culture) and cultural orientation (feelings about different cultures and the levels of engagement in those groups) in that all three describe a relationship to the cultural environment, they are active, and they encompass multiple life domains such as language and activities (Tsai et al., 2002). On the other hand, ethnic identity differs in its reliance on conscious self-endorsement, while acculturation and cultural orientation don't necessarily require it. Tsai et al. (2002) explain that although an individual may participate in American traditions and customs, they may not explicitly identify themselves with American culture. Accordingly, ethnic identity provides a subjective perspective on an individual's group membership and cultural identity, which may play a more significant role than objective definitions or external groupings.

Two theoretical models have been proposed that help understand how ethnic identify might confer benefits for minority group members who are coping with multiple stressors. First, an acculturative stress model of Black Americans theorizes that cultural factors, such as racial identity and cultural values (i.e. group focus and social responsiveness), are associated with less distress, through effective coping processes such as cognitive appraisals, efficacy expectations, and social support (Anderson, 1991). Secondly, Myers (2009) proposes that socio-cultural factors including a strong ethnic identity may serve as a coping resource that relates to health behaviors (e.g. less substance use, greater adherence to medications) and biological stress processes (e.g. lower cortisol levels and physiological reactivity) that influence health. Together, these theories suggest that a strong sense of ethnic identity may offer a coping advantage over minority group members with a weaker sense of ethnic identity (Anderson, 1991; Myers, 2009). It's important to note that individuals with multiple burdens, such as those with low SES background and minority status, may have limited access to these cultural resources due to cognitive or social availability and consequently may be at a higher risk for adverse health and functional outcomes. This becomes more of a challenge for those individuals dealing with a chronic illness such as HIV infection.

Ethnic Identity and Mental Health

Previous literature has shown a positive relationship between ethnic identity and well-being in a wide range of minority populations (Gray-Little & Hafdahl, 2000; Ryff et al., 2003; Tsia et al., 2001). Greater ethnic identity has been shown to be related to less perceived discrimination and fewer depressive symptoms in Filipino-

Americans (Mossakowski, 2003), and with greater well-being (e.g. personal growth, self-acceptance) in a sample of Asian and Asian-Americans (Iwamoto & Liu, 2010). Similarly, in a sample of Latinos, a stronger ethnic identity predicted stronger well-being, lower depression, and lower acculturative stress (French & Chavez, 2010; Iturbide et al., 2009; Umana-Taylor et al., 2011). Research examining the protective factors of ethnic identity in African-Americans show that those with high ethnic identity evidence lower perceived stress (Caldwell et al., 2002), race-related stress (Sellers et al. 2003), psychological distress (Crawford et al., 2002), and depression (Walker et al, 2008; Settles et al., 2010). At the same time, African-Americans, Latinos, and Asian-Americans with positive views of their ethnic group also report greater well-being (Utsey et al., 2002), self-esteem (Utsey et al., 2002; Stevenson & Arrington, 2009), and life satisfaction (Utsey et al., 2002; Crawford et al., 2002). Little research has examined the effects of ethnic identity subscales. However, two studies have shown a differential effect of ethnic identity components, such that ethnic identity affirmation is positively associated with mental health whereas ethnic identity search is negatively associated with mental health (Torres & Ong, 2010; Green et al., 2006). It is still unclear why differential effects of ethnic identity search and ethnic identity affirmation exist and more research is necessary to elucidate their relationships with mental health.

There is a dearth of research investigating the influence of ethnic identity on mental health in people living with HIV, but available studies suggest it may be a protective factor as well. In one study, greater ethnic identity was associated with more life satisfaction and lower psychological distress in a sample of African-American men

with HIV (Crawford et al., 2002). In another study, ethnic identity was significantly related to lower perceived stress in a sample of low-income minority WLWH (Lopez et al., 2012).

Ethnic Identity and Physical Health

While research on the influence of ethnic identity on physical health is also lacking, studies have shown that African-Americans who report a greater sense of ethnic identity also report fewer chronic health problems, such as hypertension and chronic headaches (Utsey et al., 2002; Williams, Spencer, & Jackson, 1999). Studies examining acculturation, or the degree to which immigrants adopt the beliefs and behaviors of their new cultural group, also provide some evidence of the health protective effects of strong ethnic ties to one's host culture. For instance, Hispanics with Lupus who report lower acculturation (or stronger ethnic ties) show less disease activity than those reporting greater acculturation (Alarcon et al., 1999). In addition, Turkish migrants to Germany who reported greater acculturation (or weaker ethnic ties) showed increased cardiac output and heart rate, which may put them at greater risk for hypertension, when compared to those who reported lower acculturation (Bongard, Pogge, & Arslaner, 2002). These studies suggest that less acculturation or stronger ethnic ties may positively influence health outcomes, whereas more acculturation or weaker ethnic ties may negatively affect well-being. It's important to note that there is some evidence that acculturation has adaptive outcomes for non-dominant cultural groups (Berry, 1997; Berry et al., 2006). This may be explained by studies suggesting that acculturation may be bidimensional vs. unidimensional, such that individuals can retain or strengthen their

native cultural values at the same time that they adapt or acquire values from the mainstream culture (Kim & Abreu, 2001; Ryder, Alden, & Paulhus, 2000).

Mediators of the Relationship Between EI and Stress

Two ways through which ethnic identity may exert protective effects on health are by increasing an individual's confidence in their ability to cope with stress (i.e., coping self-efficacy) and increasing their sense that people are available to provide emotional and tangible aid to them (i.e., perceived social support) (Anderson, 1991). It has been shown that ethnic identity is associated with increased use of social support in Asian-Americans, which in turn is associated with decreased perceptions of race-related stress (Yoo & Lee, 2005). Additionally, Latina women with lower levels of acculturation, who are more likely to preserve their ethnic identity, report higher levels of self-efficacy and perceived support in coping with the results of their genetic cancer risk screening results (Lagos et al., 2008). Research also suggests that self-efficacy and social support are useful coping resources for protecting individuals with HIV from negative effects of stress on psychological and physical well-being. Studies have shown that an increased sense of coping self-efficacy in men and women with HIV is associated with lower levels of both perceived and objective stress, less psychological distress, and better immune function (Benight et al., 1997; Chesney et al., 2003; Ironson et al., 2005). Similarly, greater perceptions of social support are associated with lower levels of perceived stigma and fewer depressive symptoms in African-Americans who are HIV positive (Galvan et al., 2008). Notably, social support and coping self-efficacy skills have been found to mediate the relationship between greater ethnic identity and less perceived stress in

minority WLWH, such that higher ethnic identity was related to higher social support and coping self-efficacy, which in turn were related to lower perceived stress (Lopez et al., 2012).

Psychosocial Interventions and EI

Given the multitude of stressors (e.g., environmental, psychological, physiological) encountered by minority persons with HIV, it is possible that they would benefit greatly from programs designed to help them cope and manage their distress. Psychosocial interventions may be one approach through which minority populations may learn to manage everyday stressors and access their available social support resources. In fact, interventions focusing on improving psychological health have been shown to be effective in a wide range of populations. A review by Miranda et al. (2005), which investigated the efficacy and effectiveness of interventions for ethnic minorities, such as Latinos, African-Americans, and Asian-Americans, found that interpersonal psychotherapy and psychodynamic group therapy were effective for Latinos and African-Americans in helping them manage mood symptoms. Furthermore, Cognitive Behavioral Therapy (CBT) groups proved to be efficacious (capacity to produce an effect) and effective (ability to bring about change under real life conditions) for Latinos and African-Americans in helping them cope with depressive symptoms. Very few studies were available in this review that examined the effects of psychosocial interventions on anxiety, but a single study showed that a Taoist tailored psychological intervention was significantly effective in reducing anxiety symptoms in Chinese patients, and these benefits were maintained six months later (Zhang et al., 2002).

The inclusion of ethnicity and culture-specific components in intervention research has grown in recent years. It has been suggested that tailored and targeted interventions are not only efficacious, but also have more lasting results when compared to interventions that are not tailored to meet the specific needs or to maximize the particular strengths of individuals in minority groups (Marin et al., 1995; Greene, Smith, & Peters, 1995; Pasick, D'Onofrio, & Otero-Sabogal, 1996). The efficacy of tailored interventions has been shown for health behaviors such as smoking cessation (Berman, Grosser, & Gritz, 1998; Voorhees et al., 1996; Orleans et al., 1998), cancer awareness (Skinner et al., 1994; Boyd et al., 1998; Kreuter et al., 2005), nutrition (Resnicow et al., 1999; Campbell et al., 2000), and diabetes management (Mauldon, Melkus & Cagganello, 2006). Tailored and targeted interventions have incorporated cultural components such as religiosity or church-based messages (Resnicow et al., 1994; Campbell, Bernhardt, et al., 1999; Berman, Grosser, & Gritz, 1998), afrocentricism (Resnicow et al., 1994), and cultural collectivism (Kreuter et al., 2005).

The mechanics of how psychosocial interventions that are culturally oriented are successful or how ethnic identity influences outcomes remains unclear. Research on evidence- based treatments with diverse populations has suggested that benefits may be derived simply by considering cultural differences, which enables clinicians to respond uniquely to their patients, even if culture-specific protocols are not implemented (Huey & Polo, 2008). Other studies have found that similarities among clients and therapists influence short-term outcomes in some ethnic groups (Flicker et al., 2008; Chapman & Shoenwald, 2011). Given the ethnic disparities regarding utilization of mental health

resources, it is possible that programs that cater to the specific needs of minority populations might be more desirable, and thus result in greater engagement and less attrition. While many studies on this topic have focused on adolescents, given the importance of identity development during that time, ethnic identity development may be relevant for adults as well. One exploratory study showed that greater ethnic identity in African-American women predicted lower rates of risky sexual behavior during an HIV/STD prevention intervention, and that ethnic identity mainly worked through the pathway of motivation and to a smaller degree through self-efficacy (Beadnell et al., 2003). Indeed, it has been suggested that ethnic identity may be protective by enhancing other pre-existing protective factors (Brook et al., 1998a; 1998), including self-esteem and social support (Jemmott et al., 1995), but further research is still necessary on this topic.

Psychosocial Interventions and HIV

In HIV positive populations, psychosocial interventions incorporating cognitive behavioral techniques (e.g., changing irrational thoughts, learning adaptive coping skills) have also been shown to be effective in improving mental health. Specifically, in a review by Crepaz et al. (2008) people that were HIV positive that took part in CBT psychosocial interventions reported improvements in depression and anxiety symptoms and also gained adaptive coping skills to manage and cope with their stress compared to those not participating in these groups. However, the long-term effects of these interventions were not as clear.

There is ample evidence that points to psychological and physical health improvements for people with HIV who undergo a group-based Cognitive Behavioral Stress Management (CBSM) intervention. CBSM interventions have demonstrated efficacy in improving mental and physical health in populations who are HIV positive, as well as other populations dealing with a chronic illness (Fekete et al., 2007). One CBSM intervention tested extensively in persons with HIV is a 10 week manualized procedure that comprises both cognitive behavioral techniques and relaxation training. It was designed to increase stress awareness, build social support and coping self-efficacy skills, change distorted cognitive appraisals, reduce perceived stress, and improve an individual's sense of control (Antoni, Schneiderman, & Ironson, 2007). A study looking at depression and anxiety levels in a sample of homosexual men awaiting HIV status notification, showed that men randomized to a CBSM group exhibited stable levels of depression and anxiety when given a seropositive diagnosis of HIV. In contrast, men in the no treatment control group exhibited significant increases in both depression and anxiety when notified of their HIV positive diagnosis (Antoni et al., 1991). Other CBSM studies have demonstrated similar results of improvements in depressed mood, anxiety, and distress in gay men who have been living with HIV (Lutgendorf et al., 1997; Carrico et al., 2005a). Improvements in psychological functioning following CBSM have also been shown in minority WLWH. Specifically, low-income minority women with case defining AIDS who were randomized to a CBSM-based intervention showed reductions in depression, anxiety, and denial, and improvements in self-efficacy, social support, coping skills, and quality of life (Weiss et al., 2011). Follow-up analyses of these study

participants showed that CBSM reductions in depressed mood remained even after a one-year follow-up (Laperriere et al., 2005).

Importantly, stress management interventions that modify psychosocial factors may also modify biological factors, such as endocrine and immune system indicators, which have important implications for disease status and course (Antoni, 2003). For example, men living with HIV who were in the CBSM group that showed less depression and anxiety after serostatus notification also showed greater helper CD4+ T-cells and natural killer (NK) cell counts compared to controls (Antoni et al., 1991). CBSM studies have also shown alterations in sympathetic adrenal medullary (SAM) and hypothalamic pituitary adrenal (HPA) stress hormones in persons with HIV. Research investigating the effects of CBSM has shown decreases in 24-hour urinary free cortisol output, plasma cortisol/dehydroepiandrosterone (DHEA-S) ratio, and 24-hour urinary norepinephrine (NE) post-intervention in samples of gay men with HIV (Antoni et al., 2000a; Cruess et al., 1999; Antoni et al., 2000b; Cruess et al., 2000). Significant associations between psychological and physical health were revealed in these studies, such that urinary cortisol and plasma cortisol/DHEA-s ratio reductions were associated with decreases in depressive mood, while urinary NE reductions were associated with decreases in anxiety.

Subjective and Objective Stress in HIV

The availability of psychosocial interventions for people living with HIV is significant, given how successful the approaches are in helping them deal with a wide range of stressors. Individuals with HIV experience a variety of illness-specific stressors as well as general stressors (i.e. neighborhood safety, job stress etc.), which may be

associated with mental health sequelae (Gore-Felton and Koopman, 2002; Koopman et al. 2000; Roberts et al. 2001). One meta-analysis found that depression rates were twice as high in people with HIV when compared to individuals with no HIV diagnosis (Ciesla & Roberts, 2001). Another study found that an estimated 31% of men and women living with HIV reported acute stress reactions to recent life events that also met criteria for a diagnosis of acute stress disorder (Koopman et al., 2002). Similar to PTSD, acute stress disorder is an anxiety disorder that develops after a traumatic event or stressor but the duration is shorter. Interestingly, only 9.4% of participants in this study reported a stressful life event that was threatening to the life or physical integrity of themselves or others, a criterion of a PTSD diagnosis. This suggests that although a critical subset of people living with HIV experience non-traumatic life events, they still experience high levels of acute stress that may put them at risk for developing PTSD. The prevalence of PTSD in populations infected with HIV has been estimated to be up to 42% (Cohen et al. 2002). Importantly, subjective measures of stress, such as self-reported acute life events and perceived stress, have been related with poorer medication adherence in people with HIV (Leserman et al. 2008; Mellins et al., 2003; Bottonari et al. 2005; French et al., 2005). Moreover, it has been shown that both depression and anxiety symptoms are associated with lower levels of natural killer (NK) cell activity, higher activation of CD8+ T-cells, and greater viral load in women with HIV (Evans et al., 2002).

Studies of objective measures of stress, such as adrenal "stress" hormones, have found disturbances in HIV-infected persons that may directly influence the course of disease. To begin, the sympathetic nervous system (SNS) regulates a variety of

homeostatic mechanisms in the body and releases catecholamines, such as epinephrine and norepinephrine (NE), as a response to stress. The SNS together with the HPA axis make up a hormonal-biological system that is associated with neuro-immune status changes (Pabello & Lawrence, 2006). People who are HIV seropositive show an earlier NE peak in response to laboratory behavioral challenges (e.g., cold pressor test) when compared to HIV seronegative persons, suggesting a physiological dysfunction in those infected with HIV (Kumar et al., 1991). Notably, research has demonstrated that NE plays a significant role in accelerating the rate of HIV replication (Cole et al., 1998; Cole et al., 2001).

Another regulatory system, the HPA axis, mediates the body's reaction to stress by producing corticosteroids, such as cortisol (Antoni, 2003). Individuals that are HIV seropositive show higher resting levels of cortisol when compared to individuals that are HIV seronegative (Lortholary et al., 1996; Enwonwu et al., 1996). Cortisol has been demonstrated to enhance HIV replication in vitro (Markham et al, 1986), and has been associated with the up-regulation of apoptosis of CD4+ T-cells (Roger et al, 2004; Nair et al., 2000), short-term reductions of lymphocyte proliferation and NK cells, and decreases in CD8+ and CD4+ cells (Petitto et al., 2000; Ullum et al., 1995; Antoni et al., 2000). Additionally, a study investigating the effects of a bereavement support group for persons with HIV found that increased CD4+ T-cell counts were associated with reductions in cortisol (Goodkin et al, 1998).

Prior research has shown a significant relationship between objective measures of stress (cortisol, NE) with more subjective measures of stress, such as clinical diagnoses

of Major Depressive Disorder (MDD) and PTSD. For example, higher than average levels of cortisol have been associated with a diagnosis of MDD (Plotsky et al., 1998; Yehuda et al., 1993; Yehuda et al. 1996). Over-activity of the SNS has also been linked to MDD, evidenced by higher levels of circulating NE and epinephrine in diagnosed patients (Gold & Chrousos, 1999). Furthermore, people diagnosed with PTSD also show profiles of increased levels of NE (Yehuda et al., 1996; Southwick et al., 1993; Cohen et al., 2001), and increased or decreased levels of cortisol (Cohen et al., 2001). Specifically, dysregulated cortisol output has been found in people with combat related PTSD, with some studies showing decreases in 24-hour urine cortisol (Mason et al., 1986; Yehuda et al., 1991) and 24-hour plasma concentrations (Yehuda, 1994), and other studies showing increases in 24-hour urinary output (Pitman & Orr, 1990; Lemieux & Coe, 1995; De Bellis et al., 1999a).

Statement of the Problem

Members of minority communities living with HIV encounter a multitude of stressors that negatively impact their mental and physical health. In spite of this, it appears that those with high ethnic identity are able to utilize available resources, such as social support and coping self-efficacy, to manage their stress. It is plausible, therefore, that persons with greater ethnic identity, compared to those with less ethnic identity, may benefit more from targeted stress management interventions that draw on these coping resources. Given the benefits of psychosocial interventions on objective and subjective indicators of stress in WLWH, it is important to understand whether ethnic identity influences these intervention effects, and if so, <u>how</u> it does so. No prior study to date has

investigated these questions in low-income minority WLWH undergoing a targeted group based CBSM intervention.

Proposed Project: Aims and Hypotheses

The proposed project seeks to investigate whether ethnic identity moderates the effects of a targeted CBSM intervention on subjective and objective stress post-intervention and at 6-month follow-up in low-income minority WLWH. This project also aims to test whether resources such as social support and coping self-efficacy account for these moderating effects. Specifically, the aims of the present research are:

1) <u>Aim 1</u>: To test the moderating effects of ethnic identity (EI) on the relationship between CBSM and subjective indicators of stress (Impact of Events Scale [IES], Perceived Stress Scale [PSS], Life Experiences Survey [LES]) at post-intervention and 6-month follow-up. It is hypothesized that the effects of CBSM will be stronger for women with greater EI than women with lower EI. Specifically, women with greater EI randomized to CBSM will experience more reductions in self-reported stress than the control group and women with lower EI that are randomized to CBSM or control.

2) <u>Aim 2</u>: To test the moderating effects of EI on the effects of CBSM on objective indicators of stress (urinary free Norepinephrine [NE] and Cortisol) at post-intervention and 6-month follow-up. Again, it is hypothesized that the effects of CBSM will be stronger for women with a greater EI than in women with lower EI. Specifically, women with greater EI randomized to CBSM will experience

more reductions in circulating levels of stress hormones than the control group and women with lower EI that are randomized to CBSM or control.

3) Aim 3: If overall EI moderates CBSM effects, the moderating effects of EI subscales, EI search and EI affirmation, on the effects of CBSM on subjective and objective indicators of stress will also be tested. Specifically, women reporting greater EI search and EI affirmation that are randomized to CBSM will experience more reductions in self-reported stress and circulating levels of stress hormones than will women in the control condition and women with lower EI that are randomized to CBSM or control.

Follow-up Analyses:

4) If EI moderation effects are found for intervention effects on subjective and objective stress, then mediation of the moderation model will be tested looking at intervention-associated changes in social support (using the Social Provisions Scale; SPS) and coping self-efficacy (using the Cognitive Coping Self-Efficacy Scale; CCSE) as candidate mediator variables. It is hypothesized that the moderating effect of EI on subjective and objective stress will work through CBSM-associated increases in social support and coping self-efficacy.

Exploratory Analyses:

5) An exploratory analysis will be conducted looking at the moderating effects of EI on the relationship between CBSM and disease status at post-intervention and 6-month follow-up. Specifically, women reporting greater EI randomized to CBSM

will evidence decreased levels of viral load than will women in the control

condition and women with lower EI that are randomized to CBSM or control.

CHAPTER 2: METHOD

Participants

Participants were from the Stress Management and Relaxation Training (SMART) women's study conducted during 1998-2004 (PO1MH4954H Schneiderman, N., PL.) that examined a variety of psychological, behavioral, and biological factors in WLWH who were on highly active antiretroviral therapy (HAART). This study utilized a randomized controlled trial comparing minority WLWH assigned to a CBSM condition with women assigned to a psychoeducational control group in order to establish the efficacy of CBSM. Baseline, post-intervention, and 6-month follow-up data from psychosocial and biological measures were utilized for the current research study. Eligibility criteria included WLWH who were 18 years or older, fluent in English, and had a sixth grade reading level or higher. Women with any major psychiatric (assessed by a structured clinical interview), neurocognitive (assessed by the HIV dementia scale) or medical impairment (e.g. serious co-morbid conditions such as cancer, hepatitis, autoimmune disease; life expectancy < 12 months) were excluded from the study. Additional exclusionary criteria included drug and/or alcohol abuse in the previous six months of the study, use of immunomodulatory medications or a history of another chronic illness besides HIV that could have caused permanent changes in the immune system. Women included in the study did not differ significantly from the excluded women on sociodemographic (i.e. education, age, socioeconomic status, etc.) or biological (i.e. CD4, viral load etc.) characteristics, or on any of the main study variables

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(all p's > .05). Table 1 shows means and standard deviations of baseline outcomes by group (CBSM vs. Control) and total across groups.

One hundred and forty three WLWH were eligible to participate in the study. Four women were excluded from the study because of missing demographic information and an additional five women withdrew before randomization, yielding a final sample size of 123 for the current study. See figure 1 for participant flow through the study. Participants had a mean age of 38.15 (*SD* = 7.7; range = 20-62) and had been diagnosed with HIV for approximately 7.4 years (*SD* = 4.5; range = .48-24.6). Women were predominantly African-American (89%), with the remainder being Latina (7.7%), Asian or Pacific Islander (1.1%), American Indian or Alaskan Native (1.1%) or of another ethnic group (1.1%). More than half of the women had a high school diploma or greater (56.9%) and many women were on disability (53.3%) at the time of assessment. Most women had never been married (40.2%), with the remainder being married (27.2%), divorced (17.4%), widowed (6.5%), or separated (8.7%). The majority of the women reported having one or more children (80.4%) and earned an average yearly income of $5000-$10,000. At study entry, women had a mean CD4+ cell count of 484.26 cells/mm^3 (*SD* = 297.97; range = 22 - 1616) and an average HIV viral load of 21,717.61 copies/mm^3 (range = 0 - 700,986).

Procedure

At baseline, participants eligible for the study signed informed consents, completed psychosocial measures, provided morning peripheral venous blood samples (between 8:00am - 12:00pm) and a 24-hour urine collection sample. Participants

completed a 60 to 90 minute psychosocial interview that assessed overall psychiatric and psychological well-being during the baseline assessment and were randomized to a CBSM or one day workshop if eligible. CBSM groups were conducted by female Clinical Health Psychology graduate students or a post-doctoral associate. Participants completed assessment measures at baseline, post-intervention and 6 month follow-up. They were compensated financially for completing each assessment and for study related accommodations (e.g., transportation, childcare, meals). They were also contacted monthly in between study related visits, to update any contact information and to remind them of their next appointment. Before any study related visit, participants were contacted through phone, mail, or in person to discuss any resource issues (e.g., transportation, childcare) or other demands (e.g., employment) that could interfere with their ability to attend their appointment.

Measures

<center>Psychosocial</center>

Ethnic identity. Ethnic identity was measured with the current version of The Multigroup Ethnic Identity Measure (MEIM) (Phinney, 1992). The MEIM is composed of 12 items that assess the degree of identification to one's ethnic group (e.g., I think a lot about how my life is affected by my ethnic group membership; I participate in cultural practices of my own group, such as special food, music, or customs). Items are summed into a single score that represents overall ethnic identity, and can also yield two subscale scores: ethnic identity search (a cognitive and developmental component) and affirmation, belonging, and commitment (an affective component). Participants in the

study indicated how much they agreed with the 12 statements on a Likert scale from 1 (strongly disagree) to 4 (strongly agree) with higher scores indicating a stronger ethnic identity (Range= 12-48). The mean overall ethnic identity score for women in our sample was 35.2 (*SD* = 5.30; range = 18-48). Alpha for ethnic identity search and affirmation subscales were .76 and .84 respectively. Alpha for overall ethnic identity score was .86.

Coping self-efficacy. The Cognitive Coping Self-Efficacy (CCSE) scale (Ironson et al., 1986) measured participants' confidence in utilizing successful coping behaviors when faced with life and HIV disease challenges. The CCSE asks participants to rate their belief in their ability to cope with HIV and life hassles on 10 items (e.g., How confident are you that you will be able to take your antiretroviral medications as they are prescribed to you? In a difficult situation, to what extent are you able to have positive as well as negative thoughts?). Responses are rated on a scale of 1 (not at all) to 5 (to a large extent/all the time). Scores for all items are summed to create a total coping self-efficacy score with higher scores signifying more confidence in overcoming stressful situations (Range= 10-50). At study entry women in the sample had a mean CCSE score of 32.88 (*SD* = 6.69; range = 10-45). Alpha for CCSE was .82.

Social support. The Social Provisions Scale (SPS; Cutrona & Russell, 2002) was used to assess the degree to which respondents perceived receiving and giving several dimensions of social support. The SPS consists of 24 items with six subscales including attachment (e.g. I have close relationships that provide me with a sense of emotional security and well-being), social integration (e.g., I feel part of a group of people who share my attitudes and beliefs), reliable alliance (e.g., There are people I can depend on to

help me if I really need it), reassurance of worth (e.g., There are people who admire my talents and abilities), guidance (e.g., There is a trustworthy person I could turn to for advice if I were having problems), and opportunity for nurturance (e.g., There are people who depend on me for help). Participants indicated the extent to which they agreed with each statement on a scale of 1 (strongly disagree) to 4 (strongly agree). The six subscales are summed to derive a total social support score (Range= 24-96). Women in our sample had a mean total SPS score of 71.15 (SD = 9.87; range = 51-92). Alpha for the overall SPS score was .93.

<div align="center">Subjective Measures of Stress</div>

Impact of Events Scale. The Impact of Events Scale (IES; Horowitz, Wilner, & Alvarez, 1979) is a self-report measure that assesses degree of thought intrusion and avoidance commonly associated with distress about life challenges. The 15 items of the IES are summed to create a total IES score and can be broken down into two subscales: avoidance and intrusion. In this study the IES was keyed to the experience of diagnosis of and treatment for HIV as reflected by HIV specific questions. The Intrusion subscale measures the extent of unwanted thoughts and images that are related to a particular life challenge (e.g., I had waves of strong feelings about it; I had dreams about it). The Avoidance subscale assesses the degree to which an individual distracts themself in order to avoid thinking about a particular stressful situation (e.g., I was aware that I still had a lot of feelings about it, but I didn't deal with them; I tried to remove it from my memory). It has been shown that the IES discriminates well between mild and severe stress in people but it should not be used as a measure of PTSD given its lack of measuring

hyperarousal symptoms (Sundin & Horowitz, 2002). Baseline total IES stress score for women was 22.53 (*SD* = 16.78; range = 0-71). Alpha for the total IES score was .90 at study entry. Mean baseline IES avoidance and intrusion scores were 12.98 (*SD* = 9.51; range = 0-36) and 9.77 (*SD* = 8.62; range = 0-35), respectively. Alphas for IES avoidance and intrusion subscales were .83 and .85.

Perceived stress. Women's perceptions of general stress were assessed by the Perceived Stress Scale (PSS; Cohen et al., 1983). The PSS is composed of 14 items about individuals' experience of the degree that they have felt overwhelmed by different stressful life events during the last 30 days on a scale from 0 (never) to 4 (very often) (e.g., In the last month how often have you felt nervous or "stressed"? How often have you dealt successfully with irritating life hassles?). Positive items on the measure were reverse scored so that higher scores on this scale indicate greater levels of perceived stress (Range= 0-56). At study entry, women's average PSS scores were 24.08 *(SD =* 7.50; range = 7-43*)*. Alpha for the PSS was .82.

Life Experiences Survey. The Life Experiences Survey- Revised (LES; Sarason et al., 1978) measures 36 stressful life events affecting an individual in the past three months. This study utilized the LES to gather information about HIV-specific stressors. The LES asks participants to indicate the number and severity of their experiences using a 7-point Likert scale, from "extremely negative" (-3) to "extremely positive" (+3). An average impact score for negative life events was computed by summing impact scores for negatively related events and dividing them by the total number of negative life events experienced. A score of zero was assigned to an event that did not occur. Greater

life stress scores indicated higher impact of negative life events (0= no impact, 1= slightly negative, 2= moderately negative, 3= extremely negative). Examples of life events include "Serious illness or injury of a close family member, close friend, mate/lover, or child" and "Experienced discrimination because of your HIV status, gender, sexual orientation, and/or ethnicity". At study entry, women's average total LES scores were 2.13 (SD = 1.04; range = 0-3). Alpha for total LES was .73.

<center>Objective Measures of Stress</center>

Stress Hormones. Cortisol and Norepinephrine (NE) output levels were measured through a 24-hour urine collection procedure. Urinary assessment through a 24-hour period was chosen over blood draw (plasma collection) since it provides an integrated measurement of stress hormone output, which reflects more accurately than plasma, the circulating levels of freely available (unbound) cortisol and NE, and is not confounded with acute stress from venipuncture. Given the volatility of measuring stress hormones, substance use and urine volume were monitored closely to assess compliance with urine collection. Participants were asked to abstain from illicit drug use, smoking, chocolate, and caffeinated drinks as these may affect circulating values. Before each assessment visit, participants were given a collection container that contained 1g sodium metabisulfite and were provided with verbal and written instructions on how to collect their urine. Urine samples were refrigerated until they were dropped off at the assessment facility. The twenty-four hour collection was conducted during the same week of the baseline, post-intervention and at the 6-month follow-up visits.

Urinary free cortisol was determined by a standard solid-phase radioimmunoassay (RIA) procedure from Diagnostic Products (Coat-A-Count Cortisol, Los Angeles, CA) that included kits with 50mL of a 500-mL sample extracted with10mL of dichloromethane. Fifty microliters of urine extract were evaporated to dryness under nitrogen. One milliliter of ^{125}I-labeled "cortisol" was added to tubes coated with antibodies, followed by a 45-minute incubation, decantation, and quantification for one minute with a gamma counter. This procedure has a reported sensitivity to 0.2 ug/dl and is highly specific with little cross reactivity to other steroids or chemicals that may be in the samples. Cortisol levels were calculated with a standard calibration curve and values are expressed as mg per 24-hour (Antoni et al., 2005).

Urinary free NE was determined using a high-pressure liquid chromatography with an electro chemical detection (HPLC-ECD) method, which was expressed as mg per 24-hour (Kumar et al., 1991, 1993). Before being assayed NE samples were measured for volume, and then put into two 10ml aliquots, both frozen at -70[0]C. Each tube contained 100 ul of six hydrochloric acid to thwart catecholamine breakdown. Sample tubes were thawed before being assayed and were adjusted to a pH of 3.00.

Disease Status

CD4+ Cell Counts. Disease status was assessed via women's viral load and CD4+ cell counts using morning peripheral venous blood samples (collected between 8am to 12 pm) in sterile tubes containing sodium heparin (Vacutainer Cat #6489, Becton-Dickinson, Rutherford, NJ), with advanced disease progression indicated by lower CD4+ cells and higher viral load. Samples were collected at baseline, post-intervention and 6-month

follow-up. A single laser flow cytometer (Becton Dickinson FACSCalibur) was used with whole blood to determine lymphocyte phenotypes. This included a four-color immunofluorescence analysis to derive the number and percentage of T-cells and subsets using monoclonal antibodies specific for lineage, activation, differentiation, and adhesion molecules. T-lymphocyte counts were determined with a Coulter hematology analyzer (Coulter Instruments Laboratories, Hialeah, FL) and the four-color panel was based on markers for use in the AIDS Clinical Trials Group (ACTG) Advanced Flow Cytometry Focus Group's recommendation (CD3-FITC/CD8-PE/CD45-PerCP/CD4-APC). Among persons with HIV, a diagnosis of AIDS is made when a CD4+ T-cell count of 200 or below is reached (Dolin et al., 2010). Women had a mean CD4+ cell count of 484.26 cells/mm^3 (SD = 297.97; range = 22-1616).

Viral Load. HIV-1 viral load was determined with reverse transcriptase polymerase chain reaction (RT-PCR) Amplicor HIV monitor, Ultrasensitive kit assay (Roche Diagnostics). Plasma was extracted using guanidium thiocyanate and isopropranolol, then reverse transcribed into DNA, and amplified by RT-PCR using HIV specific primers. The detection range was 399-72,000,000 copies/ml. Values were logarithmically transformed and winsorized. Viral loads of 500 or lower HIV RNA copies per mL is considered low, while a viral load of 40,000 or more HIV RNA copies per mL is considered high (Mylonakis, 2001). Women had a mean HIV viral load of 9488.97copies/mm^3 (range = 0-283,050).

Intervention

CBSM. Participants were randomized either to a 10 week targeted Cognitive

Behavioral Stress Management (CBSM) group or a 1 day psychoeducational group

workshop. Women in the experimental condition participated in ten 2-hour weekly

CBSM sessions. The "SMART" women study employed a similar format as previous

CBSM studies conducted with HIV positive men at the University of Miami, but included

modifications designed to make the intervention more applicable for low-income

minority women who were HIV positive (Byrnes Pereira, 2002). Targeted components

addressed issues relevant for minority women with HIV and introduced coping strategies

that HIV+ women of color draw upon, such as flexibility, spirituality, endurance, and

positive thinking (Gillman & Newman, 1996). For instance, session exercises were in

line with African-American oral tradition that emphasized collectivism (Greene, 1994;

Phinney, 1996) and taught the importance of relationships versus individuality (Jordan et

al., 1991). A goal of these exercises was to facilitate feelings of trust, safety, and

empowerment. Learning when to use emotion-focused coping (e.g., for uncontrollable

stressors) versus problem-focused coping (e.g., for controllable stressors) was particularly

emphasized during group sessions. The intervention employed a weekly check-in prior to

sessions that was culturally relevant and that also allowed group facilitators to utilize

current salient stressors during group rather than the use of generic examples provided by

treatment manuals. Given the utilization of spirituality and faith as coping mechanisms

for women of color (Gillman & Newman, 1996), the intervention incorporated a "prayer

and action" component, which emphasized the importance of faith in use with behavioral

coping strategies, such as adherence or medical screening. Other modifications included exploration of constraints on assertiveness when dealing with cultural norms, gender roles, and power differentials as well as honoring the cultural importance of time flexibility when starting or stopping session components (Byrnes Pereira, 2002). See table 1 (Byrnes Pereira, 2002).

CBSM sessions were held once a week for two hours and were conducted according to the training manual by a post-doctoral associate and advanced clinical psychology graduate students. The 2-hour sessions consisted of two parts, a CBSM didactic component and relaxation training. The didactic component included psycho-education of biological effects of stress, and mind body connection of stress and emotions; CBT techniques including identification of cognitive distortions, rational thought replacement, coping effectiveness training, assertiveness training, and anger management; and identification and utilization of social support and group processing of experiences with HIV/AIDS. A variety of relaxation techniques were taught to participants so that they would be able to choose among the techniques that they felt most comfortable with and at ease in incorporating into their lifestyle. These included four and seven-muscle progressive muscle relaxation, deep breathing, basic meditation practices, and autogenic training.

Control Condition. Women who were randomized to the control condition were invited to attend a one-day psychoeducation seminar where they received a five hour compressed overview of the CBSM intervention including the mentioned modifications. The session was scheduled during one of the weekends during the period of the

corresponding 10-week experimental condition and consisted of an informational overview of the topics covered in the 10-week intervention. The control condition differed from the 10-week CBSM intervention in having less contact hours, the lack of structured group interactions, and absence of homework or assigned home based practice.

Analysis Plan

<u>Control variables</u>

Bivariate correlations of sociodemographic (i.e., age, education, employment etc.) and baseline disease status (i.e., CD4, viral load, etc.) variables with post-intervention and 6-month follow-up IES, PSS, LES, cortisol, and NE were conducted to establish candidate covariates. No significant correlations emerged (all p's >.05) during these analyses. Candidate covariates included age, time since diagnosis, stage of disease, CD4+ cells, viral load, and income, as they have been shown to be associated with stress-related psychosocial and physiological processes (Singh et al., 1997; Lopez et al., 2012; Hand et al., 2006; Cohen et al., 2002; Ickovics et al., 2002).

<u>Structural Equation Modeling</u>

Structural Equation Modeling (SEM; Muthén & Muthén, 1998) was utilized to test the hypotheses that high Ethnic Identity (EI) women randomized to CBSM will experience greater reductions in both subjective stress indicators (IES, PSS, LES) and circulating levels of stress hormones (total 24-hour urinary cortisol [cortisol ug/24h], urinary concentration of cortisol [cortisol ug/ml], total-24 hour urinary NE [NE ug/24h], urinary concentration of NE [NE ug/ml]) than low EI women that are randomized to CBSM or women in the control condition. An advantage of SEM is that it allows multiple

indicators to be used to create latent variables, which reduces measurement error. Additionally, SEM has the ability to examine all associations among variables simultaneously, which cannot be conducted using other analyses, such as multiple regression. Overall model fit was determined by fit indices for good model fit including chi-square (ideal is a non-significant chi-square); comparative fit index (CFI), for which values above .95 indicate good fit; the root-mean-square error of approximation (RMSEA), for which values below .05 indicate good fit; and the standardized root-mean-square residual (SRMR), for which values below .10 indicate good fit (Kline, 2005). Study effects were tested with the available parameter estimate (unstandardized coefficient), with a .05 significance level. Missing data was estimated using full information maximum likelihood (FIML) method, which uses all available data for each person and estimates missing information from relations among variables in the sample. This method was chosen given that the data was missing completely at random (Little's MCAR test: X^2= 89.551, DF= 660, p= 1.00).

<div align="center">Measurement Model</div>

A "super stress" latent variable with observed variables: IES, PSS, LES, cortisol ug/24h, cortisol ug, ml, NE ug/24h, and NE ug/ml was created to conduct a confirmatory factor analysis (CFA) determining whether subjective and objective stress are unitary or separate. See Figure 2. Subjective and objective stress were found not to be unitary, thus a separate subjective stress latent variable for subjective stress was created with observed variables IES, PSS and LES, as well as a separate objective stress latent variable with observed variables NE ug/24h, NE ug/ml, cortisol ug/24h, and cortisol ug/ml. A two-

factor model also proved to be inadequate and as such separate observed stress variables were utilized as outcome variables. A full description of the steps taken in creating the measurement model is provided in the results section.

<div align="center">Structural Model</div>

Once the measurement model was fit to the data, the structural model was analyzed to examine the associations among the observed and latent variables. Specifically, Latent Growth Modeling (LGM) was utilized to test intervention and moderation effects on stress (LGM; Duncan, Duncan, Strycker, Li, & Alpert, 1999; Muthén, 1997). The intercept (starting point) and slope (change over time) were modeled as latent variables from data at baseline (Time point 1, T1), post-intervention (Time point 2, T2), and at 6-month follow-up (Time point 3, T3). Unless otherwise specified, residual variances were constrained equal as per the homogeneity of variance assumption. The main predictor, CBSM versus control condition, was coded as 1 and 0, respectively. The path from condition to intercept reflected the group difference in baseline values and was expected to be non significant. The path from condition to slope reflected the extent to which change in stress over time was associated with condition. A significant effect indicated differing mean trajectories between groups. For the current analyses, a model was utilized in which T3 was specified as 34 weeks after T1. If this model did not fit the data well, a model in which T3 was freely estimated to capture potential nonlinear change was tested. See Figure 3.

Next, the moderation model was examined. First, direct effects were tested by regressing the stress latent variable on the two predictor variables: condition and ethnic

identity. The moderation effect of ethnic identity (centered) on the relationship between condition and stress was tested by regressing the stress latent variable on the interaction between condition and ethnic identity. See Figure 4. If overall ethnic identity moderated CBSM, secondary analyses looking at the ethnic identity subscales, Ethnic Identity Search and Ethnic Identity Affirmation, were also tested separately as moderators using the steps stated above. Furthermore, an exploratory analysis including disease status as an outcome of the interactive effects of ethnic identity and CBSM was conducted. Post hoc analyses were conducted if a significant interaction was found by creating a high ethnic identity (+ 1 standard deviation), medium ethnic identity (0 standard deviation), and a low ethnic identity (-1 standard deviation) variable. Each variable was tested separately following the moderation steps outlined above to decompose the condition X ethnic identity interaction.

If significant changes were found from the moderation models, mediation analyses of the moderation models followed testing intervention-associated increases of coping self-efficacy and social support as candidate mediator variables through LGM as described above. For mediation analyses, a complex model was created that simultaneously estimated both the effect of the interaction of ethnic identity and condition on the outcome variable and on the mediator variables. Included in these analyses was a predictive path from the slope of social support and coping self-efficacy to the slope of stress. See Figure 5. T3 data in the mediation analyses were handled the same as they were handled in the final model described earlier. Specifically, if T3 was specified as 34 weeks in the final model, it was specified as 34 weeks in the mediation

model and if it was freely estimated in the final model, it was freely estimated here as well. If social support and coping self-efficacy mediated the effect of the interaction of ethnic identity and condition on stress, then the indirect effect of the path from condition X ethnic identity to stress would be significant.

CHAPTER 3: RESULTS

Measurement Model

Confirmatory factor analyses were conducted on a single latent factor with the following measures: IES, PSS, LES, urinary cortisol concentration (ug/ml), total 24 hour urinary cortisol (ug/24h), urinary NE concentration (ug/ml), and total 24 hour urinary NE (ug/24h). Both cortisol and NE variables were log transformed in these analyses to resolve the high kurtosis observed in these variables. All observed variables were regressed on a single "super stress" latent variable. First, a stress latent variable was created with T1 stress measures so that stress may be defined for this sample of low-income minority WLWH. This model demonstrated poor fit (X^2 (20) = 159.63 p=.00, CFI = .66, RMSEA = .195, SRMR = .23) as were similar models for T2 (X^2 (20) = 155.25 p=.00, CFI = .45, RMSEA = .26, SRMR = .17) and T3 (X^2 (20) = 246.05 p=.00, CFI = .32, RMSEA = .35, SRMR = .17).

To determine what might be contributing to the lack of fit in the present model, loadings of each observed variable were examined. It was discovered that loadings of all the physiological variables were low and non-significant compared to the remaining psychological variables, which were not only significant but also had adequate loadings (.20-.50). This suggests that an alternative model with physiological and psychological stress as separate latent factors may be a better fit. A two factor model was then tested with PSS, IES, and LES loading on a latent psychological stress factor and with measures of NE ug/24h, NE ug/ml, cortisol ug/24h, and cortisol ug/ml loading on a latent physiological stress factor. Although model fit improved, the two factor CFA resulted in

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a poor model fit as well (X^2 (19) = 70.56 p=.00, CFI = .79, RMSEA = .15, SRMR = .05), as did models for Time 2 (X^2 (19) = 85.13 p=.00, CFI = .73, RMSEA = .19, SRMR = .23) and Time 3 (X^2 (19) = 43.13 p=.00, CFI = .93, RMSEA = .12, SRMR = .10).

After attempts to create a better model by eliminating non-significant and low loadings as well as taking modification indices suggestions that were theoretically sound into account, the sample size reduced to less than 100. This created an insufficient ratio of parameters estimated to degrees of freedom that would be necessary to run the proposed complex models to test our hypotheses. Moreover, samples of 100 to 200 are recommended to have confidence in the goodness of fit tests (Hoyle 1995). In light of these results the best course of action was to run LGM's utilizing the actual observed measures themselves. An issue to consider when running multiple outcome measures is the significant increase of Type I errors or finding false significance (Feise, 2002). On the other hand, while adjusting for p-values decreases the chances of making Type I errors it also increases the chances of Type II errors (false non-significance) or needing to increase the sample size (Feise, 2002). As such, to improve the quality of the present project a set of primary outcome variables with sufficient theoretical evidence of their validity for measuring stress were chosen to test our hypothesis. The outcome measures included in the present analyses were the PSS, IES, and NE given their validity in measuring stress and their wide use in the intervention literature in HIV populations (Lopez et al., 2012; Cohen et al., 1983; Leon et al., 2007; Wohlfarth et al., 2003; Antoni et al., 2000b; Ironson et al., 2008). Notably, none of the potential covariates in the

analyses plan improved model fit during analyses and were therefore not retained in the final models.

Structural Model

Perceived Stress Scale. For the PSS, when the three time points were specified, the model was a good fit, $\chi 2(7, N = 113) = 5.15$, $p = .64$ (CFI = 1.00, RMSEA = 0, SRMR = .05). Condition did not predict variation in intercept (estimate = 1.77, $p = ns$) indicating that the groups did not differ significantly in perceived stress at baseline. Additionally, condition did not have a significant relation with slope (estimate = -.047, $p = ns$) indicating no differential change of perceived stress over time between the CBSM and control condition.

Impact of Events Scale. For the IES, when the three time points were specified, the model was also a good fit, $\chi 2(5, N = 111) = 2.50$, $p = .64$ (CFI = 1.00, RMSEA = 0, SRMR = .02). Condition did not predict variation in intercept (estimate = -1.35, $p = ns$) indicating that the groups did not differ significantly in IES scores at baseline. Condition did not have a significant relation with slope (estimate = .018, $p = ns$) indicating no differential change in IES scores over time between the CBSM and control condition. For the IES avoidance scale, when the three time points were specified, the model was also a good fit, $\chi 2(4, N = 112) = .909$, $p = .92$ (CFI = 1.00, RMSEA = 0, SRMR = .02). Again, condition did not predict variation in intercept (estimate = -.49, $p = ns$) indicating that the groups did not differ significantly in IES avoidance scores at baseline. Condition did not have a significant relation with slope (estimate = .009, $p = ns$) as well indicating no differential change of IES avoidance scores over time between the CBSM and control

condition. Lastly, for the IES intrusion scale, when the three time points were specified, the model was also a good fit, $\chi2(8, N = 112) = 7.77$, p = .46 (CFI = 1.00, RMSEA = 0, SRMR = .03). Condition did not predict variation in intercept (estimate = .270, p = *ns*) indicating that the groups did not differ significantly in IES intrusion scores at baseline. Condition did not have a significant relation with slope (estimate = -.042, p = *ns*) indicating no differential change of IES intrusion scores over time between the CBSM and control conditions.

Norepinephrine. For the NE ug/ml or urinary concentration of NE, when the three time points were specified, the model was a good fit, $\chi2(5, N = 108) = 4.92$, p = .42 (CFI = 1.00, RMSEA = 0, SRMR = .03). Condition did not predict variation in intercept (estimate = -.070, p = *ns*) indicating that the groups did not differ significantly in NE ug/ml at baseline. Condition did not predict variation in slope (estimate = -.005, p = *ns*) indicating no differential change over time in NE ug/ml in CBSM versus control group. Similarly, for NE ug/24h or total 24-hour urinary NE, when the three time points were specified, the model was a good fit, $\chi2(5, N = 108) = 4.03$, p = .55 (CFI = 1.00, RMSEA = 0, SRMR = .03). Condition did not predict variation in intercept (estimate = -.086, p = *ns*) indicating that the groups did not differ significantly in NE ug/24h. Condition did not have a significant relation with slope (estimate = -.055, p = *ns*) either indicating no differential change over time of NE ug/24h between the CBSM and control condition.

Moderation

PSS. Model fit values for the moderation model were as follows for PSS: $\chi2(6, N = 113) = 5.40$, p = .49 (CFI = 1.00, RMSEA = 0, SRMR = .04). This model was a good

fit and as hypothesized, results showed a significant interaction (b = -.013, SE = .006, p = .033), indicating that women with greater ethnic identity in CBSM reported lower levels of perceived stress over time. Figure 6 illustrates the moderation model with coefficients and fit indices for the PSS. Figure 7 illustrates the decomposition of ethnic identity X condition (CBSM, control) interactions for perceived stress scale scores with mean values for baseline, post-intervention , and 6 month follow-up in each subgroup (hi, med, lo).

IES. There was a good model fit for the overall IES, $\chi 2(4, N = 111) = 2.5$, p = .64 (CFI = 1.00, RMSEA = 0, SRMR = .02), however, there was no significant interaction effect (b = -.018, SE = .047, p = .707). This suggests that ethnic identity and condition do not interact to predict changes in overall IES over time. There was also a good model fit for the IES avoidance subscale, $\chi 2(4, N = 112) = .909$, p = .92 (CFI = 1.00, RMSEA = 0, SRMR = .02), but similarly, there was no significant interaction effect (b = -.009, SE = .014, p = .509). For the IES intrusive subscale there was a relative good model fit, $\chi 2(7, N = 112) = 8.84$, p = .26 (CFI = .98, RMSEA = .05, SRMR = .04), and there was also a significant interaction (b = -.015, SE = .008, p = .052), indicating that women with greater ethnic identity in CBSM reported lower levels of HIV-specific intrusive thoughts over time. Figure 8 illustrates the moderation model with coefficients and fit indices for the IES- intrusion. Figure 9 illustrates the decomposition of ethnic identity X condition (CBSM, control) interactions for impact of events scale-intrusion scores with mean values for baseline, post-intervention, and 6 month follow-up in each subgroup (hi, med, lo).

NE. There was a good model fit for NE ug/ml, $\chi2(5, N = 108) = 4.9$, $p = .43$ (CFI = 1.00, RMSEA = 0, SRMR = .03), however, there was no significant interaction effect ($b = .16$, SE = .102, $p = .23$), suggesting that ethnic identity and condition do not interact to produce changes over time in urinary concentrations of NE in our sample. Similarly, there was a good model fit for NE ug/24h, $\chi2(5, N = 108) = 4.03$, $p = .56$ (CFI = 1.00, RMSEA = 0, SRMR = .03), but there was no significant interaction effect ($b = -.001$, SE = .00, $p = .24$), suggesting that ethnic identity and condition do not interact to predict changes over time in total 24h NE.

Viral load. Exploratory moderation analyses were also conducted for viral load to assess disease status. Model fit values for viral load were as follows: $\chi2(8, N = 92) = 12.29$, $p = .14$ (CFI = .94, RMSEA = .08, SRMR = .08). Although model fit was good, findings showed no significant interaction ($b = -.002$, SE = .001, $p = .234$), indicating that ethnic identity and condition do not interact to predict changes in viral load over time.

Ethnic Identity Subscales. To determine which aspect of ethnic identity was driving the results and to test our third hypothesis, moderation analyses looking at ethnic identity subscales (EI search and EI affirmation) were conducted. For PSS, when the model included the interaction of EI search and condition there was a good model fit, $\chi2(6, N = 112) = 5.88$, $p = .44$ (CFI = 1.00, RMSEA = 0, SRMR = .03), but there was no significant interaction effect ($b = -.023$, SE = .013, $p = .08$). On the other hand, when the model included the interaction of EI affirmation and condition there was good model fit, $\chi2(7, N = 112) = 8.84$, $p = .26$ (CFI = .98, RMSEA = .05, SRMR = .04), and a significant interaction ($b = -.015$, SE = .008, $p = .052$) was found. This suggests that women with

higher ethnic identity affirmation in CBSM reported decreased levels of perceived stress over time.

Additionally, for the IES intrusive subscale, when the model included the interaction of EI search and condition there was a good model fit, $\chi^2(7, N = 113) = 4.59$, $p = .71$ (CFI = 1.00, RMSEA = 0, SRMR = .03), but there was no significant interaction effect (b = -.035, SE = .048, p = .47). Again, when the model included the interaction of EI affirmation and condition there was good model fit, $\chi^2(6, N = 112) = 4.97$, p = .55 (CFI = 1.00, RMSEA = 0, SRMR = .03), and a significant interaction (b = -.023, SE = .012, p = .022), suggesting that women reporting greater ethnic identity affirmation in CBSM reported decreased levels of HIV-specific intrusive thoughts over time.

Post Hoc Analyses of Moderation Effects

PSS and IES. To better understand the nature of the significant interaction effects of condition and EI in predicting PSS and IES intrusive thoughts, post-hoc analyses were conducted. A high ethnic identity (+ 1 standard deviation) and low ethnic identity (-1 standard deviation) variable was created and was tested separately as an interaction term with condition following the moderation steps as outlined above. Graphs decomposing the interactions for PSS and IES with means of each time point can be found in Figure 8 and Figure 9. For participants high in ethnic identity, the CBSM condition predicted less perceived stress than controls over time (b = -.012, SE = .006, p = .05). This indicated that among women with high levels of ethnic identity, CBSM produced lower levels of perceived stress compared to women with high ethnic identity in the control condition. Additionally, for women high in ethnic identity, assignment to CBSM predicted less IES

intrusive thoughts than controls over time (b = -.015, SE = .008, p = .05). This indicated that among women with high levels of ethnic identity CBSM produced lower levels of HIV-specific intrusive thoughts than women high in ethnic identity in the control group. In contrast, for women low in ethnic identity there were no effects of condition on either PSS or IES (b = -.012, SE = .008, p = .13; b = .009, SE = .014, p = .51). This suggested that the ethnic identity X group assignment interaction effects on perceived stress and HIV-specific intrusive thoughts were largely accounted for by the effects of group assignment in the high ethnic identity subgroup.

Mediation Analyses

First, independent samples t-tests were run to determine if there were any intervention-associated changes in the proposed mediators (coping self-efficacy and social support) from baseline to T2. For both coping self-efficacy and social support, there were no significant differences between women in CBSM vs. control group (CSE: t(100)= -.443, p= .65; SPS: t(92)= .446, p= .65) at post-intervention.

Moderation analyses were then conducted using LGM as described above to determine if ethnic identity interacts with condition to produce changes in CSE, overall SPS, and the SPS subscales. Moderation models for CSE and SPS were not a good fit with Time 3 specified (fixed at T1 plus 34 months) or freely estimated thus no mediation models were tested for these variables. Of the SPS subscales, a moderation effect was found for SPS integration. For SPS integration, when the model included the interaction term and Time 3 was freely estimated there was a reasonable model fit, $\chi^2(12, N = 113) = 7.80$, p = .25 (CFI = .98, RMSEA = .05, SRMR = .13) and there was a significant

interaction (b = .015, SE = .008, p = .047). This indicated that ethnic identity and condition interact to predict change in levels of SPS integration over time. Specifically, women with higher ethnic identity in the CBSM condition reported higher levels of SPS integration over time. Mediation analyses including the slope of SPS integration predicting the slope of PSS and IES intrusion were then conducted separately. For PSS, the model did not fit the data, $\chi2(22, N = 113) = 172.47$, p = .00 (CFI = .034, RMSEA = .25, SRMR = .50), and the indirect effect was not significant (b = .001, SE = .001, p = .48), indicating that CBSM changes in SPS integration do not mediate the relationship between ethnic identity X condition and perceived stress. For IES intrusion, the model fit the data well, $\chi2(19, N = 113) = 24.84$, p = .17 (CFI = .97, RMSEA = .05, SRMR = .05), but the indirect effect was also not significant (b = -.008, SE = .010, p = .53), indicating that CBSM changes in SPS integration do not mediate the relationship between ethnic identity X condition and perceived stress in our sample.

CHAPTER 4: DISCUSSION

Although prior work has demonstrated the efficacy of cognitive behavioral interventions to help persons with HIV infection manage the stressors of this chronic disease, less is known about individual difference factors that might influence the efficacy of these interventions on different outcomes. This lack of specific information is particularly apparent in emerging populations such as women living with HIV (WLWH) who are from underserved minority groups. The present study examined whether ethnic identity moderated the effects of a targeted 10-week group-based stress management intervention, CBSM, on subjective and objective indicators of stress at post-intervention and 6-month follow-up in minority WLWH. A measure of ethnic identity, the Multi-Ethnic Identity Measure (MEIM) was used to classify minority WLWH who were participating in a randomized trial testing the effects of CBSM. The primary goal of the study was to test whether women with greater ethnic identity, including ethnic identity affirmation and ethnic identity search, would benefit the most from this group-based intervention. Outcome stress measures included self-reported perceived stress and urinary norepinephrine output. CBSM changes in social support and coping self-efficacy were also tested as potential mediators of the moderation models.

Subjective Stress Outcomes

The first set of hypotheses predicted that women with greater ethnic identity in the CBSM condition would report lower levels of subjective stress than women in the control group, as well as women with lower ethnic identity in CBSM or control. Subjective stress outcomes were operationalized as changes in perceived stress as

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measured by the Perceived Stress Scale (PSS) and degree of HIV-specific thought intrusion and avoidance as measured by the Impact of Events Scale (IES). Results revealed that ethnic identity in minority WLWH moderates the relationship between intervention condition and levels of both perceived general stress and HIV-specific intrusive thoughts. Specifically, women who had a strong sense of ethnic identity that were randomized to CBSM evidenced the lowest levels of perceived stress from baseline to post-intervention and at 6-month follow-up compared to women with greater ethnic identity in the control condition. In contrast, women with a lower ethnic identity assigned to CBSM, showed no differences versus those in the control condition. Interestingly in our figures decomposing the interaction between ethnic identity and intervention it was shown that women with higher ethnic identity in the control condition had the highest reports of stress by 6 month follow-up. One reason for this finding may be that these particular women experienced more life events at follow-up. However, t-tests comparing impact scores for negative life events at 6 month follow-up in women with higher vs. lower ethnic identity in the control group demonstrated that this was not the case ($t(26)$= .138, p= .89). No significant differences in negative life events at 6 months were found between CBSM and control group women with higher ethnic identity as well ($t(23)$= .34, p= .74). Although life events reported for the period leading up to the 6 month follow-up do not appear to explain group differences in outcomes, it's possible that other stressors not captured by our measures were affecting the lives of these women.

Results suggest that identifying with one's ethnicity and feeling a sense of commitment to one's ethnic group may provide minority women with the skills needed to

cope with perceived stressors and may explain why they benefit the most from group-based targeted stress management interventions that draw on these resources. It is a possibility that women with a stronger sense of ethnic identity in CBSM maximized their group interactions and built more connections with members of the group that may have remained even after the intervention was over. Unfortunately information on continued group contact after the group ended was not collected in the study. Additionally, it may be the case that those with stronger ethnic identities expected the present targeted intervention to be successful which may have influenced their reports on stress perceptions. It's also important to take into consideration the diversity of ethnicities in the sample and how different cultural perceptions may have influenced study outcomes.

Study results suggest that ethnic identity is an important intrapersonal resource that promotes well-being in low income minority WLWH and is consistent with prior research on ethnic identity's beneficial effect (Anderson, 1991; Myers, 2009). This study has important implications for our sample given their multiple stressful experiences and shows how they may benefit significantly from psychosocial interventions that can help them recognize and be aware of untapped resources. Some of these resources may include intrapersonal (e.g. coping strategies) or interpersonal (e.g., social support) processes. In the present study there was no evidence that coping self-efficacy (intrapersonal factor) or social support (interpersonal factor) examined as putative mediators could explain the moderating effects of ethnic identity. This is further discussed in the mediation section of the discussion.

Ethnic Identity Subscales

To further assess what aspect of ethnic identity drove our findings, ethnic identity search and ethnic identity affirmation subscales were also tested as moderators on the effects of condition on subjective stress. As mentioned the affirmation subscale refers to a person's sense of attachment, pride, and overall positive feelings about their own ethnic group while the ethnic identity search subscale refers to examination of the history and traditions of their group and exploration of issues such as prejudice and discrimination (Phinney 1992). It was hypothesized that women reporting greater ethnic identity search and ethnic identity affirmation randomized to CBSM would experience greater reductions in self-reported stress than women in the control condition and women with lower reports in these subscales randomized to CBSM or control. Findings suggested that women with greater ethnic identity affirmation, in particular, reported decreased perceptions of stress and HIV-specific intrusive thoughts from baseline to post-intervention and at 6 month follow-up when compared to women assigned to the control group. This was not the case for ethnic identity search, which did not moderate the relationship between condition and stress.

One explanation for these findings may be that the ethnic identity affirmation subscale loads more strongly on the overall construct of ethnic identity than the ethnic identity search subscale, thus, their correspondence with the intervention moderator effects seen in the overall ethnic identity total score. The two scales may also differ in terms of reliability. Indeed, research has suggested that the ethnic identity affirmation factor can be measured reliably and has better internal consistency than the ethnic

identity search factor (Pegg & Plybon, 2005; Spencer et al., 2000). Similarly, in the present study the affirmation factor loaded more strongly on overall ethnic identity and had better reliability than the ethnic identity search factor (α= .84 vs. α= .76). These findings may also explain prior research findings on the differential effects of ethnic identity affirmation and ethnic identity search. For instance, literature has shown that the ethnic identity affirmation subscale is positively associated with mental health whereas ethnic identity search is negatively associated with mental health (Torres & Ong, 2010; Green et al., 2006). Since little research has examined the effects of these ethnic identity subscales on mental health in the context of HIV/AIDS, it is still unclear if and why differential effects exist for ethnic identity search and ethnic identity affirmation.

Objective Stress

The second set of hypotheses predicted that women with greater ethnic identity in the CBSM condition would report lower levels of physiological stress than women in the control condition and women lower in ethnic identity in the CBSM or control conditions. Objective stress outcomes were operationalized as changes in urinary concentrations of norepinephrine (NE ug/ml) and total 24-hour norepinephrine (NE ug/24h). Our findings suggested that ethnic identity does not moderate intervention effects on urinary norepinephrine output. This was unexpected given our significant results with subjective stress outcomes and the research evidence of the direct relationship between subjective stress and objective stress (Yehuda et al., 1996; Southwick et al., 1993; Cohen et al., 2001; Pitman & Orr, 1990; Lemieux & Coe, 1995; De Bellis et al., 1999a). It is likely that low sample size may have contributed to the lack of findings, as we could not afford

to eliminate any norepinephrine data in our analyses and may have retained some cases with less than optimal samples. For instance, prior work in our lab has set a conservative criterion for inclusion of urinary norepinephrine data at volume levels of 400 or more (Antoni, Cruess, Wagner et al., 2000b). However, for the present project this would have eliminated a significant amount of our sample (approximately 32 cases). It has also been suggested that a cutoff of $\geq$ 250 ml would be acceptable to detect effects (Ironson et al., 2008). Thus, analyses including urinary norepinephrine data at volume levels of 250 or more were also conducted to test the present moderation models. Results showed similar findings with good model fits for both NE ug/ml, $\chi2(7, N = 102) = 12.55$, $p = .08$ (CFI = .88, RMSEA = 0, SRMR = .03), and NE ug/24h, $\chi2(7, N = 102) = 89.41$, $p = .26$ (CFI = .94, RMSEA = .09, SRMR = .05), but no significant interaction effects emerged (b = .001, SE = .00, p = .21, b = .00, SE = .00, p = .33). The mean urine volume in the samples collected in the present study was 877.07 (SD= 549.67) at baseline, 868.75 (SD= 553.61) at post-intervention, and 975.34 (SD= 558.54) at 6-month follow-up.

There is a possibility that women participating in the study who perceived the 24-hour collection urine procedure as too intrusive were less likely to comply with urine collection across the entire 24-hour period. For example, a 24-hour collection procedure requires subjects to collect urine during potential busy times such as at work or on the go during the day, which is a time when compliance may be more difficult. Creatinine information was also not available for the current study, which would alert us of a manipulated test sample or of low collection levels (Cone, 1997). These factors may have influenced the strength of our data and contributed to our lack of findings. Nonetheless,

other measures were taken to ensure that our physiological data was as reliable as possible for the present project, including examining drug use among women (none was reported). We also used log transformed physiological data to remove skewness and kurtosis in the present analyses. It is possible that other adrenal stress hormones, such as cortisol, may have shown different effects from those found with norepinephrine. Future research is needed to reveal the effects of ethnic identity X condition on alternative stress hormones.

Viral Load

Exploratory moderation analyses were also conducted to assess viral load effects but no significant effects were found. It may be the case that more time is necessary to detect changes in viral load in the present sample. Prior studies of CBSM have shown effects on viral load, though these included follow-ups out to 15 months (Antoni et al., 2006). Another possibility is that by including cases with undetectable viral loads at baseline in study analyses that changes were not able to be identified due to floor effects. This was the case in a prior study of CBSM in HIV-infected MSMs (Antoni et al., 2006). As such, additional analyses including only women with detectable viral load levels at baseline were tested. When analyses included only cases with detectable viral load levels at baseline, all model fit values were good, $\chi^2(8, N = 86) = 11.65$, $p = .17$ (CFI = .94, RMSEA = .07, SRMR = .06), but interaction effects were non-significant ($b = -.001$, SE = .001, $p = .42$). This indicates that ethnic identity and condition do not interact to predict changes in viral load up to 6-month follow-up. Alternative influential variables should be

investigated, including health behaviors such as medication adherence and its influence on disease status.

Mediation

Another goal of the present study was to establish mediators of our moderation models. Follow-up hypotheses predicted that the moderating effect of ethnic identity on intervention effects on subjective indicators of stress would work through CBSM-associated increases in social support and coping self-efficacy. Increased social support was operationalized as higher scores on the Social Provisions Scale (SPS), and increased coping self-efficacy as higher scores on the Cognitive Coping Self-Efficacy measure (CCSE). No significant interaction effects were found for the overall measures of social support and coping self-efficacy but significant ethnic identity X condition effects were found for the SPS social integration subscale. The social integration subscale taps into a participants' sense of belonging to a group of friends (Cutrona & Russell, 2002), a relevant factor for women undergoing a group-based CBSM. Results indicated that high ethnic identity women in CBSM showed greater increases in social integration than controls. However, mediation analyses did not support the hypothesis that CBSM associated changes in SPS social integration mediated the ethnic identity X condition effects on stress outcomes since indirect effects in the mediated moderation test were not significant for either the PSS or the IES intrusion scale. This is contrary to a previous cross-sectional study with the same sample of women, which showed that women with greater ethnic identity reported less perceived stress in part through higher perceptions of social support and coping self-efficacy (Lopez et al., 2012). These factors may change

with time and depending on context, which may explain the lack of results in this prospective study.

The present longitudinal study indicates that there may be other mediators that can better explain how ethnic identity may promote well-being in low-income minority WLWH that participate in a group-based CBSM intervention. Potential mediators of the ethnic identity-stress relationship that were not measured in our study but that may have influenced the ethnic identity-stress relationship include intrapersonal variables such as self-esteem and self worth. Prior research on self-esteem and self worth has indicated a direct and positive relationship of both variables with ethnic identity (Nesdale and Mak, 2003; Phinney 1991; Umana-Taylor et al., 2002; McMahon & Watts, 2002) and psychological adjustment (Dubois et al., 1998). As mentioned previously, individuals with a strong sense of ethnic identity hold positive views about their cultural group, seek out more information about their culture, and seek out others from their cultural group who share similar interests (Phinney, 1991). As a result of these behaviors it is likely that individuals with high ethnic identity are not only strengthening their social networks, but are also offered more opportunities for social interactions that may increase a sense of belonging and connection that in turn promote confidence and self-esteem. These social and personal resources, in turn, may help women appraise life events as being less stressful. Phinney (2001) has suggested that because individuals ascribe importance to groups they belong to and develop self-esteem from their sense of belonging, ethnic identity affirmation has an influential role in their self-concept. Other factors through which ethnic identity provided benefits to our participants may be intervention specific.

For example, the targeted CBSM taught women when to utilize emotion focused coping versus problem solving coping during times of stress and emphasized spirituality through its "prayer and action" component. These coping factors may have been more readily and cognitively available to these women. More research is necessary at this time to fully elucidate the relationship between ethnic identity and these potential mediators at this time.

Limitations

Despite the strengths in the present project, there are limitations that should be noted. One limitation of the current study is the lack of generalizability of our findings given the unique composition of our sample. Specifically, our sample was mostly composed of low-income African-American women with HIV. Caution should thus be taken when generalizing our results to men or other dissimilar populations. In addition, the control condition differed from the intervention in having less contact hours, the lack of structured group interactions, and absence of homework or assigned home based practice. It is possible that testing two experimental intervention conditions comparable in attention and information may reduce significant differences between treatments. Moreover, a limited sample size may have restricted the power for testing the fine-grained analyses that were needed in the present study. Although analyzing moderation and mediation models separately for the same data using simple regression analyses is more forgiving of small sample sizes, we opted to examine effects simultaneously as this allows for more complex and relevant research questions, such as the ones presented in this project. However these types of analyses (e.g., SEM) generally require sample sizes

of 100 – 200 to produce reliable results. Thus it will be critical to replicate the findings presented here using larger samples. Furthermore, even though changes in perceptions of stress and HIV intrusive thoughts were statistically significant, these changes may not equate to clinically significant improvements of distress in this population. Effect sizes for perceived stress and HIV intrusive thoughts in the present study were $d= .40$ and $d= .30$, respectively.

Future Research

Future research should continue to address traditional beneficial factors (e.g. cognitive ability, social support) as well as culturally specific beneficial factors (e.g., religiosity, familismo) among minority women with HIV in greater detail, elucidating a range of coping factors that are most effective in helping them decrease stress and improve their well-being. To date the literature has established a direct relationship between general coping factors (e.g. emotion-focused coping, active coping, social support) and psychological health (Ball et al., 2002; Vyavaharkar et al., 2011; Prado et al., 2004). Even though research exists on the association between spirituality and well-being in African-American women (Dalmida et al., 2011; Simoni et al., 2002), examinations of additional culturally-specific factors are still lacking and in need. This can be valuable work as identifying successful resiliency factors among minority women with HIV can help create more effective interventions that aim to improve the lives of these women.

It is important to explore whether psychosocial interventions that are tailored to the cultural and social environment of women living with HIV have maximal and lasting

impact not only on stress but also in quality of life and physical health outcomes. Furthermore, understanding for which women these interventions are most beneficial can aid in appropriately providing women with the necessary resources. In our study there were no significant changes in subjective stress for women with low ethnic identity, pointing to the potent role of intrapersonal factors when determining the success of targeted interventions. Interestingly, in a meta-analysis of culturally adapted mental health interventions, the greatest effects were found for participants that were less acculturated, and possibly more identified with their original ethnic group (Griner & Smith, 2006). It may be possible that targeted interventions are most helpful to those with a high sense of ethnic identification or that are less acculturated, while standard interventions (e.g. original or non-tailored evidence based interventions) may be appropriate for individuals that are more acculturated or with a lower sense of ethnic identity. It is also possible that women with a low sense of ethnic identity may benefit more from one-on-one interventions versus group-based interventions, however, further studies are needed to examine whether ethnic identity influences the effectiveness of targeted interventions in minority WLWH.

Given that social support and coping self-efficacy did not explain the ethnic identity X condition and stress relationship, future studies may want to focus on clarifying alternative potential mediators through which ethnic identity provides its benefits. Self-esteem and self worth are two constructs to consider but other unexplored factors may also be at play. Lastly, studies should continue to investigate the differing effects of ethnic identity search and ethnic identity affirmation on mental and physical

health on minorities. Unraveling the different aspects of ethnic identity will help us to better understand its different components and their role on well-being.

Summary

Overall, results suggest that a group-based targeted CBSM intervention and ethnic identity interact to predict subjective stress in a sample of low-income minority women living with HIV. Specifically, women with a stronger sense of ethnic identity who were randomized to a targeted CBSM reported significantly more decreases in perceived stress and HIV-specific intrusive thoughts than women in the control group. There were no significant changes in subjective stress for women with a low ethnic identity. Although significant changes were found for subjective stress these were not paralleled by changes in objective stress, as there were no changes in urinary norepinephrine levels found in our sample. In the present study, ethnic identity affirmation and not ethnic identity search proved to be the driving force in predicting less subjective stress in minority women assigned to CBSM. In sum, findings suggested that targeted interventions, such as the group-based and targeted CBSM utilized for this study, are successful in decreasing distress, especially among women with a strong sense of ethnic identity.

The present study is among the first to examine the interactive effects of a strong ethnic identity and a targeted CBSM intervention in predicting lower subjective stress in a sample of low-income minority WLWH. Our study results that women with a strong sense of ethnic identity who are randomized to CBSM experience decreases in perceived stress, suggests that an individual difference characteristic like stronger ethnic identification is important for women engaged in targeted interventions designed to

reduce the negative effect of a chronic disease (e.g., HIV) on mental health. For those with a lower ethnic identity it may be the case that general interventions or intensive one-on-one interventions as opposed to culturally or targeted interventions are the most helpful. However, more research is necessary on this topic. Importantly, being informed of a participant's sense of ethnic identity can help us identify which interventions are most successful in providing the necessary coping skills to better equip them for life stressors.

It has been known from the outset that the HIV epidemic has disproportionately affected the poorest and most marginalized women (Kamb & Wortley, 2000). This has highlighted the importance of acknowledging stress buffering factors (e.g., ethnic identity) and their influence on the well-being of members of these populations. Given that coping with a chronic illness like HIV is a major challenge, interventions such as CBSM, may provide benefits to women with HIV by helping them find ways to ameliorate general and HIV-specific distress. Moreover, by identifying significant individual difference factors and intrapersonal components that influence the success of interventions, increases in the scientific understanding of behaviors and improvements in intervention efficacy can continue to be made. Again, this will help us create more effective and relevant interventions for those chronic disease populations most likely to derive the greatest benefits from them.

Table 1.

Means and Standard deviations of baseline outcomes by intervention group and total scores across groups.

	CBSM		Control		Total	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
Impact of Events Scale	22.27	*(16.88)*	22.79	*(16.54)*	22.53	*(16.78)*
Impact of Events Scale-Avoidance	12.72	(9.42)	13.16	(9.76)	12.98	*(9.51)*
Impact of Events Scale-Intrusion	9.54	*(8.92)*	9.90	*(8.31)*	9.77	*(8.62)*
Perceived Stress Scale	23.39	(8.28)	24.62	(7.03)	24.08	(7.50)
Life Experiences Survey	2.02	*(.57)*	2.45	*(.64)*	2.13	*(1.04)*
Viral Load	20,324	*(87,711)*	7,318	*(25,205)*	13,821	*(56,458)*
Norepinephrine ug/24h	388.66	*(328.97)*	463.44	*(455.02)*	426.05	*(391.99)*
Norepinephrine ug/ml	.53	*(.41)*	.71	*(.65)*	.62	*(.53)*
Cortisol ug/24h	28.46	*(19.90)*	39.23	*(34.38)*	33.85	*(27.14)*
Cortisol ug/ml	3.99	*(3.28)*	4.90	*(4.53)*	4.45	*(3.91)*

CBSM= Cognitive Behavioral Stress Management; SD= Standard Deviation

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Table 2.

Modified components of targeted Cognitive Behavioral Stress Management intervention.

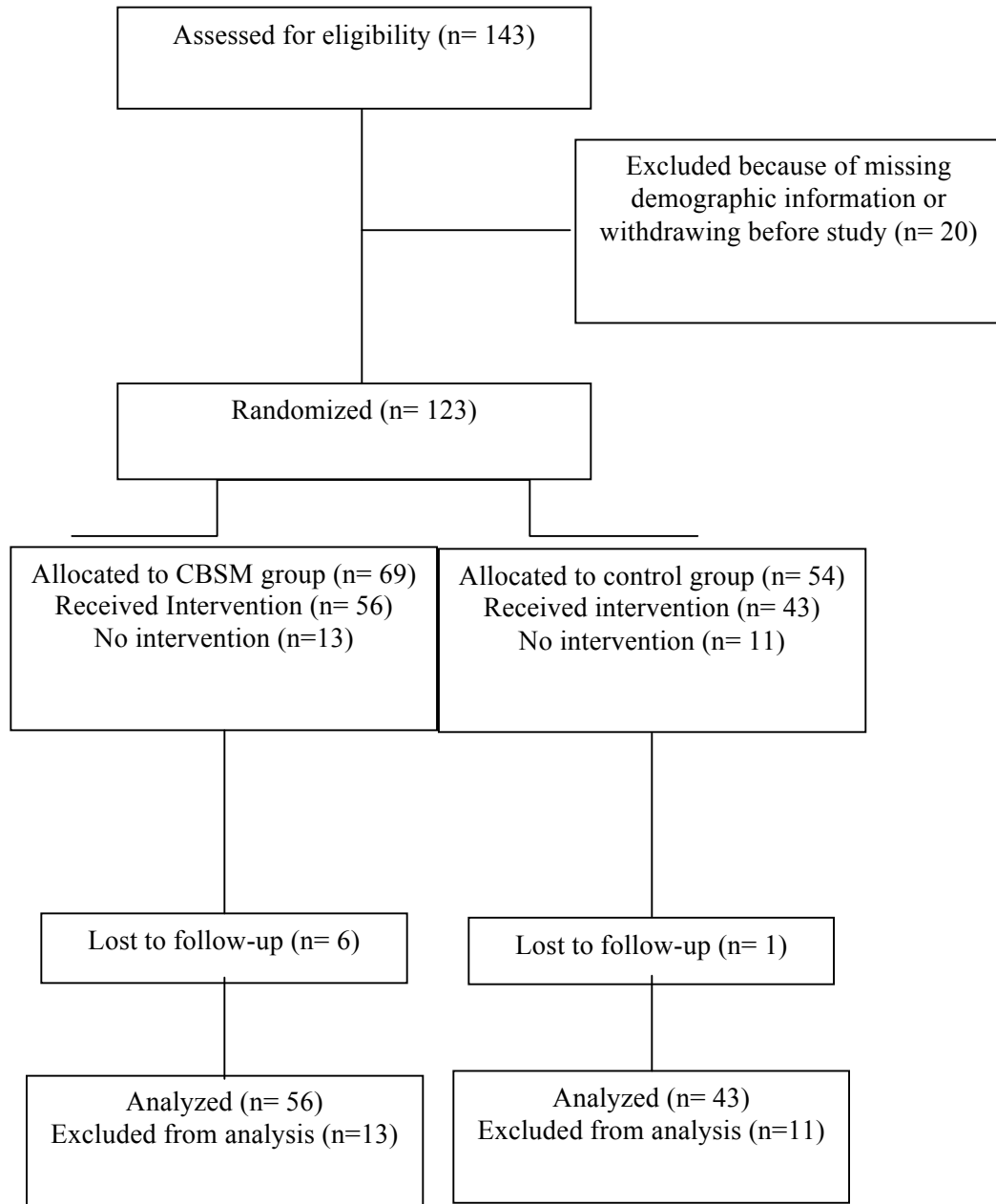| Targeting a Cognitive Behavioral Stress Management Intervention for the Unique Needs of Minority Women Living with HIV.		
Type of Modification	Area/Module(s) Modified	Nature of Modification(s)
Content	Coping Skills	- Use of "Serenity Prayer" to explore emotion-versus problem-focused coping styles - Exploration of combining "prayer and action" - Emphasis on the fact that most stressors, even those related to death and dying, are comprised of both uncontrollable and controllable aspects
	Assertiveness Training	- Exploration of significant constraints on being assertive due to cultural norms, gender roles, and power differentials - Exploration of the possible need for passivity, passive-aggressiveness, or even hostility based on the context
	Relaxation Techniques	- Emphasis on more familiar techniques which do not require extensive practice (e.g., deep breathing and guided imagery techniques) - Use of progressive muscle relaxation using 7 rather than 16 muscle groups - Providing example of meditation use by African-American female role models of strength during adversity (e.g., Tina Turner) - Exploration of parallels between meditation and prayer
	All	- Use of group-based, group-selected, and in-session exercises (e.g., check-in period, role-playing) - Use of current and salient stressors rather than "pre-packaged" stressor examples provided in treatment manuals
Format	All	- Relaxed and informal group sessions, including flexible start and stop times - Provision of childcare, transportation, and lunch

Figure 1. Participant Flow Through The Study

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            ┌─────────────────────────────────────┐
            │   Assessed for eligibility (n= 143)  │
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                          │
                          │         ┌─────────────────────────────────────┐
                          │         │   Excluded because of missing        │
                          ├─────────│   demographic information or          │
                          │         │   withdrawing before study (n= 20)    │
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            ┌─────────────────────────────────────┐
            │        Randomized (n= 123)           │
            └─────────────────────────────────────┘
                   │                      │
       ┌───────────────────────┐  ┌───────────────────────┐
       │ Allocated to CBSM      │  │ Allocated to control   │
       │ group (n= 69)          │  │ group (n= 54)          │
       │ Received Intervention  │  │ Received intervention  │
       │ (n= 56)                │  │ (n= 43)                │
       │ No intervention (n=13) │  │ No intervention (n= 11)│
       └───────────────────────┘  └───────────────────────┘
                   │                      │
       ┌───────────────────────┐  ┌───────────────────────┐
       │ Lost to follow-up      │  │ Lost to follow-up      │
       │ (n= 6)                 │  │ (n= 1)                 │
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                   │                      │
       ┌───────────────────────┐  ┌───────────────────────┐
       │ Analyzed (n= 56)       │  │ Analyzed (n= 43)       │
       │ Excluded from analysis │  │ Excluded from analysis │
       │ (n=13)                 │  │ (n=11)                 │
       └───────────────────────┘  └───────────────────────┘
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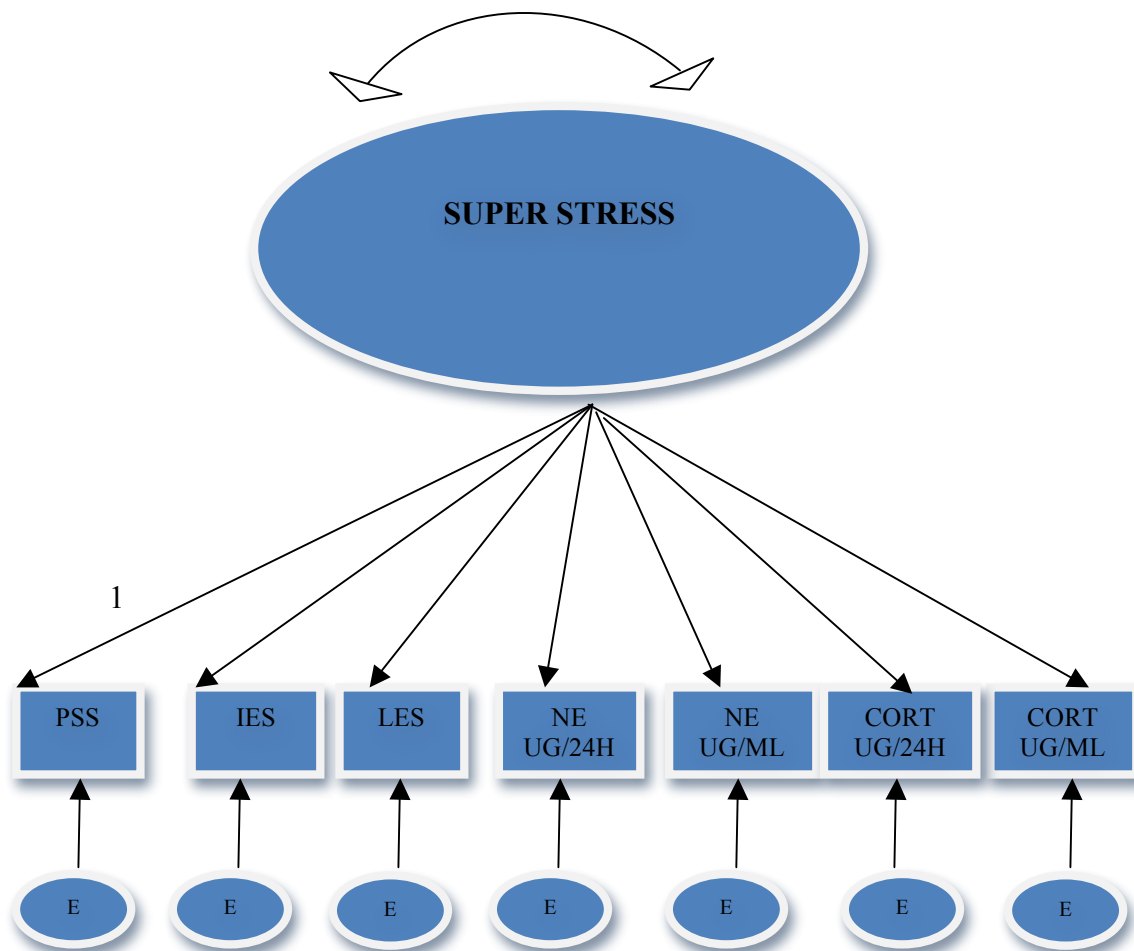*Figure 2*. Measurement Model of "Super Stress".

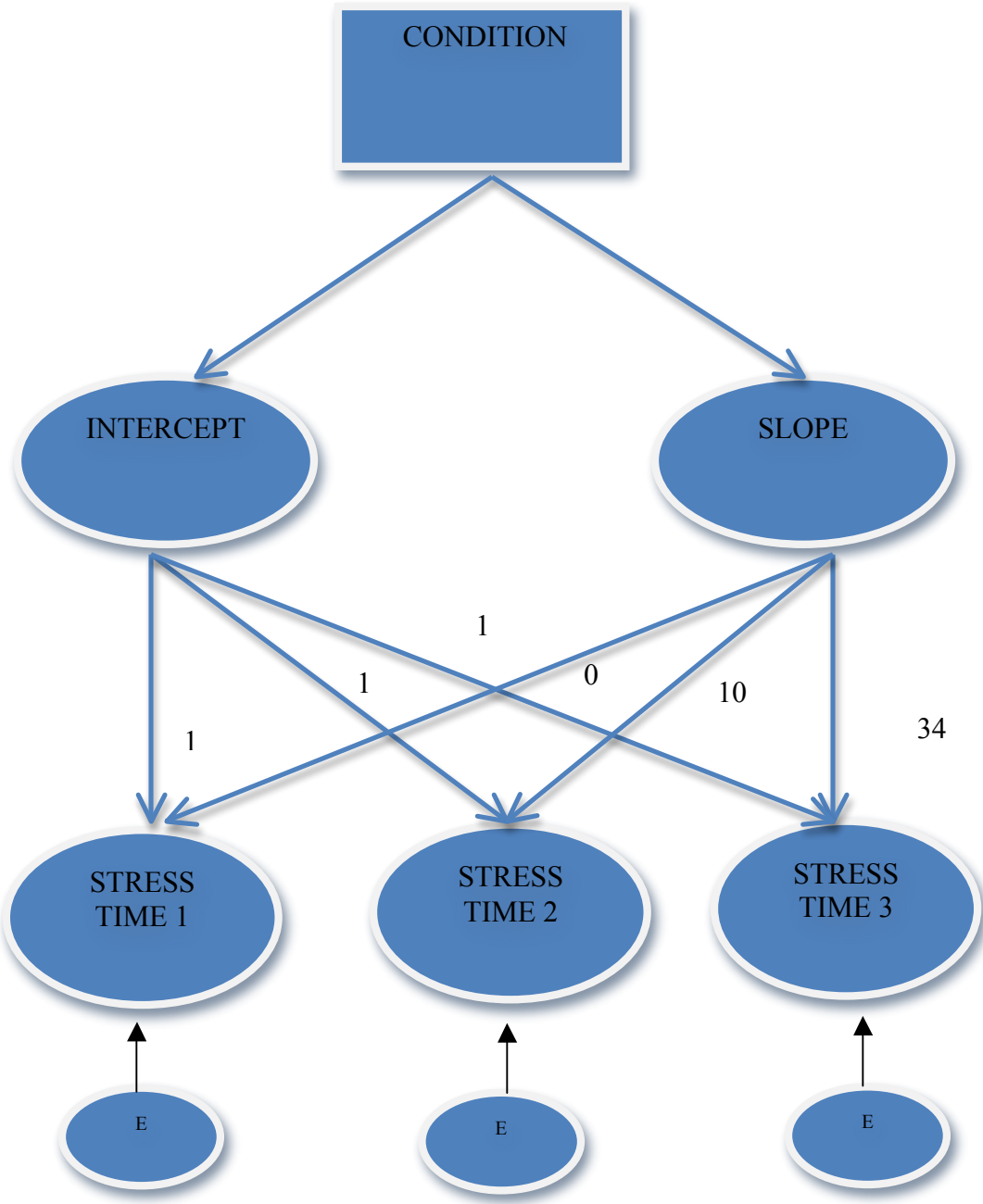*Figure 3*. Latent growth model of condition effects on stress.

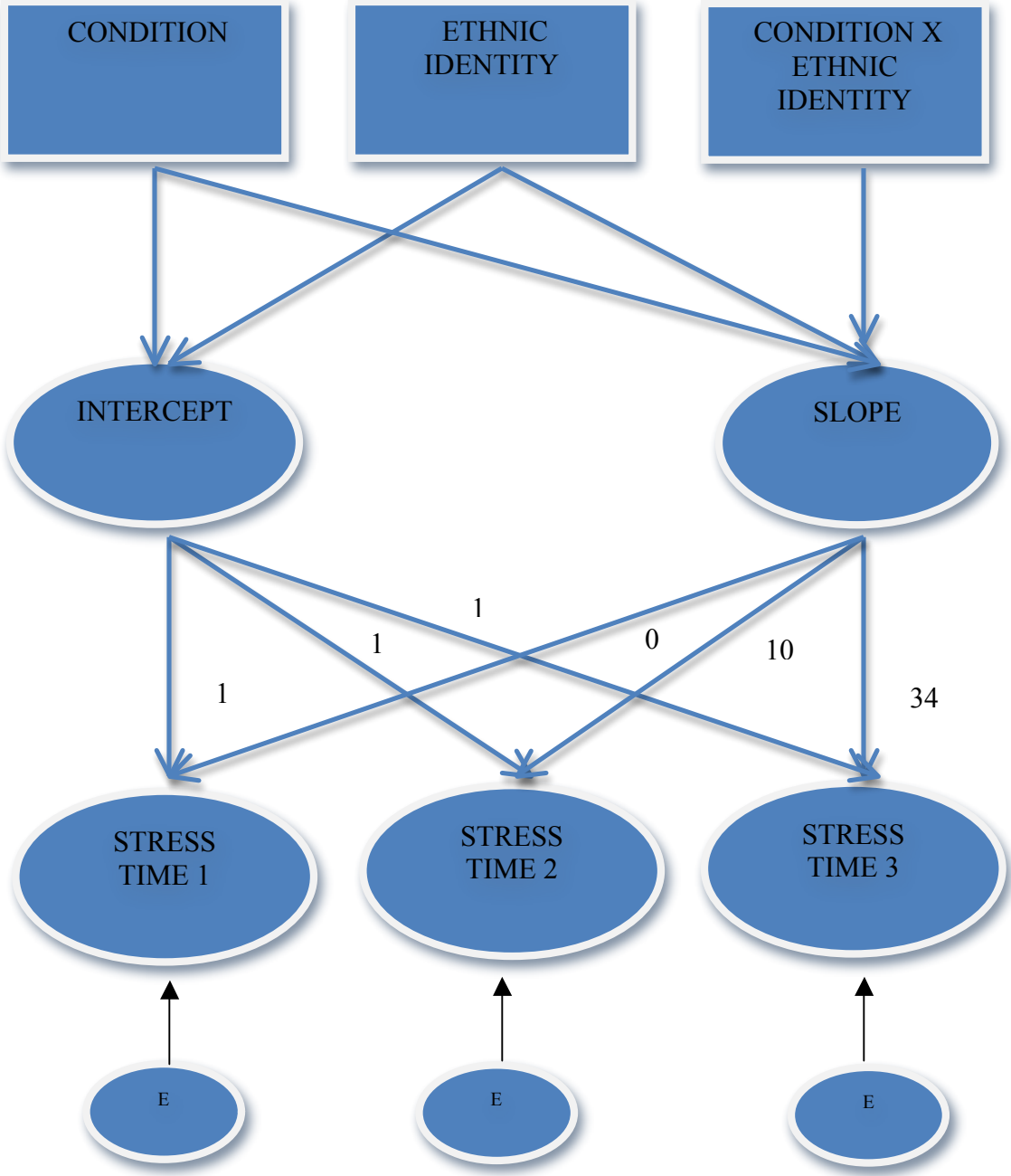*Figure 4*. Moderation Model.
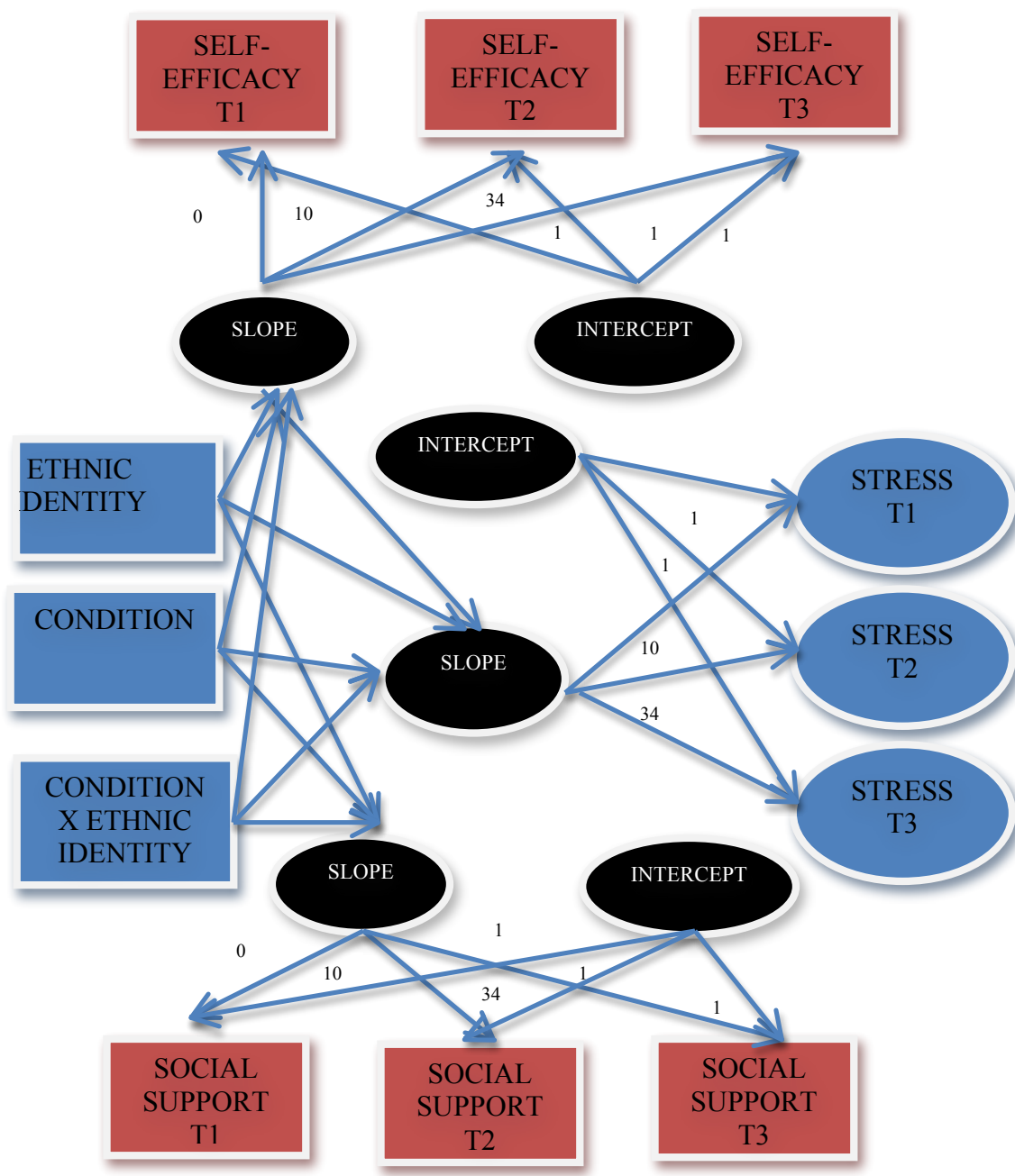
Figure 5. Mediated Moderation Model.

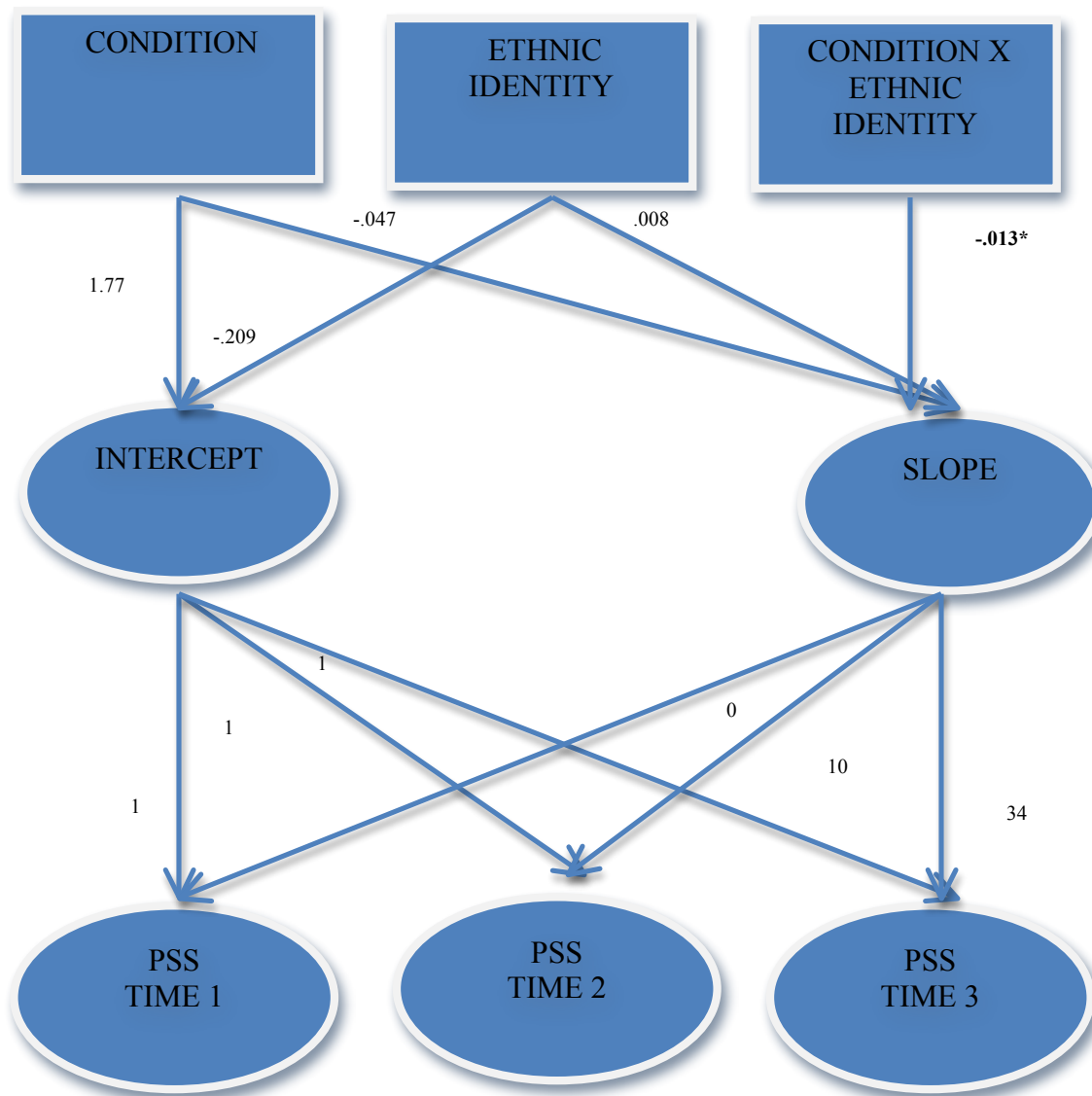*Figure 6*. Moderation Model with Coefficients for the Perceived Stress Scale (PSS).

Fit indices: $\chi 2(6, N = 113) = 5.40$, $p = .49$ (CFI = 1.00, RMSEA = 0, SRMR = .04).

Figure 7. Decomposition of ethnic identity (EI) X condition (CBSM, control) interactions for perceived stress scale (PSS) scores with mean values for baseline (T1), post-intervention (T2), and 6 month follow-up (T3) in each subgroup.

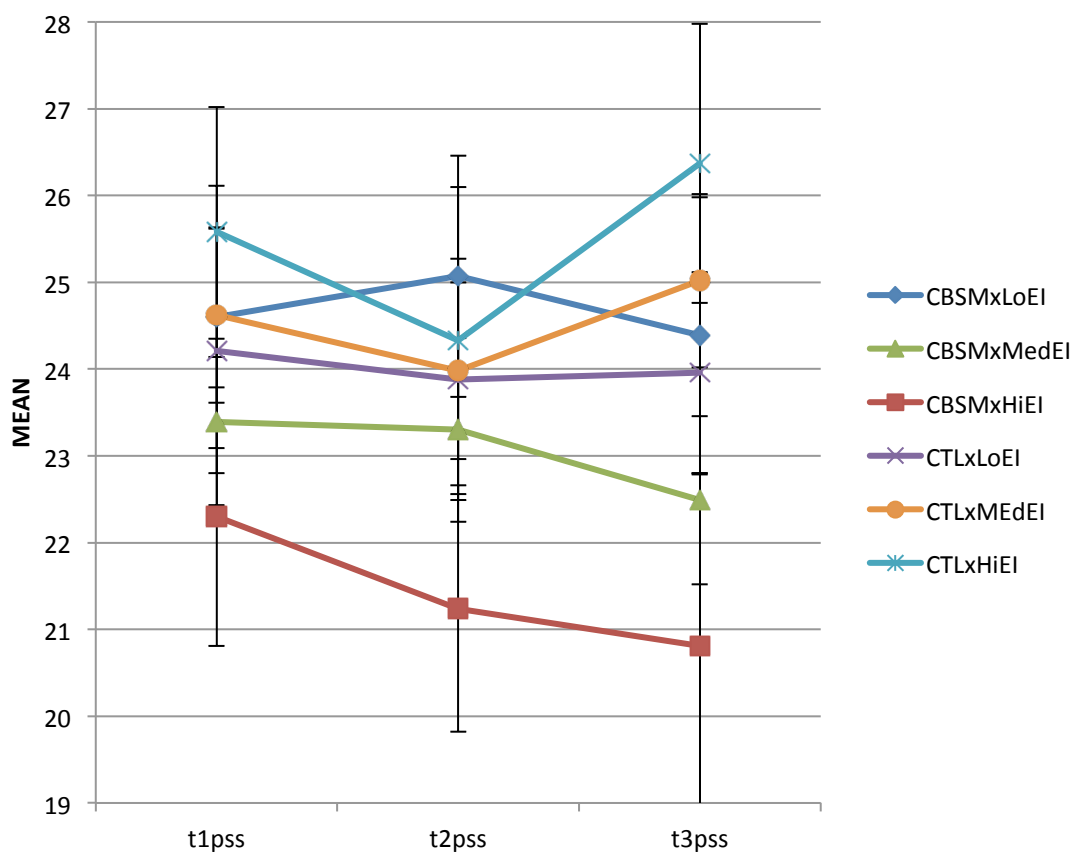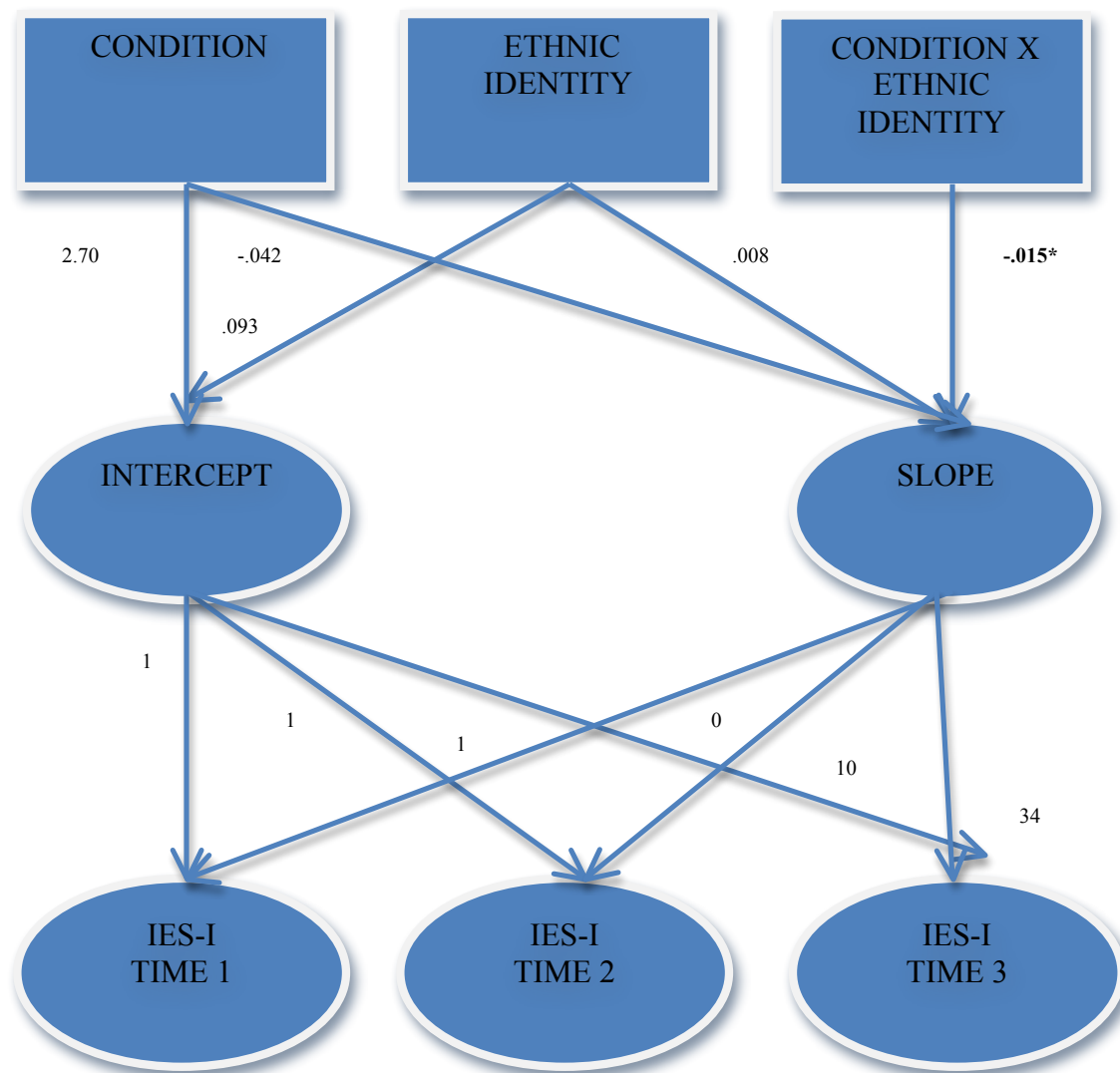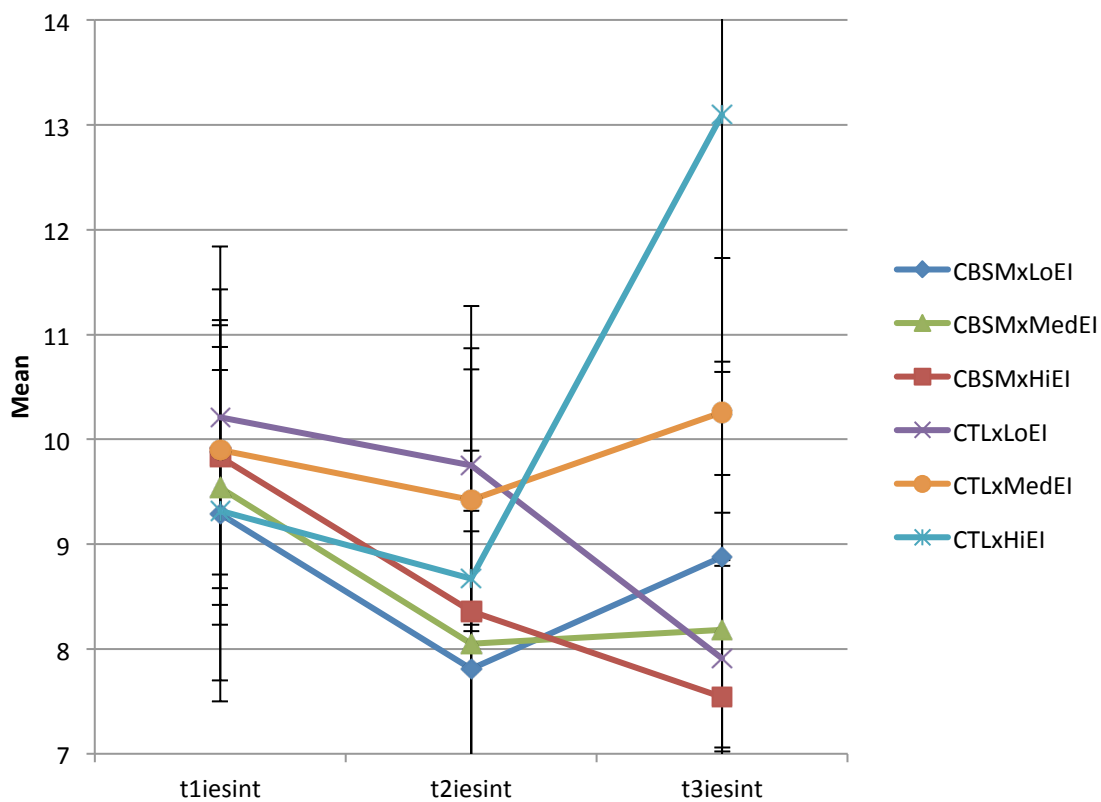*Figure 8.* Moderation Model with Coefficients for the Impact of Events Scale Intrusion
Subscale (IES-I).

Fit indices: $\chi 2(4, N = 112) = .909$, $p = .92$ (CFI = 1.00, RMSEA = 0, SRMR = .02).

Figure 9. Decomposition of Ethnic Identity (EI) X condition (CBSM, control) interaction effects on IES intrusion scores with mean values for baseline (T1), post-intervention (T2), and 6 month follow-up (T3) in each subgroup.

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MEIM

In the U.S., people come from many different cultures, and there are a variety of names to describe the different backgrounds or <u>ethnic groups</u> that people come from. Some examples of the names of ethnic groups are Hispanic or Latino, Black or African-American, Asian American, White or Caucasian, and Native American. Every person is born into an ethnic group-- or sometimes two or more groups, but people differ on how important their ethnicity is to them, how they feel about it, and how much their behavior is affected by it. The following questions are about your ethnicity or your ethnic group and how you feel about it or react to it.

In terms of ethnic group, I consider myself to be (fill in):
Please use the numbers on the card to indicate how much you agree or disagree with each statement.

	Strongly	**Disagree**	**Agree**	**Strongly**
1. I have spent time trying to find out more about my ethnic group, such as its history, traditions, & customs.	1	2	3	4
2. I am active in organizations or social groups that include mostly members of my own ethnic group.	1	2	3	4
3. I have a clear sense of my ethnic background and what it means for me.	1	2	3	4
4. I think a lot about how my life is affected by my ethnic group membership.	1	2	3	4
5. I am happy that I am a member of the group I belong to.	1	2	3	4
6. I have a strong sense of belonging to my own ethnic group.	1	2	3	4
7. I understand pretty well what my ethnic group membership means to me.	1	2	3	4
8. In order to learn more about my ethnic background, I have often talked to other people about my group.	1	2	3	4
9. I have a lot of pride in my ethnic group.	1	2	3	4
10. I participate in cultural practices of my own group, such as special food, music, or customs.	1	2	3	4
11. I feel strong attachment towards my own ethnic group.	1	2	3	4
12. I feel good about my cultural or ethnic background.	1	2	3	4

13.   My ethnicity is
1)   Asian or Asian American, including Chinese, Japanese and others
2)   Black or African American
3)   Hispanic or Latino, including Cuban, South American, Central American, Puerto Rican, and others
4)   White, Caucasian, Anglo, European American; **NOT Hispanic**
5)   American Indian/ Native American
6)   Mixed; Parents are from two different groups
7)   Other (write in): _____

APPENDIX B

CSE

INSTRUCTIONS: Please circle the number of the scale to the right of each statement
that most closely corresponds to your answer.

1 = Not at all
2 = A small amount
3 = Fair
4 = Somewhat (most of the time)
5 = To a large extent (all of the time)

To what extent do you believe that you are able to prevent
reinfection with the AIDS virus over the next five years? (OR "How   1   2   3   4   5
much do you believe that you will be able to keep yourself from
being reinfected with HIV [or the AIDS virus] over the next five
years?")

To what extent do you believe that you could retard the
development of AIDS-related symptoms and prolong your life? (OR   1   2   3   4   5
"How much do you believe that you can slow down the
development of HIV-related symptoms and be able to live longer?")

To what extent are you able to interpret stressful events
realistically (rather than catastrophically)? (OR "When you are in a   1   2   3   4   5
stressful situation, how much are you able to see things as they
really are, rather than blowing them out of proportion?" OR "When
you are in a stressful situation, how much are you able to keep
yourself from making a 'mountain out of a molehill'?")

To what extent are you able to reduce anxiety-provoking thoughts?
(OR "How much are you able to reduce thoughts that make you   1   2   3   4   5
nervous?" OR "When something that you are thinking about makes
you nervous, how much are you able to keep yourself from thinking
it so much?")

To what extent are you able to control disturbing thoughts? (OR
"How much are you able to control thoughts that upset or bother   1   2   3   4   5
you?" OR "When something that you are thinking about makes you
upset or bothers you, how much are you able to stop thinking
about it so much?")

In a difficult situation, to what extent are you able to see positive as
well as negative thoughts? (OR "In a difficult situation, how much   1   2   3   4   5
are you able to see positive as well as negative thoughts?")

To what extent are you able to really relax yourself when you need
to? (OR "How much are you able to really relax yourself when you   1   2   3   4   5
need to?")

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To what extent could you follow an exercise program involving 20 minutes of moderate exercise three times a week? (OR "How much do you think you could follow an exercise program, doing 20 minutes of moderate exercise three times a week?")

1   2   3   4   5

To what extent do you do favors for people that you really do not want to? (OR "How much do you do favors for people even though you really don't want to?")making a 'mountain out of a molehill'?")

1   2   3   4   5

How confident are you that you will be able to take your antiretroviral medications as they are prescribed to you? (OR "How much do you believe that you will be able to take your antiretroviral medications at the times that your doctor has instructed you to?")

1   2   3   4   5

How confident are you that you will be alive five years from now? (Please give the answer as a percent, where 100% mean you would definitely be alive.) (OR "Please give me a number from anywhere from 0 all the way up to 100 to tell me how confident you are that you will be alive 5 years from now. 0% would mean that you believe that you definitely will not be alive 5 years from now, and 100% would mean that you believe that you definitely WILL be alive 5 years from now.")

0% ➔ 100%

_____
percent

APPENDIX C

SPS

For the following questions, I would like for you to think about your current relationships with friends, family members, co-workers, community members, and so on. Please rate to what extent you agree that each statement describes your current relationships with other people. Use the following scale to give me your opinion. If you strongly disagree with a statement, you would circle "1". If you disagree, but not strongly, you would circle "2." If you agree with a statement, but not strongly, you would circle "3". If you strongly agree with a statement, you would circle "4".

		Strongly Disagree	Disagree	Agree	Strongly Agree
1.	There are people I can depend on to help me if I really need it.	1	2	3	4
2.	I feel that I do not have any close personal relationships with other people	1	2	3	4
3.	There is no one I can turn to for guidance in times of stress.	1	2	3	4
4.	There are people who depend on me for help.	1	2	3	4
5.	There are people who enjoy the same social activities I do.	1	2	3	4
6.	Other people do not view me as competent.	1	2	3	4
7.	I feel personally responsible for the well-being of another person.	1	2	3	4
8.	I feel part of a group of people who share my attitudes and beliefs.	1	2	3	4
9.	I do not think other people respect my skills and abilities.	1	2	3	4
10.	If something went wrong, no one would come to my assistance.	1	2	3	4
11.	I have close relationships that provide me with a sense of emotional security and well-being.	1	2	3	4
12.	There is someone I could talk to about important decisions in my life.	1	2	3	4
13.	I have relationships where my competence and skill are recognized.	1	2	3	4
14.	There is no one who shares my interests and concerns.	1	2	3	4
15.	There is no one who really relies on me for their well-being.	1	2	3	4
16.	There is a trustworthy person I could turn to for advice if I were having problems.	1	2	3	4
17.	I feel a strong emotional bond with at least one other person.	1	2	3	4
18.	There is no one I can depend on for aid if I really need it.	1	2	3	4
19.	There is no one I feel comfortable talking about problems with.	1	2	3	4
20.	There are people who admire my talents and abilities.	1	2	3	4

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21. I lack a feeling of intimacy with another person.	1	2	3	4
22. There is no one who likes to do the things I do.	1	2	3	4
23. There are people I can count on in an emergency.	1	2	3	4
24. No one needs me to care for them anymore.	1	2	3	4

IES

Here is a list of statements regarding <u>AIDS or the threat of AIDS</u>. Please use this scale to rate how often these comments were true for you <u>DURING THE PAST SEVEN DAYS.</u>

	<u>Not at All</u>	<u>Rarely</u>	<u>Sometimes</u>	<u>Often</u>
1. I thought about it when I didn't mean to.	1	2	3	4
2. I avoided letting myself get upset when I thought about it or was reminded of it.	1	2	3	4
3. I tried to remove it from memory.	1	2	3	4
4. I had trouble falling asleep or staying asleep, because of pictures or thoughts about it that came into my mind.	1	2	3	4
5. I had waves of strong feelings about it.	1	2	3	4
6. I had dreams about it.	1	2	3	4
7. I stayed away from reminders of it.	1	2	3	4
8. I felt as if it hadn't happened or it wasn't real.	1	2	3	4
9. I tried not to talk about it.	1	2	3	4
10. Pictures about it popped into my mind.	1	2	3	4
11. Other things kept making me think about it.	1	2	3	4
12. I was aware that I still had a lot of feelings about it, but I didn't deal with them.	1	2	3	4
13. I tried not to think about it.	1	2	3	4
14. Any reminder brought back feelings about it.	1	2	3	4
15. My feelings about it were kind of numb.	1	2	3	4

PSS

In the last month…	Never	Almost Never	Some-times	Fairly Often	Very Often
1. how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2. how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3. how often have you felt nervous and "stressed"?	0	1	2	3	4
4. how often have you dealt successfully with irritating life hassles?	0	1	2	3	4
5. how often have you felt that you were effectively coping with important changes that were occurring in your life?	0	1	2	3	4
6. how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
7. how often have you felt that things were going your way?	0	1	2	3	4
8. how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
9. how often have you been able to control irritations in your life?	0	1	2	3	4
10. how often have you felt that you were on top of things?	0	1	2	3	4
11. how often have you been angered because of things that happened that were outside of your control?	0	1	2	3	4

12.   how often have you found yourself thinking about things that you have to accomplish?

     0   1   2   3   4

13.   how often have you been able to control the way you spend your time?

     0   1   2   3   4

14.   how often have you felt difficulties were piling up so high that you could not overcome them?

     0   1   2   3   4

The questions in this scale ask you about your feelings and thoughts during *the last month*. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question.