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Resilience, stress hormones, and health outcomes in women with HIV

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Dissertation

**RESILIENCE, STRESS HORMONES, AND HEALTH OUTCOMES
IN WOMEN WITH HIV**

by

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RESILIENCE, STRESS HORMONES, AND HEALTH OUTCOMES

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ABSTRACT

Abuse is associated with higher depressive symptoms (DS) and coronary heart disease risk (CHD), lower health-related quality of life (HRQOL), and dysregulated levels of cortisol and norepinephrine (NE). In HIV+ women, abuse relates to higher viral load (VL), lower CD4 count, and nonadherence to highly active antiretroviral therapy (HAART). Resilience (adaptive functioning following trauma) and positive self-esteem (PSE) were hypothesized to buffer the impact of abuse and predict better health outcomes. Three studies tested these hypotheses using self-report measures (for abuse, resilience, DS, HRQOL, and HAART use and adherence), autobiographical narratives (for PSE), Framingham Risk Score (for CHD risk), and blood and urinary specimens for cortisol, NE, and HIV disease markers (VL and CD4 count).

Study 1 included 138 HIV+ and 64 HIV- women (87% African-American), and investigated the relationships between childhood sexual abuse (CSA), DS, and HRQOL and whether resilience moderated the relationships between CSA and outcomes. Consistent with the hypothesis, multiple regressions indicated

that higher resilience related to lower DS and higher HRQOL across both HIV+ and HIV-women, and CSA related to higher DS only for women scoring low in resilience.

Study 2 examined how resilience moderated the relationships between abuse history and HAART adherence, VL, and CD4 count in 138 HIV+ women. As predicted, multiple regressions revealed that resilience related to having undetectable VL. Sexual and multiple abuse histories related to lower HAART adherence only for women scoring low in resilience.

Study 3 with 53 HIV+ women investigated the relationships among resilience, PSE, abuse histories, NE, cortisol and CHD risk. In partial support of hypotheses, partial correlations showed that higher resilience related to lower cortisol; higher PSE related to lower NE; higher NE/cortisol ratio related to higher CHD risk; histories of abuse related to higher CHD risk, and lower cortisol related to higher CHD risk.

The findings suggest that resilience and PSE relate to better health outcomes for HIV+ and HIV- women, and levels of stress hormones in HIV+ women are related in complex ways to abuse, resilience, PSE, and CHD risk. Promoting resilience and PSE may help HIV+ and HIV- women achieve better health outcomes.

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LIST OF ABBREVIATIONS

AIDS	Acquired immunodeficiency syndrome
ART	Antiretroviral therapy
CD4	Cluster of differentiation 4 T-helper cells
CD-RISC	Connor-Davidson Resilience Scale – 10 items
CES-D	Center for Epidemiological Studies – Depression Scale
CHD	Coronary heart disease
CSA	Childhood sexual abuse
DS	Depressive symptoms
FRS	Framingham Risk Score
HAART	Highly active antiretroviral therapy
HDL	High density lipoprotein
HIV	Human immunodeficiency virus
HRQOL	Health-Related Quality of Life
LDL	Low density lipoprotein
NE	Norepinephrine
NIAAA	National Institute on Alcohol Abuse and Alcohol
NIDA	National Institute on Drug Abuse
PSE	Positive self-esteem
PTSD	Posttraumatic Stress Disorder
VL	HIV viral load

CHAPTER ONE

General Introduction

Each year an estimated 50,000 individuals are newly infected with HIV in the United States and over one million individuals are currently living with HIV (Centers for Disease Control and Prevention, 2013b). With access to highly active antiretroviral therapy (HAART) and proper treatment adherence, HIV is a chronic illness and no longer a death sentence (Antiretroviral Therapy Cohort, 2008). Thus, it is important to explore the factors that may promote greater longevity and better health outcomes for persons infected with HIV.

There is a high prevalence of trauma/abuse history among women with HIV and demographically similar women who are at risk for HIV infection. A history of abuse is associated with negative health outcomes such as higher depressive symptoms, lower quality of life, HIV medication nonadherence, antiretroviral failure and increased risk for heart disease (Cohen et al., 2004; Machtinger, Haberer, Wilson, & Weiss, 2012; Machtinger, Wilson, Haberer, & Weiss, 2012; Midei, Matthews, Chang, & Bromberger, 2013; Wilson, 2010). Women may also be resilient in the face of trauma and function adaptively following histories of abuse, however the literature has focused on factors that place women “at risk” for HIV transmission/ contraction and poor health outcomes, and far less attention has been given to factors that may place women “at promise” for better outcomes. Limited research indicates that positive coping

such as meaning making minimizes HIV disease progression (G. Ironson & Hayward, 2008; G. Ironson, Stuetzle, & Fletcher, 2006).

Researchers have hypothesized that stress hormones such as norepinephrine and cortisol may explain some of the association between psychological stress such as abuse and health outcomes (Schneiderman, Ironson, & Siegel, 2005). Norepinephrine (NE) and cortisol are stress hormones that play a key role in the body's biological and behavioral response to stress and trauma and have shown significant association with heart disease and HIV disease progression markers (Cole, Kemeny, Fahey, Zack, & Naliboff, 2003; Cole et al., 2001; Fantidis et al., 2002; Otte, Neylan, Pipkin, Browner, & Whooley, 2005). However, little is known about how NE and cortisol levels relate to either abuse histories or to positive psychosocial factors such as resilience and positive self-esteem (Rozanski & Kubzansky, 2005).

Among HIV+ and sociodemographically matched HIV- women who were primarily African Americans, a series of three studies focused on the important understudied factors of resilience and positive self-esteem subsequent to trauma. The primary aims were to investigate how resilience and positive self-esteem related to mental and physical health outcomes including depressive symptoms, health-related quality of life, highly active antiretroviral therapy (HAART) adherence, HIV disease markers (i.e. viral load (marker of disease burden as the number of HIV virus particles in the blood increases) and CD4+ T cell count (a

measure of immune response with lower CD4 cells indicating more immunosuppression), coronary heart disease (CHD) risk, and stress hormone levels (i.e. norepinephrine and cortisol). Study 1 investigated the relationships among childhood sexual abuse (CSA), depressive symptoms, and health-related quality of life in 138 HIV+ and a demographically matched sample of 64 HIV- women. Further, the study investigated whether resilience moderated the relationships between CSA and health outcomes. Study 2 focused solely on 138 HIV+ women and examined how resilience moderated the relationships between abuse history and HAART adherence, viral load, and CD4 count. Study 3 also focused on HIV+ women and investigated the relationships among resilience, positive self-esteem, abuse histories, NE and cortisol levels and CHD risk in a sample of 53 HIV+ women. Depressive symptoms were also assessed as a potential mediator of the relationships investigated in studies 2 and 3. The findings can potentially inform the development of intervention strategies that promote resilience and positive self esteem in women with and at risk for HIV, hopefully leading to better mental and physical health outcomes.

Depressive Symptoms and Quality of Life in Women with HIV

In comparison to the general population, the lifetime prevalence of depressive disorders is significantly higher in women with HIV (Dew, Becker, Sanchez, & Caldararo, 1997; Gala, Pergami, Catalan, & Durbano, 1993; Kessler, Chiu, Demler, Merikangas, & Walters, 2005; Ronald C. Kessler et al., 2005;

Rabkin, 1996; Regier et al., 1990). In addition, HIV+ women have higher rates of depression and lower quality of life than men and HIV- women (Ickovics et al., 2001; M. S. Kaplan, Marks, & Mertens, 1997; Tate et al., 2003). Higher depressive symptoms are often related to lower quality of life (Jia, Uphold, Wu, Chen, & Duncan, 2005; Tate et al., 2003). Among HIV infected persons, depressive symptoms have also been shown to mediate the impact of psychosocial factors on quality of life. For instance, Jia and colleagues (2005) reported that higher social support and more adaptive coping with HIV (e.g. managing the illness) related to lower depressive symptoms and better quality of life and that depressive symptoms significantly mediated the relationships of social support and coping with HIV with quality of life.

Depression is also significantly associated with medication nonadherence, greater decline in CD4+ cell counts, antiretroviral failure, increased mortality, nondisclosure of HIV status to sexual partners, and higher risky sexual behaviors in women with HIV (Armistead, Morse, Forehand, Morse, & Clark, 1999; Boarts, Sledjeski, Bogart, & Delahanty, 2006; Catz, Kelly, Bogart, Benotsch, & McAuliffe, 2000; Cook et al., 2004; Cunningham, Crystal, Bozzette, & Hays, 2005; Ickovics et al., 2001; Leserman et al., 2007). Depression is therefore closely linked to a woman's ability to adhere to HIV medication and her HIV disease progression.

Medication Adherence and HIV Disease Markers

Consistent adherence to prescribed HAART regimens is essential to good health outcomes, including HIV viral suppression, improved CD4 cell counts and decreased rates of morbidity and mortality (Garcia de Olalla et al., 2002; Palella et al., 1998; Paterson et al., 2000; Wood et al., 2004). According to Patterson and colleagues (2000), at least a 95% adherence rate is necessary to achieve viral suppression and an undetectable viral load. However, in the United States, the mean adherence rate is approximately 71%, with most individuals adhering at suboptimal rates (Golin et al., 2002; Mannheimer, Friedland, Matts, Child, & Chesney, 2002). Howard et al. (2002) found that among predominantly minority women the mean adherence rate ranged between 45% and 64% over time. Medication nonadherence can have serious consequences, such as the development of drug resistant strains of HIV, and therefore remains a major public health issue (Lucas, 2005; Richman et al., 2004; Wainberg & Friedland, 1998).

A growing body of literature exists on the factors that relate to nonadherence, however there is only a small body of literature on psychological factors that facilitate adherence. Factors that relate to nonadherence include trauma/abuse histories, depression, post-traumatic stress disorder (PTSD), low self-efficacy, parental responsibilities, partner relationship difficulties, perceived stigma, drug/alcohol use, low education literacy, and non-adaptive coping such

as denial and avoidance (Edwards, 2006; Howard et al., 2002; Kalichman, Ramachandran, & Catz, 1999; Murphy, Greenwell, & Hoffman, 2002; Vyavaharkar et al., 2007). Conversely, the factors that promote adherence include social support, positive states of mind, low negative affect, spirituality, self-efficacy, and good patient-physician relationships (Edwards, 2006; Roberts, 2002; Simoni, Frick, & Huang, 2006; Sontag & Richardson, 1997; Vyavaharkar et al., 2007).

HIV and Coronary Heart Disease

In the era of HAART and with optimal adherence, HIV+ individuals are dying less from HIV related causes and are increasingly dying from non-HIV related causes such as heart disease. Coronary heart disease, (buildup of plaque inside the coronary arteries), is the most common type of heart disease (Go et al., 2013). HIV may put patients at higher risk for coronary heart disease. For younger age groups, it may in part be linked to taking antiretroviral treatments (ART), which may increase CHD risk (Barbaro, 2003; Currier et al., 2003). Other risk factors for heart disease include genetics, diet, hypertension, diabetes, cigarette smoking and other environmental factors (de Lorgeril et al., 1994; Marenberg, Risch, Berkman, Floderus, & de Faire, 1994; O'Toole, Conklin, & Bhatnagar, 2008; P. W. Wilson et al., 1998).

In addition, the majority of individuals infected with HIV are ethnic minorities from low socioeconomic backgrounds who experience daily stressors

such as discrimination and unstable neighborhoods that may place them at increased risk for CHD (Bennett et al., 2004; Kaplan et al., 2007; Krantz & McCeney, 2002). Black Americans have the highest mortality due to cardiovascular disease when compared with other racial/ethnic groups. In 2009, 19,270 Black women ages 20 and older died from CHD; and the age adjusted death rate for CHD was 110.3 for Black women compared to 84.9 for white women (Go et al., 2013). More recently, researchers have begun to note a connection between abuse histories and increased risk for heart disease across ethnic groups (Dong et al., 2004; Midei et al., 2013). In addition, literature exists that link dysregulated levels of stress hormones to heart disease risk (Fantidis et al., 2002; Otte et al., 2005).

Stress Hormones

Cortisol (a corticosteroid) and NE (a catecholamine) are stress hormones that act as neurotransmitters in the central nervous system and sympathetic nervous system (Heritage, 2007). Stressors such as traumatic events lead to the release of NE and cortisol (among other hormones), which underlies the fight-flight-freeze response. The baseline levels of cortisol and norepinephrine that an individual has as well as the levels released in response to stress are also impacted by genetics (Hu, Caron, & Sieber-Blum, 2009; Kohli et al., 2011; Velders et al., 2011; Wust, Federenko, Hellhammer, & Kirschbaum, 2000). When released under stressful conditions, NE and cortisol prepare the body to cope

with stress by increasing heart rate, triggering the release of glucose from energy stores, increasing blood flow to skeletal muscle, and decreasing digestion (Jonas, 2005). Due to their role in stress response, cortisol and NE have been key hormones investigated by researchers exploring the pathophysiology of stress.

Investigators have used various approaches to measure stress hormones. For instance hormones can be assessed from saliva, urinary collection, and blood plasma (Fantidis et al., 2002; Ironson et al., 2008; Vedhara, Tuinstra, Miles, Sanderman, & Ranchor, 2006). In addition, collection methods vary if done at a single time point, multiple time points, or over the course of several hours or days (Brand, 1999; Vedhara et al., 2006). Some investigators might be interested in the total hormone output, how the hormone levels differ/change between different time points (e.g. awakening response, which is the change between morning waking level and 15-60 min later), and/or the regression slope generated by hormone output at several time points over the course of one or more days (Fantidis et al., 2002; Ironson et al., 2008; Vedhara et al., 2006). For daily hormone patterns researchers expect to see a peak at early morning and decline over the course of the day. Thus, normal regression slope values are negative and further away from zero while abnormal slopes are flat with values closer to zero (Vedhara et al., 2006).

While initial activation of the hypothalamic pituitary axis (HPA) in the face of trauma is adaptive and can help an individual survive a traumatic encounter (e.g. provide energy to muscles to escape), chronic arousal of the HPA in the form of high levels of cortisol and NE has been linked to anxiety, hyperarousal, heart disease and impaired immune functioning, while low levels of cortisol and/or NE have been associated with depression, irritability, hypotension, and attention-deficit hyperactivity disorder (Bennett et al., 2004; Girod & Brotman, 2004; Knight, Avery, Janssen, & Powell, 2010; Oldenburg et al., 2001; Otte et al., 2005; Velders et al., 2011; Viggiano, Ruocco, Arcieri, & Sadile, 2004; Vogelzangs et al., 2010). Thus, sustained elevated levels, extremely low levels or a blunted response (lack of response) of cortisol and NE are signs of dysregulation (Fantidis et al., 2002; Otte, McCaffery, Ali, & Whooley, 2007; Vedhara et al., 2006).

Researchers have noted that histories of abuse are linked with both high and low stress hormone levels. For instance Yehuda (2001) found that among adult offspring of Holocaust survivors, childhood emotional abuse was significantly associated with lower urinary cortisol. Lemieux and Cole (1995) reported higher overall 24-hour urinary cortisol and norepinephrine levels in women with a history of childhood sexual abuse and PTSD, but Bremner and colleagues (2003) found that women with a history of childhood sexual abuse and PTSD had lower levels of cortisol, but only during the afternoon hours (12-

8pm) of a 24-hour urine collection. Further, Friedman et al. (2007) reported that among women who had histories of childhood sexual abuse, those with subsequent adult sexual abuse had higher 24-hour urinary norepinephrine and cortisol levels in comparison to those who were not revictimized. Inconsistencies are also displayed in the child literature with one study conducted among children finding that childhood neglect was associated with lower cortisol levels and flatter diurnal cortisol slopes, but childhood abuse (mostly physical) was associated with higher cortisol levels and steeper diurnal cortisol slopes (van der Vegt, van der Ende, Kirschbaum, Verhulst, & Tiemeier, 2009). A study reported that a combination of high NE and low cortisol (i.e., high NE/cortisol ratio) may be especially sensitive in detecting individuals with a PTSD diagnosis who have been found to have higher NE/cortisol ratios than those without (Mason, Giller, Kosten, & Harkness, 1988). However this study was conducted among male veterans and the findings were not replicated among women with PTSD (Lemieux & Coe, 1995). The inconsistencies in the literature may be due to time of day that urine/saliva is collected, the length of the collection period, what the situational context is that surrounds the collection and the age, ethnicity and gender of participants. For example, a study by Merritt et al (2011) found the African American caregivers showed flatter cortisol slope scores than White caregivers, which the authors suggests might be linked to additional stressors

(e.g. discrimination) experienced by African Americans as well as worse pre-existing health factors.

Among patients with heart disease, higher levels of both NE and cortisol have been linked to increased risk of mortality and worse outcomes (Cohn et al., 1984; Otte et al., 2007; Smith et al., 2005; Vogelzangs et al., 2010). However, cortisol and norepinephrine have anti-inflammatory properties and high levels have also been found to be beneficial for patients with coronary heart disease (Fantidis et al., 2002; Straub et al., 2002); and low levels of cortisol have also been linked to cardiovascular disease risk (Bennett et al., 2004). These inconsistencies in relationships between stress hormones and CHD risk mirror those found in relationships between stress hormones and abuse and are not well understood in the literature.

Abuse, HIV, and Health Outcomes

Over 67% of 2000 HIV+ and 500 HIV- participants in the Women's Interagency HIV Study (WIHS), reported histories of physical, sexual or emotional abuse (Cohen et al., 2000; Cohen et al., 2004). Similarly, in a meta-analysis of HIV+ women, Machtiger and colleagues (2012) reported a 55.3% rate of intimate partner violence that is more than double the US national average and estimated a 30% rate of recent PTSD that is over five-times the rate in a national sample. Sachs-Ericsson et al (2005) found that individuals with a history of CSA had 1.5 greater likelihood of experiencing serious health problems

and George (1996) found that survivors of abuse were two times more likely to have mental health disorders than people without a history of abuse.

Given such high rates of abuse HIV+ women are susceptible to negative consequences of abuse such as depression, substance abuse, eating disorders, obesity and autoimmune disorders (George, 1996; Pine, Goldstein, Wolk, & Weissman, 2001; Romans, Gendall, Martin, & Mullen, 2001; Sachs-Ericsson, Blazer, Plant, & Arnow, 2005; D. R. Wilson, 2010). Histories of abuse have indeed been found to relate to negative health outcomes for HIV+ women, including HIV medication nonadherence, antiretroviral failure, and increased mortality (Cohen et al., 2000; Cohen et al., 2004; Leserman, Pence, & Stangl, 2007; Machtinger et al., 2012; Meade et al., 2009). For instance, Machtinger and colleagues (2012) found that among HIV+ biological and transgender women, those who reported recent trauma, including being threatened, abused, and the victim of violence had over four-times the odds of antiretroviral failure in comparison to HIV+ women who did not report recent trauma. Several noted consequences of abuse (e.g. obesity and substance use) are risk factors for heart disease and a limited number of studies have directly linked abuse histories to heart disease (Dong et al., 2004; Midei et al., 2013). It is also likely that because of their abuse histories along with psychosocial stressors of HIV infection itself, women with HIV may have dysregulated levels of stress hormones (Cole, Kemeny, Fahey, Zack, & Naliboff, 2003; Friedman et al., 2007).

Resilience

Resilience is the ability to function and cope adaptively in the face of or following adversities such as trauma and abuse (Connor and Davidson, 2003; Masten, Best, & Garmezy, 1990). Evidence exists to suggest that interactions among genetics, other biological processes, and the environment may lay the foundation for resilience (Caspi et al., 2003; Charney, 2004; Tannenbaum & Anisman, 2003; Waaktaar & Torgersen, 2012; Young, Gallagher, & Porter, 2002). For instance, Caspi et al (2003) found that the 5-HTT gene promoter polymorphism moderated the relationship between stressful life events and depression and suicidality, such that individuals who were homozygous for the long allele of the gene had lower depressive symptoms, less diagnosable depression and lower suicidality in comparison with individuals who had one or two copies of the short allele of the gene. In addition, Weber and colleagues (2009) reported that the MAOA genotype moderated the relationship between childhood trauma exposure and aggressive behaviors so that high activity MAOA gene predicted lower aggressive scores in comparison to low activity MAOA gene. However, this moderation existed only in the context of low to moderate trauma exposure, but when trauma exposure was severe or extreme children had high aggressive scores regardless of MAOA genotype.

Environmental factors including close friendships, parental support, and strong family network are also associated with resilient functioning (Haskett,

Nears, Ward, & McPherson, 2006; Wells, 2009). In addition, resilience has been linked to environmental and psychosocial resources such as higher education, higher income and employment although not consistently (Bonanno, Galea, Bucciarelli, & Vlahov, 2006, 2007; Dale et al.; Kjellstrand & Harper, 2012).

In previous literature, scholars have defined and studied resilience as the process of bouncing back from an adversity, (Jacelon, 1997; Olsson, Bond, Burns, Vella-Brodrick, & Sawyer, 2003), an outcome consisting of adaptive functioning (Bonanno, 2012; Bonanno et al., 2006), and/or a set of personality traits (Connor & Davidson, 2003; Jacelon, 1997). Researchers who view resilience as a process emphasize “how” someone adapts successfully following trauma (Fine, 1991; Jacelon, 1997; Luthar & Cicchetti, 2000). For instance, Fine (1991) described a two stage resilience process that included: (1) acute phase: individual focuses their energy on managing and minimizing the impact of the stressor and (2) reorganization phase: accepting and facing their new realities.

In contrast, some researchers view resilience as an outcome, but there are many variations in the particular outcome representing resilience (e.g. improved mental health status or symptomology, reduction in substance use). McGeary (2011), in a review of 25 randomly selected peer reviewed articles on resilience, noted that 13 different measures of resilience outcome were noted such as physical functioning and behaviors. Furthermore, researchers such as Bonanno (2012, p. 753) encourage the conceptualization of resilience as an

outcome trajectory and defined resilience as “a stable trajectory of healthy functioning in response to a clearly defined event.”

Others view resilience not as a process or outcome, but as personality traits or qualities that might facilitate the process of bouncing back or arriving at a good outcome. Wagnild and Young (1993, p. 165) defined resilience as “a personality characteristic that moderates the negative effects of stress and promotes adaption” and similarly Connor and Davidson (2003, p. 76) wrote “resilience embodies the personal qualities that enable one to thrive in the face of adversity.” Researchers who view resilience as personal qualities posit that these include characteristics such as commitment, sense of humor, optimism, self-efficacy, having a realistic sense of control, being action and goal-oriented, viewing stress as a challenge/opportunity, and being able to adapt to change (Connor & Davidson, 2003; Kobasa, 1979; Lyons, 1991; Rutter, 1985; Werner, 2004; Werner, 1993). In addition, self-esteem is a factor that relates to resilience. Self-esteem consists of the views, beliefs, and emotions people hold about themselves that can range from negative to positive, and can be with respect to abilities, personality traits, and accomplishments (Mruk, 2006). Positive self-esteem has been associated with resilience (Dumont & Provost, 1999) and has been noted as a factor that promotes resilience among individuals who experience adversity and high-risk environments (Werner, 2004). Self-esteem is also impacted by resilience, in that an individual who strives in the face of

hardship may feel positive about herself based on this experience (Baumeister, Campbell, Krueger, & Vohs, 2003).

In summary there are many ways of conceptualizing and measuring resilience, but in general it is assumed to be the ability to function adaptively following a traumatic experience, which may involve personality characteristics, coping strategies, and/or outcomes. It is also probable that positive adaptation is a process that occurs over time. Further both genetics and psychosocial experiences are assumed to contribute to resilience.

Resilience, Black Women, and HIV

Resilience is especially important in the lives of women with HIV who are faced with multiple stressors. In the United States Black women represent the largest proportion of women who are newly diagnosed and/or living with HIV (Centers for Disease Control and Prevention, 2013b) and they face stressors such as HIV related stigma, interpersonal violence, child-rearing responsibilities, mental illness, poverty, unstable environments, microaggressions, racial/ gender discrimination and systemic exclusion from resources/opportunities, such as access to quality health care, education and employment (Centers for Disease Control and Prevention, 2013a, 2013b; Cohen et al., 2000; DeMarco, Miller, Patsdaughter, Chisholm, & Grindel, 1998; Ingram & Hutchinson, 1999; Kelso, 2013). As such, it is especially important to investigate resilience and how it relates to health outcomes in samples of Black women with HIV because women

who are resilient may be able to thrive despite these circumstances and engage in healthy behaviors such as adhering to medication and establishing fulfilling lives.

Within the past decade scholars have noted that Black women show high levels of resilience despite their adverse circumstances and experiences (Caldwell-Colbert, Parks, & Eshun, 2009; Dale et al.; O'Connor, 2002; Singleton, 2004). Their coping strategies that are associated with resilience, including an internal locus of control, belief in a divine order, the presence of strong female role models, the capacity for forgiveness, and lower perceived stress (Faison, 2007; Norman, 2002; Singleton, 2004). However, most of the studies on resilience among Black women have been based on qualitative inquiry rather than on a quantitative resilience measure, and among Black women and women with HIV, few studies have investigated the link between resilience (measured quantitatively) and health outcomes such as depression, quality of life, HIV medication adherence, HIV disease markers and CHD risk (Faison, 2007; Norman, 2002; Singleton, 2004).

Resilience and Health Outcomes

In the general population resilience has been linked to good health outcomes including less depression, fewer psychiatric symptoms, higher quality

of life, and positive response to psychopharmacology treatments (Campbell-Sills & Stein, 2007; Davidson et al., 2012). Measures of resilience in these studies have included a widely used self-report resilience measure the Connor-Davidson Resilience Scale (CD-RISC) and other self-report questionnaires. For instance, in patients diagnosed with PTSD or depression, higher pretreatment resilience scores on the CD-RISC predicted better response to treatment with antidepressants (Davidson et al., 2012; Min, Lee, Lee, Lee, & Chae, 2012). Similarly, in a sample of women with infertility problems higher resilience (as measured by the CD-RISC) was associated with lower fertility related and general distress (Sexton, Byrd, & von Kluge, 2010).

Resilience has been shown to mitigate or buffer the impact of adverse experiences on health. Among returning soldiers who served in Operation Iraqi Freedom and Operation Enduring Freedom, resilience (using the CD-RISC) was found to be protective against depressive symptoms and traumatic stress (Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009) and a longitudinal study found that higher resilience (a factor score comprised of scales measuring self-esteem, self-efficacy, self-mastery and optimism) buffered against worsening diabetes health markers (Yi, Vitaliano, Smith, Yi, & Weinger, 2008).

Resilience, Depression, and Quality of Life in Persons with HIV

While studies among community samples have shown that higher resilience relates to lower depression and other psychiatric symptoms (Campbell-Sills & Stein, 2007; Davidson et al., 2012; Sexton, Byrd, & von Kluge, 2010), among HIV infected individuals only a small number of studies have explored these relationships (Farber, Schwartz, Schaper, Moonen, & McDaniel, 2000; Scali et al., 2012; Wingo et al., 2010; Yu et al., 2009a). In a sample of individuals with symptomatic HIV and AIDS in the U.S., higher hardiness (a construct closely related to resilience which often assumes some protective personality characteristics prior to experiencing the adversity and is measured with the Dispositional Resilience Scale) was significantly related to higher physical health quality of life and lower psychological distress (Farber et al., 2000). Similarly, among individuals with HIV in rural China, Yu and colleagues (2009a) found that higher resilience (using the CD-RISC), was associated with lower depression.

Some literature suggests that resilience can moderate the relationship between abuse and depression. In a community sample Wingo and colleagues (2010) found that childhood abuse and trauma exposure were related to higher depression severity, and that resilience, as measured with the CD-RISC 10-item, moderated the relationships between trauma and depression scores such that the high resilience group had lower depression scores than the medium and low resilience groups.

Resilience, Medication Adherence, and HIV Disease Markers

While no studies to our knowledge have reported a link between resilience and HIV medication adherence or disease markers, some studies have indicated that positive coping strategies are related to better antiretroviral therapy (ART) adherence and HIV disease markers (Ickovics et al., 2006; O'Cleirigh, Ironson, Weiss, & Costa, 2007). The relationship between positive coping strategies and better HAART adherence is critical because HAART adherence relates to better HIV biomarkers, including viral load and CD4 + cell count. Among HIV infected women, Ickovics et al. (2006) found that adaptive psychological coping strategies, including positive affect, positive expectancy regarding health outcomes, and finding meaning in challenging circumstances, were negatively associated with HIV mortality, time to death, and CD4+ cell count decline. In addition, over a one year period, conscientiousness (e.g., being organized, detail oriented and responsible) was associated positively with medication adherence and at the one-year point conscientiousness predicted decreases in viral load and increases in CD4 count (O'Cleirigh et al., 2007). Because resilience (as measured with the CD-RISC) is conceptualized as both adaptive personality traits and coping strategies (e.g. optimism), it has the potential to relate to better medication adherence and HIV disease markers. For example, resilient women may be optimistic about living longer and may view maintaining their health as a

goal to work towards and consequently adhere to their medications, which would result in better HIV disease markers, including undetectable viral load and higher CD4 counts.

Resilience, Stress Hormones, and CHD risk

There are very few studies that have looked at the relationship between resilience and stress hormones. In a sample of maltreated and nonmaltreated children, Cicchetti and Rogosch (2007) found that higher psychological resilience (measured as a composite of self-report and observer ratings on aspects including social functioning, behavioral ratings, and depressive symptoms) was associated with lower morning cortisol levels in nonmaltreated children, and with higher cortisol levels in physically abused children. Thus, higher resilience, measured in a variety of ways, has been associated with lower and higher levels of stress hormones.

Few studies have looked at resilience (or hardiness) and stress hormones in relation to heart disease risk or among patients with heart disease. Risk factors for CHD include high blood pressure, low “good” cholesterol, and high “bad” cholesterol and two studies have linked these factors to low resilience. Kasi and Cobb (1995) reported that men whose blood pressure remained higher longer were lower on ego resilience, reported longer lasting subjective stress and more severe unemployment. Ego resilience was defined as the ability to modify one’s inhibition/expression of impulses based on context and environmental factors

and measured by the Ego Resilience Scale (Block & Block, 1980). Further, Bartone et al. (2009) found that psychological hardiness (measured with the Dispositional Resilience Scale) was associated with increased levels of high density lipoprotein (HDL) cholesterol (good cholesterol), and there was a non-significant negative association with low density lipoprotein (LDL) cholesterol (bad cholesterol). Having heart disease and risk for subsequent attacks have also been linked to resilience. Patients with coronary heart disease were found to experience more stress and to have lower hardiness (measured with a composite score from questionnaires thought to capture commitment, control, and challenge) compared to a group without coronary heart disease (Bayazi & Rastegari, 2005). In addition, Affleck et al. found that heart attack patients who engaged in meaning making, a coping strategy related to resilience, (incorporating negative events into belief systems and regaining a positive view of the world) and who perceived benefits from their first attack were less likely to have a subsequent attack and exhibited less morbidity over an 8-year follow-up (1987).

Although there is little literature on the relationships between resilience and CHD risk, a few studies suggest that lower resilience may significantly relate to higher CHD risk. These inconsistencies between resilience and stress hormones mirror the inconsistencies found in the relationships of stress hormones with both abuse histories and CHD risk.

Self-esteem in Relation to Stress Hormones, and CHD Risk

Positive self-esteem (SE) is a factor that facilitates resilience and as such may also relate to stress hormones and lower CHD risk, however the literature in this area is limited. Higher self-esteem has been associated with lower levels of cortisol, and self-esteem was found to moderate the relationship between cortisol reactivity and depressed mood so that for the high SE group increased cortisol levels significantly predicted depressed mood, but for the low SE group decreased cortisol levels approached significance in predicting depressed mood (Pruessner, Lord, Meaney, & Lupien, 2004; Scarpa & Luscher, 2002; Seeman et al., 1995). We are unaware of any studies that investigated bidirectional relationships between self-esteem and heart disease risk among adults. However, in a sample of adolescents with heart disease, researchers found that in comparison to adolescents with mild heart disease, adolescents with severe heart disease reported lower self esteem (Cohen, Mansoor, Langut, & Lorber, 2007). Wray and Sensky (1998) also noted an increase in self-esteem following heart surgery in children and adolescents. However, it's not clear what the cause and effect are in this relationship: it may be that having heart disease leads to lower self-esteem because of the physical limitations imposed and/or that having lower self esteem makes heart disease more likely by affecting other related risk factors such as diet and exercise (Sorensen, Anderssen, Hjermerman, Holme, & Ursin, 1999).

Depressive Symptoms, Positive Self-esteem, Stress Hormones, and CHD Risk

Depressive symptoms have been linked to low and negative self-esteem as well as to dysregulated levels of stress hormones and increased risk for CHD. The Diagnostic and Statistical Manual (DSM-IV TR) recognizes negative self-evaluations (i.e. feelings of worthlessness) as one of the symptom criteria for the diagnosis of depression and individual studies have also validated relationships between low self-esteem and higher depressive symptoms. For instance, Kernis and colleagues (Kernis, Grannemann, & Mathis, 1991) found that lower self-esteem was associated with higher depressive symptoms among male and female college undergraduates. Similarly Orth and colleagues (Orth, Robins, & Roberts, 2008) in a longitudinal study found that lower self-esteem predicted subsequent levels of higher depressive symptoms among men and women.

In addition to being linked with self-esteem, depressive symptoms have also been associated with dysregulated levels of norepinephrine and cortisol, although the direction has been somewhat inconsistent. Among middle-aged women researchers found that higher levels of depressive symptoms were associated with higher 24-hour urinary norepinephrine and cortisol levels (Hughes, Watkins, Blumenthal, Kuhn, & Sherwood, 2004) and among patients with coronary heart disease those with depressive symptoms had higher norepinephrine levels than those without depressive symptoms (Otte et al.,

2005). In contrast, some studies have found significant associations between higher depressive symptoms and lower levels of cortisol, flat cortisol slope, and a blunted cortisol response (Burke, Fernald, Gertler, & Adler, 2005; Knight et al., 2010). Further a study by Bremner and colleagues (2007) suggested that among older patients the relationship between depression and cortisol is u-shaped, with both high cortisol and low cortisol found among patients with depression.

Perhaps due in part to their connection with stress hormone levels, depressive symptoms have often been associated with increased risk for CHD (Khawaja, Westermeyer, Gajwani, & Feinstein, 2009). For instance, a study found that among women, depressive symptoms were associated with CHD incidence and risk for CHD mortality (Mendes de Leon et al., 1998). Depression may also partially be linked to increased risk for CHD as a result of unhealthy diet and lifestyle practices (e.g. lack of exercise) noted among individuals with depression (Gallagher, Zelestis, Hollams, Denney-Wilson, & Kirkness, 2013). Given that higher depressive symptoms have been related to low self-esteem, dysregulated levels of stress hormones, and increased risk for CHD, depressive symptoms may be a potential mediator of relationships among other variables of interest, such as the relationship between positive self-esteem and stress hormones.

Summary and Present Studies

In summary, the existing literature highlights that high prevalence of abuse histories in women with HIV have been linked to higher depression, lower quality of life, medication nonadherence, HIV mortality, and increased risk for CHD. Higher depression, lower quality of life, and increased CHD risk are more apt to be associated with women with HIV who have been abused in comparison to both non-abused women with HIV and HIV- women. The relationships between abuse and poor health outcomes may be mediated or moderated by stress hormone levels. There is literature to suggest that resilience and positive self-esteem may relate to better health outcomes for women who have been abused and for women with and at risk for HIV, perhaps by affecting stress hormone levels. Resilience and positive self-esteem may potentially buffer the untoward impact of abuse on health outcomes as mediated by stress hormone levels. In addition, depressive symptoms have been related to HAART nonadherence, HIV disease markers, stress hormones and CHD risk and may be a potential mediator of the relationships that resilience and positive self-esteem have with these variables.

Three studies were designed to investigate the relationships among abuse histories, resilience, positive self-esteem and noted health outcomes among HIV+ and HIV- sociodemographically similar women. Study 1 investigates the relationships among CSA, resilience, depressive symptoms and health-related

quality of life among HIV+ and HIV- women and whether the relationships between CSA, depressive symptoms, and health-related quality of life were moderated by resilience. In a sample of women with HIV, study 2 investigates whether resilience related to HIV health outcomes (i.e. detectable viral load and CD4+ cell count) and HAART adherence and whether these relationships were mediated by depressive symptoms and if resilience moderated the relationships of abuse history with HIV medication adherence and HIV biomarkers. Study 3 investigates the relationships among resilience, positive self-esteem, abuse histories, levels of stress hormones (i.e. norepinephrine and cortisol) and coronary heart disease (CHD) among women with HIV and whether depressive symptoms mediated these relationships. Findings from these three studies may inform prevention and intervention strategies to promote better health outcomes among women with HIV and demographically similar women at risk for HIV.

CHAPTER TWO

Study #1: Resilience, Childhood Sexual Abuse, Depressive symptoms, and Health-Related Quality of Life in Women with and at Risk for HIV

Introduction

The present study sought to contribute to the literature by investigating the relationships among childhood sexual abuse (CSA), resilience, depressive symptoms and health related quality of life among women infected with HIV and a demographically matched sample of uninfected women. Previous literature has indicated that CSA is related to depression and poor quality of life for adult survivors (Draper et al., 2008; Irish, Kobayashi, & Delahanty, 2010). However, women who are resilient (with adaptive personal qualities and coping strategies) may have lower depressive symptoms and higher quality of life as suggested by studies among community samples (Campbell-Sills & Stein, 2007; Davidson et al., 2012; Sexton et al., 2010). Limited literature also suggests that resilience can moderate the relationship between CSA and depressive symptoms (Kelsch, 2012; Wingo et al., 2010). Only a limited number of studies have investigated relationships among resilience, depressive symptoms, and quality of life among HIV infected individuals (Farber et al., 2000; Scali et al., 2012; Wingo et al., 2010; Yu et al., 2009a). Depressive symptoms and quality of life are very pertinent to the lives of women with HIV, with depressive symptoms linked to HIV medication nonadherence and increased mortality (Ickovics et al., 2001;

Leserman et al., 2007) and with medication adherence affecting quality of life (Liu et al., 2006) and perhaps being affected by it as well.

Consistent with and building upon previous literature, the present study hypothesized that: (1) HIV+ women would have higher depressive symptoms and lower quality of life than HIV- women, (2) CSA would relate to higher depressive symptoms and lower quality of life among all women, (3) higher resilience would relate to lower depressive symptoms and higher quality of life among all women and (4) resilience would moderate the relationships between CSA and depressive symptoms and CSA and quality of life among all women, such that for women scoring low in resilience, CSA would predict higher depressive symptoms and lower quality of life, but for women scoring high on resilience CSA would be unrelated to depressive symptoms and HRQOL. We also explored the HIV status differences in patterns of relationships of resilience with CSA, depressive symptoms and health related quality of life, but no specific hypotheses were formulated due to the lack of previous literature.

Methods

Sample, Recruitment and Procedures

The sample consisted of 202 women (138 HIV+ and 64 HIV-) from three enrollment waves (wave 1 (1994-5), n= 48; wave 2 (2001) n= 87; wave 3 (2011) n= 67)) of the Chicago site of the Women's Interagency HIV Study (WIHS). The WIHS is a prospective cohort study that seeks to understand HIV disease

progression in women. Cohort enrollment and characteristics at the six U.S. WIHS sites have previously been described (Bacon et al., 2005; Barkan et al., 1998). Women in Chicago WIHS were approached at a visit between 2008 and 2012 to participate in this study. Written informed consent was obtained and participants received a financial honorarium of \$25 in support of their time and effort, transportation, and childcare as needed. The study protocol was approved by the Stroger and Boston University Institutional Review Boards and the WIHS Executive Committee.

Measures

To assess for a history of CSA, at baseline visit, women were asked whether they were sexually abused prior to age 18. Three self-report validated measures were used to capture resilience, depressive symptoms and health related quality of life as described below.

Connor-Davidson Resilience Scale -10 item (Campbell-Sills & Stein, 2007). The CD-RISC is a 10-item self-report measure with a 4-point Likert-type scale that assesses the individual's ability to thrive despite adversity (Campbell-Sills & Stein, 2007) using both personality traits and successful coping as indications of thriving. For instance, one item reads "Tend to bounce back after illness or hardship". Total scores range from 0 to 40 with higher scores reflecting greater resilience. The CD-RISC has demonstrated good internal consistency (Cronbach's α coefficient = .85) and construct validity was supported by CD-

RISC score moderating the relationship between childhood maltreatment, trauma exposure, and psychiatric symptoms in the general population (Campbell-Sills & Stein, 2007). Consistent with previous literature, the Cronbach's alpha reliability coefficient for the CD-RISC in the current sample was .91 and a principal components factor analysis yielded one factor with an eigenvalue over 1, accounting for 56% of the variance.

Center for Epidemiological Studies Depression Scale (CES-D Scale)(Radloff, 1977). This is a 20-item, self-report measure of current, affective depressive symptoms that is widely used in studies of women with HIV. Participants rate their level of agreement with each item on a 4-point scale. The CES-D shows high internal consistency while test-retest reliability correlations are moderate. CES-D scores were found to significantly predict mortality and CD4+ cell counts in HIV infected women participating in the multisite prospective HIV Epidemiology Research Study (HERS) and women participating in the WIHS (French et al., 2009; Ickovics et al., 2001). Cronbach's alpha reliability coefficient for the CES-D in the current sample was .98.

Quality of Life (HRQOL). This is a short form of The Medical Outcome Study (MOS)-HIV, a widely used disease specific instrument for quality of life developed by Bozzette et al. (1995), and adapted for use in WIHS. The shortened form has 21 items representing 6 domains: physical functioning, role functioning, social functioning, pain, emotional well-being, and general health

perception. All reliability indices were between 0.78 and 0.85 (Bozzette, Hays, Berry, Kanouse, & Wu, 1995). Cronbach's alphas are not typically calculated for the overall scale or for the two subscales (i.e. pain and social functioning subscales) with one or two items. In the current sample Cronbach's alpha reliability coefficients for the four subscales with more than two items ranged from .69 to .99.

Statistical Analyses

SPSS version 19.0 was used to analyze the data with Pearson correlations, partial correlations, and independent samples t-test, and hierarchical multiple linear regressions. Stata 11.0 was also used to run a mediational analysis for indirect effects. Four participants were missing data on childhood sexual abuse; one participant was missing one item on the CD-RISC; and 35 participants were missing HRQOL data because HRQOL was not collected at the resiliency study visit for those women, who were enrolled in the third enrollment wave of WIHS (2011) and for whom the study visit was their first visit. The one missing item on the CD-RISC was replaced with the respondent's average item score computed from the mean of the nine completed items.

Results

Approximately 87% of the 202 women (138 HIV+ and 64 HIV-) self-identified as African American, 62% completed at least high school, and 27%

reported a history of CSA. Table 1 displays the sample demographics and clinical characteristics.

Insert Table 1 about here

Preliminary Analyses

As assessed by chi-square and t-tests HIV+ and HIV- women did not differ in race, age, education, enrollment wave, CSA history, and resilience, but HIV- women reported higher levels of income and were more likely to be employed than HIV+ women. Partial correlations in the entire sample controlling for HIV status showed that higher education, employment and higher income were significantly related to higher resilience, lower depressive symptoms and higher HRQOL, while being older was related to a lower HRQOL, as displayed in Table 2. A history of CSA was significantly related to being older, enrolling during an earlier wave, and having higher education. Based on these findings, age, education, employment, income, and enrollment wave were included as covariates in all subsequent analyses.

Insert Table 2 about here

Hypothesis 1: HIV Status Differences in Depressive Symptoms and HRQOL

To test the hypothesis that HIV+ women would have higher depressive symptoms and lower HRQOL than HIV- women, partial correlations with HIV status, depressive symptoms, and HRQOL were run controlling for age, education, employment, income, and enrollment wave. Results indicated that HIV+ women reported significantly lower HRQOL than HIV- women ($r = -.21$, $p = .01$), but the two groups did not differ in reported depressive symptoms ($r = .02$, $p = ns$). Thus, hypothesis 1 was partially confirmed.

Exploratory Question: HIV Status as Moderator of Relationships between CSA, Resilience and Outcomes

We were interested in investigating if the nature of the relationships among CSA, resilience, depressive symptoms and HRQOL differed based on HIV status and if resilience and HIV status moderated relationships of CSA with depression and quality of life. Regression analyses were conducted for three-way interactions with HIV status, CSA, and resilience, and two-way interactions between HIV status and resilience and HIV status and CSA. Covariates were income, education, employment, age and wave entered in block 1; main effects were HIV status, CSA and resilience entered as predictors in block 2; dummy variables representing the two-way interactions of HIV status with resilience, HIV status with CSA, and CSA with resilience were entered in block 3; and dummy variables representing the three-way interaction of HIV status, CSA, and resilience were entered in block 4. The outcomes were depressive symptoms

and HRQOL scores. Findings indicated that the three-way interaction between HIV status, CSA, and resilience, and the two-way interactions between HIV status and resilience and HIV status and CSA did not significantly relate to depressive symptoms and health related HRQOL.

Given that HIV+ and HIV- women did not differ in sociodemographics, CSA, resilience, and depressive symptoms and the nature of the relationships between CSA, resilience, depressive symptoms and HRQOL did not differ based on HIV status, HIV+ and HIV- women were combined in further analyses and HIV status was included as a covariate.

Hypothesis 2: Relationships of CSA with Depressive symptoms and HRQOL

Hierarchical multiple linear regressions were used to test the hypothesis that CSA would relate to higher depressive symptoms and lower quality of life while controlling for age, education, employment, income, HIV status, and wave. In the analyses, covariates were entered in block 1, CSA was entered as a main effect in block 2, and outcomes were HRQOL or depressive symptoms. CSA significantly related to lower HRQOL ($\beta = -.18, t = -2.12, p = .04$) and approached significance in relating to higher depressive symptoms ($\beta = .12, t = 1.60, p = .11$), indicating that women with a history of childhood sexual abuse reported lower health related HRQOL and tended to report higher depressive symptoms. Thus, hypothesis 3 was partially confirmed.

Hypothesis 3: Relationships between Resilience, Depressive symptoms and HRQOL

To test the hypothesis that higher levels of resilience would relate to lower depressive symptoms and higher HRQOL we conducted multiple linear regressions while controlling for covariates of age, education, employment, income, HIV status, and wave. In block 1, covariates were entered, in block 2 resilience was entered as a main effect, and the outcomes were depressive symptoms or HRQOL. Findings indicated that resilience was significantly negatively related to depressive symptoms ($\beta = -.49, t = -7.98, p = .001$) and significantly positively related to HRQOL ($\beta = .27, t = 3.67, p = .001$) so that higher resilience related to lower depressive symptoms and higher HRQOL. Thus, hypothesis 3 was confirmed.

An additional regression analysis was conducted to explore the relationship between the two outcomes of depressive symptoms and HRQOL. In this regression covariates were entered in block 1, depressive symptoms were entered as the main effect in block 2, and HRQOL was the outcome; and results showed that higher depressive symptoms significantly related to lower HRQOL ($\beta = -.44, t = -6.14, p = .001$).

Although this was not an initial aim of this paper, given that resilience significantly related to both lower depressive symptoms and higher HRQOL a mediation analysis was conducted to investigate whether depressive symptoms

mediated the relationship between resilience and quality of life. Stata 11.0 was used to calculate the size of the direct and indirect effects and test for their significance with bootstrap. In the command, resilience was the predictor, HRQOL was the outcome, depressive symptoms were the mediator and covariates were income, education, employment, age, wave and HIV status. Results indicated that the direct effect from resilience to HRQOL was not significant (observed coefficient = .08, bias= .002, bootstrap standard of error = .09, bias corrected confidence interval (95%) = -.09 - .25), but the indirect effect from resilience through depressive symptoms to HRQOL was significant (observed coefficient = .19, bias= -.003, bootstrap standard of error = .05, bias corrected confidence interval (95%) = .10 - .31), with depressive symptoms mediating 74% of the relationship between resilience and HRQOL. The total effect from resilience to HRQOL was also significant (observed coefficient = .27, bias= -.001, bootstrap standard of error = .08, bias corrected confidence interval (95%) = .13 - .41). These findings suggest that resilience impacts HRQOL through the compound pathways of resilience to depressive symptoms and depressive symptoms to HRQOL.

Hypothesis 4: Resilience Moderating the Relationships between CSA, Depressive symptoms and HRQOL

To test the hypothesis that resilience moderated the relationships between CSA and depressive symptoms and CSA and HRQOL, we conducted

hierarchical multiple linear regressions. Regression analyses included the covariates: income, education, employment, age, wave and status entered in block 1; the main effects CSA and resilience entered as predictors in block 2, and dummy variables representing the interaction of resilience with CSA entered in block 3. The outcomes were depressive symptoms and HRQOL scores. Results showed that the interaction between resilience and CSA significantly related to depressive symptoms ($\beta = -.16, t = -2.73, p = .007$), but did not significantly relate to HRQOL ($\beta = .01, t = .16, p = ns$). To interpret this finding using methods suggested by Holmbeck (1998, 2002) women's resilience scores were divided into low (1 SD below mean, N=38) and high (1 SD above mean, N=43) resilience groups and regressions were run separately for each group with covariates entered in block 1, CSA as the main effect in block 2, and depressive symptoms as the outcome. The nature of the relationship between resilience and depressive symptoms differed based on level of resilience, in that CSA significantly related to higher depressive symptoms only for women scoring low in resilience ($\beta = .32, t = 2.15, p = .04, n=38$) but not for women high in resilience ($\beta = -.001, t = -.01, p = ns, n=40$), as displayed in Figure 1.

Insert Figure 1 about here

Discussion

As hypothesized, women with HIV reported significantly lower health related quality of life than uninfected women. This is consistent with previous literature and with the additional health burden HIV infected women face from living with HIV (Ingram & Hutchinson, 1999)(Liu et al., 2006; McDonnell et al., 2005)(Brody, 2013). However, contrary to hypotheses, we did not find a significant difference in depressive symptoms scores between HIV infected and uninfected women. The HIV+ and HIV- women in our sample are sociodemographically similar and experience similar vulnerabilities and stressors such as low socioeconomic status and unemployment (Bacon et al., 2005), which may partly explain the lack of difference in depressive symptoms by HIV status. It is also noteworthy that the majority of the current sample has been participating in a longitudinal study for years, and as such these women may have developed support networks and access to resources that reduced the disparity in depressive scores between HIV infected and uninfected women.

Consistent with prior literature and with hypotheses, we found that women with a history of childhood sexual abuse reported lower health related quality of life. Childhood sexual abuse also approached significance in relating to higher depressive symptoms in our sample, and although non-significant, this trend is consistent with the literature noting that CSA relates to higher depressive symptoms in adulthood (Sachs-Ericsson et al., 2005). Perhaps we were limited

by our sample size in detecting significant relationships between CSA and depressive symptoms. In addition, women in our sample who did not report CSA may have been exposed to other forms of childhood/adult trauma and environmental stressors, such as racial and gender discrimination (Bacon et al., 2005; Kelso, 2013) that may account for the lack of difference in depressive symptoms between women with a history of CSA and those without.

Also as hypothesized, we found that higher resilience significantly related to lower depressive symptoms and health related quality of life in our sample of HIV infected and uninfected women. Higher resilience relating to lower depressive symptoms and better health related quality of life is consistent with two previous studies among HIV infected individuals that found that lower resilience was associated with higher depressive symptoms and that hardiness (a construct similar to resilience) was related to lower psychological distress and higher physical health quality of life (Farber et al., 2000; Yu et al., 2009a).

Our post-hoc analysis showing that depressive symptoms mediated the relationship between resilience and quality of life suggest that interventions aimed at increasing resilience and lowering depressive symptoms among HIV infected and uninfected women may improve quality of life. Given that depressive symptoms and quality of life have been linked to other negative health outcomes among HIV infected women such as disease progression and medication non-adherence (Cook et al., 2002; Dew et al., 1997) interventions which increase

resilience among HIV infected and uninfected women may lead to lower depressive symptoms and better health related quality of life as well as other related health outcomes.

One of the most important findings from our analysis is that resilience moderated the relationship between CSA and higher depressive symptoms as hypothesized, in that CSA significantly related to higher depressive symptoms only for women scoring low in resilience, but not for women scoring high in resilience. This finding in a sample of HIV infected and uninfected women is important given the high prevalence of abuse histories among HIV infected and uninfected women and the association between trauma and negative health outcomes in this population (M. Cohen et al., 2000; M. H. Cohen et al., 2004; Machtiger, Haberer, et al., 2012). The results are consistent with results by Wingo and colleagues (2010) who found that resilience moderated the relationships between trauma and depression scores in a community sample such that the high resilience group reported lower depression scores than the medium and low resilience groups.

In developing the CD-RISC, Connor and Davidson (2003) viewed resilience as consisting of both personal qualities that help an individual to succeed in the face of adversity and as a measure of successful coping/adaption in response to stress. The CD-RISC captures both personality traits and successful coping via items such as “I am able to adapt when changes occur”

and “I think of myself as a strong person when dealing with life's challenges and difficulties”. Women with CSA who score highly on this scale are endorsing items that indicate that they have a positive view of themselves as strong and capable of dealing with adversity. These types of positive self-attributions may contraindicate depressive symptoms, in that women high in resilience may not be as susceptible to depressive symptoms or may respond more adaptively to the onset of depressive symptoms (e.g. by seeking support) and therefore prevent further exacerbation of depressive symptoms. It is also possible that resilience and low depressive symptoms are linked by a commonality in self-presentation or response biases: women who are likely to report they are strong and confident may also be less likely to report any vulnerabilities such as depressive symptoms.

Our findings among HIV+ and HIV- women that resilience relates to lower depressive symptoms and higher health related quality of life, and mitigates the relationship between childhood sexual abuse and depressive symptoms, make a new contribution to the literature and highlight the importance of promoting resilience in prevention and intervention strategies. Increasing resilience among HIV infected and uninfected women could lower depressive symptoms, increase health related quality of life, and especially mitigate the impact of CSA on depressive symptoms, thus potentially promoting better physical health outcomes, since depressive symptoms are associated with medication

nonadherence and HIV disease progression(Cook et al., 2004; Leserman et al., 2007).

There are findings in the literature to support the feasibility and possible effectiveness of a resilience intervention for HIV infected and uninfected women with histories of CSA. Among women and men infected with HIV and reporting histories of CSA, Sikkema and colleagues (2007; 2008) found that interventions for coping with HIV and CSA (thereby promoting resilience) reduced traumatic stress symptoms and the frequency of unprotected sexual intercourse. Another study indicated that during a period of increased academic stress for college students, a resilience intervention significantly increased resilience scores and effective coping strategies and decreased depressive symptoms, perceived stress and negative affect (M. Steinhardt & Dolbier, 2008).

Building resilience among HIV infected and uninfected women with histories of CSA might be targeted in individual and/or group therapy. Sessions could address coping/processing CSA and encourage resilient strategies such as viewing adversity as a challenge/opportunity. The CD-RISC resilience measure can be used as assessment tool at baseline, at several points during therapy and after treatment completion. Additional research needs to be conducted to adequately develop and test the efficacy of such an intervention.

Findings from this study should be interpreted within the context of the limitations of a cross-sectional study design that prevents drawing causal

conclusions, potential recall bias regarding CSA, and self-report measures of resilience, depressive symptoms and HRQOL that are subject to social desirability factors. In addition, some have argued that resilience is better understood as a trajectory of healthy functioning following a traumatic event (Bonanno, 2012), and therefore longitudinal designs examining the resilience trajectory of HIV infected and uninfected women are needed. Nonetheless, our finding that a cross-sectional measure of resilience related to lower depressive symptoms and higher quality of life, and buffered the impact of CSA on depressive symptoms provides implications for future studies of resilience among women with and at risk for HIV and the development of prevention and intervention efforts.

Table 2.1 *Sociodemographic statistics, clinical characteristics, and subsample comparisons*

	Entire sample (N = 202)	HIV + women (n = 138)	HIV - women (n = 64)	HIV+ and HIV- Comparison χ^2
	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	
Race				$\chi^2 (7, N = 202)$ = 3.58, p = .83
White / non-Hispanic	8 (4)	6 (4.3)	2 (3.1)	
White / Hispanic	10 (5)	6 (4.3)	4 (6.3)	
African-Amer / non-Hispanic	175 (87)	120 (87)	55 (85.9)	
African-Amer / Hispanic	3 (1.5)	1 (0.7)	2 (3.1)	
Other / Hispanic	3 (1.5)	2 (1.4)	1 (1.6)	
Other	3 (1.5)	3 (2.1)	0 (0.0)	
Education				$\chi^2 (5, N = 202)$ = 8.83, p = .12
Grade 11 or less	77 (38.1)	60 (43.4)	17 (26.6)	
Completed high School	58 (28.7)	38 (27.5)	20 (31.3)	
Some or complete College	65 (32.1)	38 (27.5)	27 (42.2)	
Attended/completed graduate school	2 (1)	2 (1.4)	0 (0.0)	
Income				$\chi^2 (2, N = 200)$ = 11.30, p = .01
\$6,000 or less	55 (27.2)	30 (21.7)	25 (39.1)	
\$6,001-\$12,000	79 (39.1)	64 (46.4)	15 (23.4)	
\$12,001 and above	66 (32.7)	42 (30.4)	24 (37.5)	
Employed	48 (23.8)	25 (18.1)	23 (35.9)	$\chi^2 (1, N = 201)$ = 8.05, p = .01
Marital Status				$\chi^2 (5, N = 201)$ = 5.85, p = .32
Legally/common-law marriage	31 (15.3)	20 (14.5)	11 (17.2)	
Not married but living w partner	13 (6.4)	9 (6.5)	4 (6.3)	
Widowed	13 (6.4)	12 (8.7)	1 (1.6)	
Divorced/Annulled	30 (14.9)	21 (15.2)	9 (14.1)	
Separated	19 (19.4)	15 (10.9)	4 (6.3)	
Never married	95 (47)	60 (43.5)	35 (54.7)	

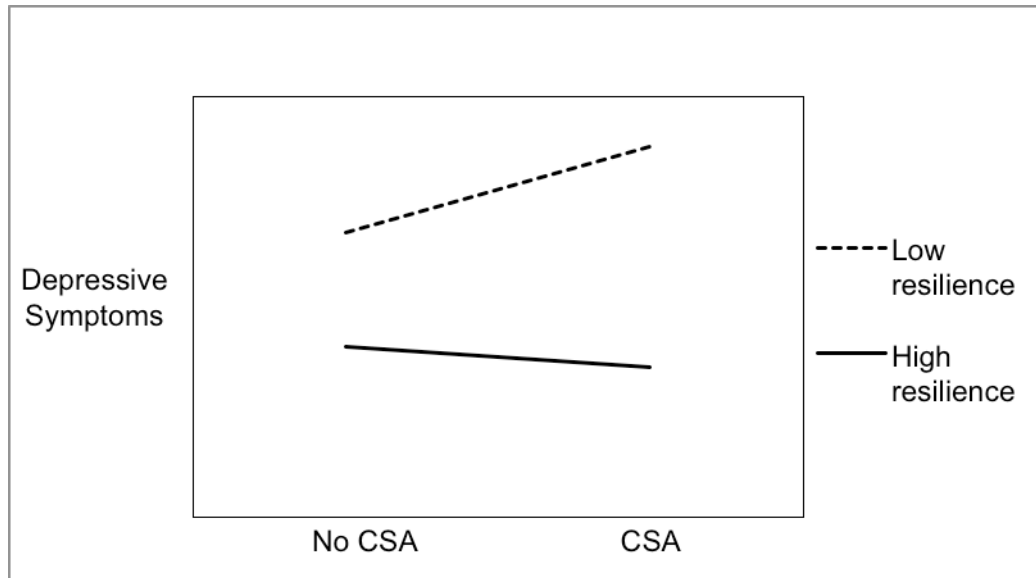
		<i>Mean (SD)</i>		<i>t (p)/χ²</i>
Age	45.23(8.43)	45.74(8.38)	44.14(8.50)	-1.25 (<i>p</i> = .21)
Childhood Sexual Abuse	54(26.7)	41(29.7)	13(20.3)	χ ² (1, N =198) = 2.05, <i>p</i> = .15
Resilience (CD-RISC)	29.14(7.55)	28.82(7.8)	29.84(7.01)	.93 (<i>p</i> = .35)
Depressive Symptoms (CES-D)	12.65(10.58)	13.28(10.83)	11.28(9.96)	-1.29 (<i>p</i> = .20)
Quality of Life (HRQOL)	67.24(20.76)	64.05(20.68)	76.71(18.14)	3.77(<i>p</i> =.001)

Table 2.2 *Partial correlations between sociodemographic variables and outcomes controlling for HIV status*

Variable	1	2	3	4	5
1. Age					
2. Education Level	.02				
3. Employment Status	-.18*	.31***			
4. Annual Household Income	.05	.31***	.39***		
5. WIHS Enrollment Wave	-.25***	.00	-.01	-.11	
6. Childhood Sexual Abuse (CSA)	.24**	.16*	.02	.06	-.36***
7. Resilience (CD-RISC)	.002	.21**	.24**	.16*	-.09
8. Quality of Life (HRQOL)	-.25**	.10	.24**	.12	.06
9. Depressive Symptoms (CES-D)	.03	-.27***	-.18*	-.26***	.13

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 2.1 *Resilience moderates the relationship between childhood sexual abuse and depressive symptoms*



Note: CSA= Childhood sexual abuse.

CHAPTER THREE

Study #2: Abuse and Resilience in Women with HIV

in Relation to HAART Medication Adherence and HIV Viral Load

Introduction

In a sample of HIV infected women, study 2 investigated whether resilience related to HIV health outcomes (disease progression i.e. detectable viral load and CD4+ cell count) and highly active antiretroviral therapy (HAART) adherence and also moderated the relationships of abuse history with HIV medication adherence and HIV biomarkers (viral load and CD4+ cell count). A secondary aim was to also investigate if the relationships between resilience and HAART adherence and resilience and HIV biomarkers were mediated by depressive symptoms. With access to HAART in the US, HIV is a manageable chronic illness, however a high rate of adherence (i.e. 95% or greater) is necessary to suppress HIV viral load and boost immune response via CD4 cell counts (Garcia de Olalla et al., 2002; Palella et al., 1998; Paterson et al., 2000; Wood et al., 2004). Unfortunately most HIV+ individuals are adhering at a rate lower than 95% in the US (Golin et al., 2002; Mannheimer et al., 2002), which can have deleterious outcomes, including the development of drug resistant strains of HIV (Lucas, 2005; Richman et al., 2004; Wainberg & Friedland, 1998). Prevalent histories of abuse and depression among women with HIV have been

linked to HIV medication nonadherence, antiretroviral failure and increased mortality (Arriola, Loudon, Doldren, & Fortenberry, 2005; Cohen et al., 2004; Cohen et al., 2002; Keuroghlian et al., 2011; Leserman et al., 2007; Machtinger, Haberer, et al., 2012; Meade, Hansen, Kochman, & Sikkema, 2009).

As indicated by study 1, resilience may be protective against negative health outcomes and related to lower depressive symptoms and higher health-related quality of life in both women with and at risk for HIV. Study 2 expands on the results of study 1 by exploring resilience and abuse in relation to HIV disease markers and HAART adherence in women with HIV, as well as whether these relationships are mediated by depressive symptoms. No previous literature has reported a link between resilience and HAART adherence or HIV disease markers, but a limited number of studies have reported that positive coping strategies (e.g. meaning making and conscientiousness) are related to better HAART adherence and disease markers (Ickovics et al., 2006; O'Cleirigh et al., 2007). In contrast, depression is associated with nonadherence to HAART and mortality (Ickovics et al., 2001; Leserman et al., 2007) among women with HIV. These studies suggest that resilience has the potential to relate to better medication adherence and HIV disease markers and possibly buffer the negative influence of abuse histories on medication adherence and HIV disease markers; and that these relationships may be mediated by depressive symptoms.

The present study hypothesized that (1) sexual abuse, physical abuse, and domestic violence histories would relate to lower HAART medication adherence, detectable viral loads, CD4+ cell count below 200 and higher depressive symptoms (2) women scoring high on resilience compared to women scoring low on resilience would have higher medication adherence, undetectable viral loads, and CD4+ cell count above 200 (3) depressive symptoms would relate to lower resilience, lower HAART medication adherence, detectable viral loads, and CD4+ cell count below 200 (4) depressive symptoms would mediate the relationships between resilience and HAART medication adherence, undetectable viral loads, and CD4+ cell count above 200 and (5) resilience would moderate the relationships between sexual abuse, physical abuse and domestic violence histories and medication adherence, detectable viral load, and lower CD4+ cell count, such that abuse histories would predict poor health outcomes (e.g. lower medication adherence, detectable viral loads, and CD4+ cell count below 200) only for women scoring low on resilience, but not for women scoring high on resilience. This study also explored whether sexual abuse, physical abuse, domestic violence, and abuse composite scores directly related to resilience scores.

Methods

Participants and Procedure

During 2011 and 2012 138 HIV+ women at the Chicago CORE center site of the Women's Interagency HIV Study (WIHS) from three enrollment waves (wave 1: 1994 – 1995, n= 38; wave 2: 2001-2002, n= 57; and wave 3: 2011-2012, n= 43) were approached and participated in this study. Demographics of the sample are presented in the Results section below. Chicago WIHS is one of six WIHS sites in the United States. WIHS is a prospective cohort study designed to better understand HIV disease in women. The study methodology has previously been reported (Bacon et al., 2005; Barkan et al., 1998). In brief, women are seen every six months for study visits which include a questionnaire on sociodemographics (e.g. substance use and employment), short physical exam and collection of blood and gynecological specimens. Women were given transportation support, childcare, and a financial honorarium of \$25 for their time and effort. The study protocol was approved by Institutional Review Boards of Boston University and John H. Stroger Jr Hospital of Cook County as well as the WIHS Executive Committee.

Measures

Sexual Abuse, Physical Abuse and Domestic Violence Histories. To assess for recent sexual abuse women were asked “Since your (MONTH) study visit, has anyone pressured or forced you to have sexual contact? By sexual

contact I mean them touching your sexual parts, you touching their sexual parts or sexual intercourse?” For recent physical abuse women were asked “Since your (MONTH) study visit, have you experienced serious physical violence (physical harm by another person)? By that I mean were you ever hurt by a person using an object or were you ever slapped, hit, punched, kicked?” To gather information on women’s experience of recent domestic violence, a total of seven questions were asked such as “Since your (MONTH) study visit, has a current or previous partner threatened to hurt or kill you?” and “Since your (MONTH) study visit, has a current or previous partner prevented you from seeing friends?” Women were asked these questions at their baseline visit to capture any prior adult or childhood experience of sexual abuse, physical abuse and domestic violence and then again each year over the course of their enrollment in WIHS (range 1-18 years). Baseline questions began with “at any time in your life” instead of “since your (MONTH) study visit.” To gather information on childhood sexual abuse at baseline women were also asked the follow-up question “How old were you when this first happened?” and below age 18 years was coded as childhood sexual abuse. Summary variables were created to capture any history of sexual abuse, physical abuse, or domestic violence (0=no reported history, 1=history of abuse report) as well as an abuse composite score summing all three types of abuses (0=no reported history of abuse, 1= one abuse, 2=two abuses, 3=three abuses).

Substance abuse. At the study visit data was gathered for participants' self-report use of alcohol and illicit drugs (intravenous drugs, crack, cocaine, and heroin) based on the National Institute on Alcohol Abuse and Alcohol (NIAAA) criteria for heavy alcohol drinking in women (four or more standard drinks in a day) and the National Institute on Drug Abuse (NIDA) recommendations for the measurement of illicit drug use. Two categories were created for substance abuse variables: (1) current or former and (2) no current or no former use.

Connor-Davidson Resilience Scale -10 item (Campbell-Sills & Stein, 2007). The 10-item CD-RISC is an abbreviated and more reliable version of the original 25-item CD-RISC (Connor & Davidson, 2003). The scale captures personality traits and adaptive coping strategies that enhance an individual's ability to strive despite adversity via items such as "I believe I can achieve my goals, even if there are obstacles" and "I am not easily discouraged by failure." Respondents rate the 10 items on a scale from 0 (not true at all) to 4 (true nearly all the time) and total scores range from 0 to 40 with higher scores reflecting greater resilience. The CD-RISC-10 has demonstrated good internal consistency (Cronbach's α coefficient = .85) and construct validity, with CD-RISC scores moderating the relationship between childhood maltreatment, trauma exposure, and psychiatric symptoms in the general population (Campbell-Sills & Stein, 2007). In the current sample the Cronbach's alpha reliability coefficient was .91.

HAART adherence. Women were asked how often they took their HAART medication as prescribed during the 6 months before the current study visit. Each woman was asked to bring in her medication bottles or a list from the pharmacy or physician or to identify the medications from the picture cards provided by WIHS staff. She was then asked to specifically recall her adherence to each drug of her current HAART regimen by pinpointing on a response card (showing percentages from 0-100%) her best guess at the percentage of the specific pills she took. These self-report adherence measures have been found to have reliable concurrent and predictive validity with measures of disease progression including viral load and CD4 count (Lazo et al., 2007; Nieuwkerk & Oort, 2005; T. E. Wilson et al., 2002). Using similar measures Paterson, Swindells, and Mohr (2000) found that HIV disease progression is significantly inhibited with reported HAART adherence greater than or equal to 95%. A categorical variable was created from our measure of adherence with 1= adherence rate \geq 95% and 0= less than 95% adherence or not taking HAART although HAART was medically indicated at the current or previous visit based on a CD4+ cell count below 500.

HIV disease progression. Semi-annual immunologic disease progression was assessed by CD4+ cell counts, and virologic disease progression was assessed by HIV RNA load, given in copies per milliliter of blood. AIDS Clinical Trials Group (ACTG) certified laboratories measured CD4+ cells/mm³ by

immunofluorescence using flow cytometry; and in laboratories participating in the National Institutes of Health Viral Quality Assurance Program, HIV-1 RNA levels were assessed using an isothermal nucleic acid sequence–based amplification (NASBA/Nuclisens) method, which has a detection limit of 20 copies/mL.

Consistent with the CD4+ cell count below 200 meeting criteria for the definition for AIDS (Centers for Disease Control and Prevention, 1992), we used a categorical CD4+ cell count cut-off of 200 in our analyses. Viral load was dichotomized as undetectable (< 20 copies/ml) and detectable (\geq 20 copies/ml).

Center for Epidemiological Studies Depression Scale (CES-D Scale)(Radloff, 1977). The CES-D is a widely used self-report measure of current affective depressive symptoms, which was previously described in the Methods section of study 1.

Statistical Analyses

SPSS version 19.0 was used to analyze the data with Pearson correlations, independent samples t-test, and hierarchical multiple linear regressions. Participants' CD-RISC resilience scores were analyzed in relation to sexual abuse, physical abuse, domestic violence, composite abuse variable, depressive symptoms, HAART adherence, detectable viral load, and CD4+ cell count with a cutoff of 200. A few participants were missing data on some measures. One participant was missing data on sexual abuse history and 9

participants did not have HAART adherence data because they were not medically indicated to be on HAART. Missing items were treated as missing in all data analyses.

Results

Eight-seven percent of the sample of 138 HIV+ women self-identified as African American, 28% completed high school and 24% attended some college. Of the 138 women 55% percent reported adult and/or childhood sexual abuse, 75% reported physical abuse, 62% reported a history of domestic violence, and 42% reported a history of all three type of abuse. A history of substance use was also prevalent in our sample: heavy drinking (current=26.8%; former=26.1%), crack/cocaine/ heroin (current=16.7%; former=51.4%), and intravenous drug use (current=1.4%; former=29%). Mean CD-RISC resilience score was 28.82 (7.8) and 27.5% of women were nonadherent to HAART (<95%). Table 1 displays descriptive statistics for the study's predictor and outcome variables as well as the sample socio-demographics.

Insert Table 1 about here

Preliminary Analyses

Pearson correlations as displayed in Table 2 showed that age, income, education, enrollment wave, and substance use each significantly related to

some predictors and/or outcomes and consequently were included as covariates in regression analyses. Bivariate correlations also indicated that >95% HAART adherence significantly related to undetectable viral load ($r = -.46, p = .001$) and CD4+ count above 200 ($r = .18, p = .05$); and undetectable viral load was significantly associated with CD4+ count above 200 ($r = -.18, p = .05$). A history of sexual abuse was significantly related to physical abuse ($r = .40, p = .001$) and domestic violence ($r = .42, p = .001$) and physical abuse and domestic violence were significantly associated with each other ($r = .42, p = .001$).

Insert Table 2 about here

Hypothesis 1: Relationships between abuse histories, HAART adherence, HIV disease markers, and Depressive Symptoms

To test the hypothesis that abuse histories would relate to lower medication adherence, detectable viral loads, CD4+ cell count below 200, and higher depressive symptoms hierarchical multiple linear regressions were run while controlling for age, education, employment, income, wave, and substance use. Covariates were entered in block 1; sexual abuse, physical abuse, domestic violence or abuse composite score were entered separately, each in an independent regression, as a main effect in block 2, and outcomes were HAART adherence, detectable viral load, CD4 cutoff of 200, and depressive symptoms

with each outcome also tested in independent regressions. Results indicated that a history of domestic violence approached significance in associating with lower HAART adherence ($\beta = -.15$, $t = -1.82$, $p = .07$), but there were no significant relationships between sexual or physical abuse and abuse composite score with HAART adherence, HIV disease markers, or depressive symptoms.

Exploratory Hypothesis: Relationships between abuse histories and resilience

Hierarchical multiple linear regressions were used to explore the relationships between sexual abuse, physical abuse, domestic violence, abuse composite score and resilience while controlling for age, education, employment, income, wave, and substance use. Covariates were entered in block 1, sexual abuse, physical abuse, domestic violence or abuse composite score were entered separately, each in an independent regression, as a main effect in block 2, and resilience was the outcome. None of the abuse variables significantly related to resilience.

Hypothesis 2: Relationships between resilience, HAART adherence, and HIV disease markers

Hierarchical multiple linear regressions were run to test the hypothesis that women scoring high on resilience compared to women scoring low on resilience would have higher medication adherence, undetectable viral loads,

and CD4+ cell count above 200 while controlling for age, education, employment, income, wave, and substance use. Covariates were entered in block 1, resilience was entered as a main effect in block 2, and outcomes were HAART adherence, CD4+ cutoff at 200, and detectable viral load. Findings showed that resilience was significantly negatively related to detectable viral load ($\beta = -.22$, $t = -2.45$, $p = .02$) and approached significance in positively relating to HAART adherence ($\beta = .14$, $t = 1.68$, $p = .10$) indicating that higher resilience scores tended to relate to better medication adherence and significantly related to having undetectable viral load.

Based on these findings Stata 11.0 was used to run a mediation analysis to test whether HAART adherence mediated any portion of the relationship between resilience and undetectable viral load and to determine the size and significance of the direct and indirect effects with bootstrap analyses. In the command, resilience was the predictor, detectable viral load was the outcome, HAART adherence was the mediator and covariates were income, education, employment, age, wave, and substance use. Results indicated that the indirect effect from resilience through HAART adherence to undetectable viral load was not significant, indicating that the relationship between resilience and undetectable viral load was not significantly mediated by adherence to HAART.

Hypothesis 3: Relationships between Depressive Symptoms, Resilience, HAART adherence, and HIV disease markers

To test the hypothesis that depressive symptoms would relate to lower resilience, lower HAART medication adherence, detectable viral loads, and CD4+ cell count below 200, hierarchical multiple regressions were conducted.

Covariates of age, education, employment, income, wave, and substance use were entered in block 1, depressive symptoms were entered as a main effect in block 2, and outcomes were resilience, HAART medication adherence, CD4+ cutoff at 200, and detectable viral load. Results indicated that higher depressive symptoms were significantly related to lower resilience ($\beta = -.49$ $t = -6.21$, $p = .001$) and lower HAART adherence ($\beta = -.19$ $t = -2.24$, $p = .03$), but were not related to detectable viral load or CD4+ cutoff at 200.

Hypothesis 4: Depressive symptoms mediating relationships of resilience with HAART adherence and HIV disease markers

According to Holmbeck (1998) three conditions need to be satisfied to suggest mediation: (1) predictor (resilience) significantly relates to the outcome (2) predictor significantly relates to the mediator (depressive symptoms) and (3) mediator significantly relates to the outcome. Findings above noted that resilience significantly related to undetectable viral load and showed a trend of relating to higher HAART medication adherence, but did not relate to CD4+ cell count. In study 1 resilience significantly related to lower depressive symptoms

and in the present study that was comprised of the subsample of HIV+ women from study 1, resilience and depression were significantly related. In the present study, depressive symptoms significantly related to lower HAART medication adherence, but did not significantly relate to detectable viral load or CD4 cell count. Thus, the results on which to base mediational analyses were somewhat satisfied to test the hypothesis that depressive symptoms would mediate the relationship between resilience and HAART medication adherence. To investigate whether depressive symptoms mediated the relationships between resilience and HAART medication adherence Stata 11.0 was used to run a mediation analysis that provided the size and significance of the direct and indirect effects with bootstrap analyses. In the command, resilience was the predictor, HAART adherence was the outcome, depressive symptoms were the mediator and the covariates were income, education, employment, age, wave, and substance use. Results indicated that the indirect effect from resilience through depressive symptoms to HAART adherence was not significant, indicating that the relationship between resilience and HAART adherence was not mediated by depressive symptoms.

Hypothesis 5: Resilience moderating relationships of abuse histories with HAART adherence and HIV disease markers

Analyses were conducted to test if resilience would moderate the relationships between sexual abuse, physical abuse and domestic violence

histories and medication adherence, detectable viral load, and lower CD4+ cell count, such that abuse histories would predict poor health outcomes (e.g. lower medication adherence, detectable viral loads, and CD4+ cell count below 200) only for women scoring low on resilience, but not for women scoring high on resilience. Two-way dummy interaction terms were created by multiplying standardized scores of abuse histories (sexual abuse, physical abuse, domestic violence or abuse composite score) and standardized resilience scores.

Hierarchical multiple linear regressions included the covariates: age, income, education, employment, wave, and substance use entered in block 1; abuse histories (each in independent regressions) and resilience entered as main effects in block 2, and the dummy variables representing the interaction of resilience with abuse histories entered in block 3. The outcome variables of HAART adherence, detectable viral load, and CD4 cutoff of 200 were tested in independent regressions. Results indicated that the interactions between resilience and sexual abuse ($\beta = .22, t = 2.65, p = .009$) and resilience and abuse composite score ($\beta = .19, t = 2.29, p = .03$) significantly related to HAART adherence, but did not significantly relate to detectable viral load and CD4 cutoff of 200. The interactions between resilience and physical abuse or domestic violence did not significantly relate to CD4 cutoff of 200, detectable viral load, and HAART adherence.

Follow-up regression analyses were done to explore the meanings of the significant interactions (i.e. resilience and sexual abuse and resilience and abuse composite score) to investigate how resilience moderated the relationships between sexual abuse history and HAART adherence, and between abuse composite score and HAART adherence. Based on Holmbeck's methods (1998, 2002), high and low resilience scores were separated into two groups (high: 1 SD above the mean, N= 27; low: 1 SD below the mean, N = 29) and post hoc regressions were run separately for each group with covariates of age, income, education, employment, wave, and substance use entered in block 1, sexual abuse or abuse composite score entered in independent regressions as the main effects in block 2, and HAART adherence as the outcome. For the low resilience score group, sexual abuse significantly related to lower HAART adherence ($\beta = -.39$, $t = -2.64$, $p = .02$), but for the high resilience score group sexual abuse did not relate to HAART adherence. Similarly, higher abuse composite score significantly related to lower HAART adherence only for women reporting low resilience ($\beta = -.35$, $t = -2.43$, $p = .03$), but not for women reporting high resilience.

Insert Figure 1 about here

Discussion

Several of our major hypotheses were confirmed showing that resilience is an important factor that may place women with HIV “at promise” for better HIV health outcomes. A higher resilience score was significantly related to having undetectable viral load and approached significance in relating to HAART adherence $\geq 95\%$, indicating that HIV infected women who scored higher on resilience are more likely to have undetectable viral loads and tended to be more likely to report taking their medications at a rate that has been shown to effectively suppress the virus.

Resilience also significantly moderated relationships between sexual and overall abuse histories with HAART adherence. For women with HIV, having a history of sexual abuse or multiple abuses in combination with low resilience predicted low HAART medication adherence ($< 95\%$), but in combination with high resilience, sexual abuse did not predict HAART adherence. This speaks to the potential power of resilience in promoting HAART adherence for women with HIV who have histories of sexual abuse.

A history of domestic violence approached significance in relating to lower medication adherence. This relationship is consistent with previous literature noting that abuse/trauma is associated with HIV medication nonadherence (Mardge H. Cohen et al., 2004). Perhaps due to our somewhat small sample size the relationship between domestic violence and HAART adherence only

approached significance and we did not find significant direct associations between history of sexual or physical abuse with HAART adherence, detectable viral load, and CD4 cutoff of 200. Similarly, we did not detect any direct associations between sexual or physical abuse histories and resilience, as consistent with previous literature in which associations between resilience and abuse histories have been rare (Campbell-Sills & Stein, 2007; Scali et al., 2012; Wingo et al., 2010). Experiencing abuse alone does not guarantee that one will develop adaptive coping strategies and personal qualities; in fact many survivors have negative outcomes. However, having or developing such qualities and strategies is what defines resilience as measured by the CD-RISC. Therefore it is not surprising that abuse histories did not directly relate to resilience scores.

Surprisingly depressive symptoms were also not significantly associated with any abuse histories, which is in contrast to previous literature (Boudewyn & Liem, 1995; Hegarty, Gunn, Chondros, & Small, 2004). In accordance with existing literature, higher depressive symptoms significantly related to lower HAART medication adherence (Ickovics et al., 2001; Leserman et al., 2007). However, depressive symptoms did not mediate the relationship between resilience and HAART adherence suggesting that the path by which resilience may relate to better medication adherence is not through its influence on lowering depressive symptoms.

Our overall findings support the argument that in women with HIV, abuse histories may relate to poor HAART adherence and HIV disease markers only in the presence of low resilience scores. Findings were limited by a cross-sectional study design, but suggest that intervention efforts aimed at promoting better health outcomes for women with HIV should incorporate aspects that target resilience (e.g., encouraging women to view stressors and challenges as things they can overcome). Interventions that have targeted resilience have provided some evidence for feasibility and effectiveness (Steinhardt, Mamerow, Brown, & Jolly, 2009; Steinhardt & Dolbier, 2008). For instance, a resilience intervention by Steinhardt and colleagues (2008) with college students consisted of sessions highlighting responses to stress (e.g., stepping up versus giving up), problem-focused coping (e.g., active planning), recognizing one's power to make decisions and influence situations, making empowering and adaptive interpretations of situations, and having meaningful relationships with others. Authors found that this intervention increased resilience scores (on the CD-RISC and Dispositional Resilience Scale), increased effective coping strategies (e.g. problem solving), and decreased perceived stress, negative affect, and depressive symptoms. Future studies are needed among women with HIV to investigate changes in resilience over time in relation to their health outcomes and develop interventions to improve women's resilience.

Table 3.1 *Sample characteristics and socio-demographic statistics of 138 participants.*

Characteristics	Mean (SD)
Age	45.74 (8.38)
Resilience (CD-RISC)	28.82 (7.8)
	<i>n (%)</i>
Domestic Violence	86 (62.3)
Physical Abuse	104 (75.4)
Sexual Abuse	76 (55.1)
Abuse composite (all 3 abuses)	58 (42)
ART adherence (<95%)	38 (27.5)
Detectable viral load (≥ 20 copies/ml)	50 (36.2)
Below CD4 cutoff of 200	21 (15.2)
Depressive Symptoms (CES-D)	13.28 (10.83)
Race	
White / non-Hispanic	6 (4.3)
White / Hispanic	6 (4.3)
African-American / non- Hispanic	120 (87)
African-American / Hispanic	1 (.7)
Other / Hispanic	2 (1.4)
Asian / Pacific Islander	1 (.7)
Native American / Alaskan	1 (.7)
Other	1 (.7)
Education	
Grade 11 or less	60 (43.4)
Completed high school	38 (27.5)
Some college	33 (23.9)
Completed college	5 (3.6)
Attended/completed graduate school	2 (1.4)
Income	
\$6,000 or less	30 (21.7)
\$6,001-\$12,000	64 (46.4)
\$12,001 or more	42 (30.4)
Employed	25 (18.1)
Marital Status	

Legally/common- law marriage	20 (14.5)
Not married but living w partner	9 (6.5)
Widowed	12 (8.7)
Divorced/Annulled	21 (15.2)
Separated	15 (10.9)
Never married	60 (43.5)

Table 3.2 *Pearson's correlations between sociodemographic variables, abuse, HIV disease markers, and depressive symptoms.*

Variable	1	2	3	4	5	6	7	8
1. Age								
2. Education Level	.03							
3. Employment Status	-.21*	.25**						
4. Annual Household Income	.01	.26**	.26**					
5. WIHS Enrollment Wave	-.40***	.01	.05	-.04				
6. Alcohol (heavy drinking)	.05	-.03	.07	.03	-.16			
7. Crack/Cocaine/Heroin	.22**	-.16	-.23**	-.17	.03	.15		
8. Intravenous Drug Use	.44***	-.01	-.23**	-.18*	-.26**	.19*	.40***	
9. Resilience (CD-RISC)	.05	.16	.15	.13	-.15	.07	-.27**	-.02
10. Domestic Violence	.08	-.06	.02	-.08	-.24**	.10	.18*	.08
11. Physical Abuse	.16	.01	-.08	-.03	-.13	.06	.27**	.10
12. Sexual Abuse	.23**	.08	.08	.005	-.12	.11	.23**	.33***
13. Abuse Composite	.19*	.02	.01	-.04	-.21*	.12	.29**	.22*
14. HAART adherence	.32***	.05	.06	-.003	.07	-.22*	-.03	.13
15. Detectable viral load	-.21*	-.13	-.08	-.007	.02	.15	-.01	-.03
16. CD4 cutoff of 200	-.003	.08	-.01	.17	.02	-.03	-.15	.03
17. Depressive Symptoms (CES-D)	-.02	-.23**	-.07	-.22*	.17*	.03	.25**	.07

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 3.1 *Regression lines for associations between abuse composite and HAART adherence as moderated by resilience.*



Note: HAART= Highly active antiretroviral therapy. Low/high abuse refers to low/high abuse composite score summing all three types of abuses.

CHAPTER FOUR

Study #3: Resilience, Stress Hormones, and Coronary Heart Disease Risk Among Women with HIV

Introduction

Death in HIV infected persons is now increasingly due to non HIV-related causes such as coronary heart disease (CHD; (Sackoff, Hanna, Pfeiffer, & Torian, 2006). There is a high prevalence of abuse histories among women with HIV (Machtiger, Wilson, et al., 2012) and abuse has been associated with increased risk of heart disease, which is not surprising given that some consequences of abuse (e.g. obesity and substance use) are also linked to heart disease (Dong et al., 2004; Kendall-Tackett, 2002). The pathway by which abuse results in negative physical consequences such as CHD is theorized to be partially connected to activity in the hypothalamic-pituitary-adrenal (HPA) axis, including the regulation of the stress hormones cortisol and norepinephrine (Hulme, 2011; Jokinen & Nordstrom, 2009; Midei et al., 2013).

Cortisol and norepinephrine are neurotransmitters that play a key role in the body's biological and behavioral response to stress and they may become dysregulated among individuals exposed to trauma/abuse (Mangold, Wand, Javors, & Mintz, 2010). Dysregulation has been defined as abnormal total levels, or abnormal response levels) and dysregulated levels of cortisol and norepinephrine have shown significant associations with heart disease risk (Cole,

Korin, Fahey, & Zack, 1998; Cole et al., 2001; Cole et al., 2003), although previous literature is inconsistent and unclear about whether it is higher or lower levels of NE and cortisol that is related to CHD risk (Ji, Guo, Yan, Li, & Lu, 2010; Jokinen & Nordstrom, 2009; Makheja, Bloom, Muesing, Simon, & Bailey, 1989; Straub et al., 2002; Thomas & Marks, 1978).

Despite histories of abuse, women with HIV may be resilient (function adaptively in the face of or following adversity) and develop positive self-esteem (Singleton, 2004; Smith et al., 2005). Their resilience and positive self-esteem may be linked to lower risk for heart disease. Only a few investigators have studied resilience (or hardiness) in relation to heart disease risk (and risk factors) and no published studies have investigated bidirectional relationships between self-esteem and heart disease risk. However, the scant literature does suggest that resilience and positive self-esteem may relate to lower CHD risk (Bartone et al., 2009; M. Cohen et al., 2007; Kasl & Cobb, 1995).

Resilience and positive self-esteem may also be associated with levels of cortisol and NE, which have been linked to heart disease (Cicchetti & Rogosch, 2007; Pruessner et al., 2004; Scarpa & Luscher, 2002; Seeman et al., 1995). However, the current literature investigating associations between psychological factors such as resilience and PSE with stress hormones is minimal. A few studies found that higher self-esteem was associated with lower levels of cortisol (Pruessner et al., 2004; Scarpa & Luscher, 2002; Seeman et al., 1995); and

higher resilience was associated with higher cortisol levels in physically abused children and lower morning cortisol levels in nonmaltreated children (Cicchetti & Rogosch, 2007).

Study 1 reported that resilience was significantly and inversely associated with depression. Further, depression is a noted consequence of abuse histories (Boudewyn & Liem, 1995; Hegarty et al., 2004) and individuals with depression have also shown dysregulated levels of cortisol and norepinephrine (Butler, Hokanson, & Flynn, 1994; Franck & De Raedt, 2007). Studies have also reported a link between depression and increased heart disease risk (Khawaja et al., 2009). Thus, depressive symptoms may be a potential mediator of relationships between resilience, stress hormones and CHD risk.

Present Study

The present study investigated the relationships among resilience, positive self-esteem, abuse histories, levels of stress hormones (i.e. norepinephrine and cortisol) and coronary heart disease (CHD) among women with HIV. We hypothesized that (1) abuse histories would be associated with higher CHD risk; (2) resilience and positive self-esteem would be negatively associated with (a) abuse histories and (b) CHD risk, (3) higher depressive symptoms would be associated with abuse histories, lower resilience, lower positive self-esteem, and higher CHD risk, and (4) depressive symptoms would mediate relationships between resilience, positive self-esteem, and abuse histories with CHD risk.

Further, additional exploratory questions involved investigating whether total levels of NE and cortisol as well as NE/cortisol ratio were significantly associated with CHD risk, abuse histories, resilience, positive self-esteem, and depressive symptoms. The predicted directions were unspecified due to inconsistencies in previous literature. The present study also explored whether depressive symptoms mediated any relationships between stress hormones and resilience, positive self-esteem, abuse histories, and CHD risk.

Methods

Participants and Procedure

At the Chicago CORE center site of the Women's Interagency HIV Study (WIHS) 53 HIV+ women were recruited for participation in the current study during 2012. They were part of three WIHS enrollment waves (recruited 1994-1995, 2001-2002 and 2011-2012). Barkan (1998) and Bacon and colleagues (2005) previously described study methods and baseline characteristics of WIHS participants. Characteristics of the current sample were also described in studies 1 and 2 and further below in the Results section. Women were given informed consent forms before participation in the study and were provided with transportation support, childcare, and a financial honorarium of \$25 for their time and effort. The study protocol was approved by Institutional Review Boards of Boston University and John H. Stroger Jr Hospital of Cook County as well as the WIHS Executive Committee.

Measures

Domestic Violence, Physical Abuse, and Sexual Abuse Histories.

Women were asked questions to capture any prior adult or childhood experience of sexual abuse, physical abuse and domestic violence at their baseline visit and then again each year over the course of their enrollment in WIHS (range 1-17 years). Baseline questions began with “at any time in your life” and at annual study visits questions began with “since your (MONTH) study visit”. To assess for physical abuse, women were asked “Since your (MONTH) study visit, have you experienced serious physical violence (physical harm by another person)? By that I mean were you ever hurt by a person using an object or were you ever slapped, hit, punched, kicked?” To gather information on sexual abuse, women were asked “Since your (MONTH) study visit, has anyone pressured or forced you to have sexual contact? By sexual contact I mean them touching your sexual parts, you touching their sexual parts or sexual intercourse.” To obtain information on childhood sexual abuse, at baseline women were also asked the follow-up question, “How old were you when this first happened?” Childhood sexual abuse was coded as sexual abuse that occurred before age 18 years. For data on domestic violence, a total of seven questions were asked, such as “Since your (MONTH) study visit, has a current or previous partner threatened to hurt or kill you?” and “Since your (MONTH) study visit, has a current or previous prevented you from seeing friends?.” Summary variables were created to capture

the proportions of visits for which women reported current physical abuse, sexual abuse, domestic violence, and any abuse (physical, sexual, or domestic violence). These proportions were created based on the number of visits over a 18-year period in which women reported each type of abuse divided by the total number of visits.

Connor-Davidson Resilience Scale -10 item (Campbell-Sills & Stein, 2007). The 10-item CD-RISC captures adaptive coping strategies and personality traits that help an individual to strive in the face of or following adversity. Items include, “ I am not easily discouraged by failure” and “ I believe I can achieve my goals, even if there are obstacles ”. Respondents rate items on a scale from 0 (not true at all) to 4 (true nearly all the time). Higher scores reflect greater resilience and total scores on the scale range from 0 to 40. The CD-RISC 10 is an abbreviated and more stable version of the original 25 item CD RISC (Connor & Davidson, 2003) that has demonstrated good internal consistency (Cronbach’s α coefficient = .85) and construct validity. For instance, CD-RISC scores moderated the relationships between trauma exposure, childhood maltreatment, and psychiatric symptoms in the general population (Campbell-Sills & Stein, 2007). The Cronbach’s alpha reliability coefficient was .91 in the current sample.

Guided Autobiography Task and Qualitative Coding of Positive Self-esteem. The Guided Autobiography task has been used extensively in previous research (D. P. McAdams et al., 2006). The task requires women to tell

narratives about three key self-defining memories in the past 15 years that they considered to be turning points in their lives. The participants were asked to describe what happened in the event; when it happened; who was involved; and what they were thinking and feeling during the event. Positive self-esteem was defined as “an expression of positive attitudes, beliefs and/or insights about oneself including (but not limited to) personality, abilities, and accomplishments”. One word was the smallest unit of text that could be coded for positive self-esteem (yes or no), but several words and/or sentences were often coded. For example, two participants were coded for positive self-esteem when they said “Me being one them really strong black woman” and “I just felt like I had a very nice personality”. The presence (scored 1) or absence (scored 0) of positive self-esteem was made on the basis of coding across all three narratives provided by each participant. Coders were a fifth year PhD candidate in clinical psychology and an advanced undergraduate psychology student whose codes demonstrated moderate reliability for 34 participants using Pearson correlations ($r=.51$, $p < .01$). Coping strategies coded from narratives have been found to be sensitive to ethnic and cultural values and have been used in previous research with African American, Asian American, and low-income women (D. McAdams, 2006; D. P. McAdams et al., 2006; Wang & Conway, 2004).

Coronary Heart Disease (CHD) risk measures. The composite 10 year Framingham CHD Risk score was used to assess overall CHD risk. The

Framingham Risk Score (FRS) (Wilson et al., 1998) is the gold standard for composite scoring methodology in cardiovascular research (Kannel & McGee, 1987). Studies have found the FRS to be highly sensitive in predicting a diagnosis of coronary heart disease with sensitivity scores averaging around 90% and specificity scores around 30% (Ketola, Laatikainen, & Vartiainen, 2009). There is also documentation of construct validity and predictive validity (Di Bari et al., 2004) in that FRS was able to accurately identify heart failure participants who had significantly greater abnormalities in cardiac structure and function (i.e. higher left ventricular mass index, lower ejection fraction, and higher left atrium systolic dimension) in comparison to non heart failure participants with significantly less abnormalities. FRS was also predictive of a higher heart failure related hospital admissions at follow-up. The FRS has been widely used in various populations including low-income, ethnic minority women (Matthews et al., 2005) as well as HIV positive populations (Knobel et al., 2007). The FRS composite score includes measures of systolic blood pressure, diastolic blood pressure, total blood cholesterol, high-density lipoprotein cholesterol, age, diabetes, and smoking. These measures were collected via blood specimens and medical exams in the current visit.

Collection of Urinary Cortisol and Norepinephrine. Cortisol and NE were assayed in urine that was collected in a 15-hour overnight period. To control for possible effects of menstrual cycle on hormone levels, urine collection

was done during the mid-follicular phase (5-10 days following first day of menses) of cycling women's menstruation cycle and at any time for post-menopausal women. Participants collected 15-hour overnight urine (random pooled sample) between 6pm and 9am or until their first morning void. A 15-hour overnight collection (6pm-9am) was chosen instead of a 24-hour collection because prior studies have reported better compliance with a 15-hour overnight urine collection. Night-time has been noted as the period most sensitive to chronic stress, and removes the confounding impact of activities such as work (Mellman, Kumar, Kulick-Bell, Kumar, & Nolan, 1995).

Participants were given a) one 3-liter urine collection bottle that contained 1 g of sodium metabisulfite preservative, b) an insulated grocery bag to be used for storing and transporting the urine, c) a plastic measuring cup that was used for urine collection and for easy pouring of urine into a collection bottle, d) a black marker to document urine collection start and end times, and e) a "reminder" posting that was placed on the toilet they used during the collection period. Participants were also asked to refrain for 12 hours prior to the evening urine collection from any intake of nicotine, alcohol, caffeine and diuretics. Participants delivered the urine collection to the clinic the morning of collection. The study research staff collected the urine, recorded the volume and refrigerated the urine until routine specimen collection by Rush Medical University labs in Chicago, IL the same or next day. Research staff also administered a questionnaire to collect

data on any medications taken (e.g. antidepressants, beta blockers, estrogen, diuretics, insulin, sedatives, pain medications, eye drops and nasal spray), substances used (e.g. alcohol, marijuana, crack, cocaine, and heroin), smoking (i.e. tobacco and cigarettes) and drinking of tea or coffee during collection. At Rush University Medical lab urine was spun and aliquots for stress hormones were acidified to a pH of 3 and frozen at 80°C (Freer, 1996) until shipped and assayed by Quest Nichols Specialty Lab in California.

Assay of Urinary Cortisol. Quest Nichols Specialty Lab used a liquid chromatography-tandem mass spectrometry (LC-MS/MS) method for urinary cortisol assay. With mean concentrations of 24.2-213.0 ug/L of cortisol, inter-assay coefficients of variation were 6.0-9.4%. The cortisol levels were adjusted for urinary creatinine (a breakdown product of muscle creatine that is used as a measure of kidney function) by dividing cortisol concentrations (picomol) by creatinine concentration (micrograms of creatinine per liter of urine (mcg/g cr)).

Assay for Urinary Norepinephrine. Acidified urine was combined with ammonium acetate buffer and an internal standard compound, the combined mixture was poured over a micro-cation column and washed, and catecholamines were eluted from the columns. The extract was then injected into a high-performance liquid chromatography with electrochemical detection. The sensitivity of the assay was 1.0 ng/ml and the intra-assay and inter-assay coefficients of variation were 4.8-6.5%. NE values were adjusted for creatinine by

dividing NE concentrations (picomol) by creatinine concentration (micrograms of creatinine per liter of urine (mcg/g cr)).

Center for Epidemiological Studies Depression Scale (CES-D Scale)(Radloff, 1977). Previously described in the Methods section of study 1, the CES-D is a 21-item self-report measure of current affective depressive symptoms, which has been widely used among women with HIV.

Data Analyses

SPSS version 21.0 was used to conduct data analyses with Pearson correlations and hierarchical multiple linear regressions. Due to skewness and a few outliers cortisol and norepinephrine levels were log-10 transformed and used in subsequent analyses and a ratio of log-10 NE/ log-10 cortisol was derived. Analyses that included or deleted outliers yielded similar results so outliers were retained. Some participants were missing data on three measures. One participant declined to participate in the autobiographical narrative task, nine participants were missing norepinephrine levels because catecholamines were undetectable from their urine sample, and seven participants were missing the cholesterol data needed to compute CHD risk. Missing data were not replaced.

Results

Sample Sociodemographics and Clinical Characteristics

Fifty-three HIV+ women participated in the study the majority were women of color (86.8% African American and 3.8% Latinas) and did not complete high

school (64.2%). Their median annual household income was \$6,001-\$12,000. Proportions of visits in which women reported current abuse ranged between .00 and .73 (minimum=0 and maximum=1) and are provided in Table 1. The average CD-RISC resilience score was 27.77 (7.50, range = 12 to 40); and 60.4% of the participants expressed positive self-esteem in autobiographical narratives. Mean CHD risk score was 3.96 ($SD=6.45$, range = -12 to 17), mean NE levels were 24.26 mcg/g cr ($SD=12.16$, range = 10 to 73), and mean cortisol levels were 21.58 mcg/g cr ($SD=32.18$, range = 2.2 to 225). Table 1 provides descriptive statistics on sociodemographic characteristics of the sample and all predictor and outcome variables.

Insert Table 1 about here

Preliminary Analyses

Pearson correlations were conducted to assess relationships between the sociodemographic variables of age, income, education, and employment with all predictors and outcomes. Results indicated that a few significant associations and trends existed. Higher CHD risk was significantly positively correlated with being older ($r=.61$, $p=.001$) and unemployed ($r= -.34$, $p=.03$). Being younger was significantly positively associated with a higher proportion of visits in which domestic violence was reported ($r=-.31$, $p=.03$) and tended to be positively

related to higher proportions of reporting current physical violence at visits ($r = -.27$, $p = .06$). Higher resilience tended to relate to higher education ($r = .25$, $p = .08$); higher positive self-esteem tended to relate to higher income ($r = .27$, $p = .06$) and being older ($r = .27$, $p = .06$); and higher depressive symptoms significantly related to lower education ($r = -.30$, $p = .03$) and tended to relate to lower income ($r = -.25$, $p = .08$). These sociodemographic variables were controlled in all relevant regression analyses.

In responding to the post urine collection questionnaire, three participants (5.7%) reported using crack, cocaine or heroin and their data were excluded from analyses with cortisol and NE given the fact that these substances may raise stress hormone levels (Haile, Mahoney, Newton, & De La Garza, 2012; Heesch et al., 1995; Kreek, 1996). Two women reported taking beta blockers (4%) and because taking beta blockers significantly related to a lower NE/cortisol ratio ($r = -.32$, $p = .05$), it was entered as a covariate in all NE/cortisol analyses. A lifetime history of ever using crack/cocaine/heroin was significantly associated with higher levels of cortisol ($r = .37$, $p = .008$) and was also controlled in all analyses that included cortisol and NE/cortisol ratio as variables.

Pearson correlations among proportions of visits at which sexual abuse, physical abuse, domestic violence, and any abuse occurred revealed that sexual abuse significantly positively related to physical violence ($r = .63$, $p = .001$) and domestic violence ($r = .72$, $p = .001$), and domestic violence and physical violence

significantly positively related to each other ($r=.89$, $p=.001$) . Resilience and positive self-esteem approached significance in positively correlating with each other ($r=.25$, $p=.07$).

Insert Table 2 about here

Hypothesis 1: Abuse Histories and CHD Risk

With age and employment status as covariates, partial correlations were conducted to test the hypothesis that abuse histories would significantly relate to higher CHD risk. The hypothesis was supported in that proportions of visits in which current sexual abuse ($r=.29$, $p=.03$), physical abuse ($r=.42$, $p=.002$), domestic violence ($r=.35$, $p=.01$), and any abuse (Beta=.38, $p=.007$) were reported were all significantly positively correlated with higher CHD risk composite score.

Hypothesis 2a: Abuse Histories, Resilience, and Positive Self-esteem

Partial correlations were conducted to test the hypothesis that abuse histories would significantly relate to lower levels of resilience and positive self-esteem, controlling for covariates (age and income in partial correlation in which positive self-esteem was an outcome; and age, education, and employment in resilience partial correlation). Analyses only tended to support the hypothesis in that a higher proportion of visits where current physical abuse was reported

tended to negatively relate to positive self-esteem ($r = -.21$, $p = .07$). Visit proportions of current sexual abuse, domestic violence, and any abuse were not significantly related to positive self-esteem and no abuse histories were significantly associated with resilience.

Hypothesis 2b: Resilience, Positive Self-esteem, and CHD risk

Partial correlations of resilience and positive self-esteem with the CHD risk score, and covariates of age, employment, education (in partial correlation in which resilience was an outcome) and income (in partial correlation in which positive self-esteem was an outcome) were used to test the hypothesis that higher resilience and positive self-esteem would relate to lower CHD risk. Results only tended to support the hypothesis in that higher positive self-esteem tended to be related to lower CHD risk ($r = -.23$, $p = .08$). Resilience did not significantly relate to CHD risk.

Hypothesis 3: Depressive symptoms in Relation to Resilience, Positive self-esteem, Abuse Histories, and CHD risk

To test the hypothesis that higher depressive symptoms would be associated with lower resilience, lower positive self-esteem, abuse histories, and higher CHD risk, partial correlations were conducted controlling for age, employment status, education, and income. In partial support of the hypothesis, higher depressive symptoms were significantly related to lower resilience ($r = -.35$, $p =$

.007). However, inconsistent with the hypothesis, depressive symptoms were not significantly associated with positive self-esteem, abuse histories or CHD risk.

Hypothesis 4: Depressive symptoms mediating the relationships between Resilience, Positive Self-esteem, and Abuse Histories with CHD risk

Three prerequisite conditions have to be met to suggest existence of a mediation (Holmbeck, 1998) (1) predictor (i.e. resilience, positive self-esteem, or abuse histories) significantly relates to the outcome (CHD risk), (2) predictor significantly relates to the potential mediator (depressive symptoms), and (3) the mediator significantly relates to the outcome. Conditions were not met to suggest that depressive symptoms mediated the relationships of CHD risk with resilience, positive self-esteem, and abuse, because although depressive symptoms significantly related to resilience, depressive symptoms were not significantly associated with CHD risk, abuse histories, and positive self-esteem. Thus depressive symptoms did not mediate relationships of CHD risk with resilience, positive self-esteem, and abuse histories.

Exploratory Question: Abuse Histories and Stress Hormones

To examine whether abuse histories were associated with total levels of urinary cortisol, norepinephrine, or NE/cortisol ratio, partial correlations were run while controlling for covariates that related to abuse histories (i.e. age) and hormone levels in this sample (i.e. lifetime use of crack/cocaine/heroin in a partial correlation in which cortisol was an outcome, and beta blockers and lifetime use

of crack/cocaine/heroin in a partial correlation in which NE/cortisol was an outcome). Results indicated that a higher proportion of visits in which current sexual abuse ($r=.22$, $p=.09$), any abuse ($r=.25$, $p=.07$) and physical abuse ($r=.19$, $p=.12$) were reported approached significance in relating to higher norepinephrine levels. Abuse histories were not significantly associated with levels of cortisol or NE/cortisol ratio.

Exploratory Question: Stress Hormones and CHD Risk

Using partial correlations we examined whether cortisol, norepinephrine, or NE/cortisol ratio significantly related to CHD risk with covariates of age, employment status, and substance use (i.e. lifetime use of crack/cocaine/heroin in a partial correlation in which cortisol was an outcome, and beta blockers and lifetime use of crack/cocaine/heroin in a partial correlation in which NE/cortisol was an outcome). Higher cortisol significantly negatively correlated with CHD risk score ($r= -.56$, $p= .001$). In contrast, higher NE/cortisol ratio significantly positively related to CHD risk score ($r= .42$, $p= .008$). NE alone was not associated with CHD risk score.

Exploratory Question: Resilience, Positive Self-esteem, and Stress Hormones

One of the primary aims of this study was to test whether resilience and positive self-esteem related to total levels of cortisol, norepinephrine, and NE/cortisol ratio. We ran partial correlations of resilience with positive self-

esteem and stress hormones controlling for sociodemographics. Education and employment were controlled in partial correlations in which resilience was an outcome. Income and age were controlled in partial correlations in which positive self-esteem was an outcome. In addition, substance use was controlled in several partial correlations (lifetime use of crack/cocaine/heroin in partial correlations in which cortisol was an outcome, and beta blockers and lifetime use of crack/cocaine/heroin in partial correlations in which NE/cortisol was an outcome). Results indicated that resilience significantly negatively related to cortisol levels ($r = -.29$, $p = .03$) and approached significance in negatively relating to NE ($r = -.23$, $p = .08$), but was not associated with NE/cortisol ratio. In addition, positive self-esteem significantly negatively related to NE ($r = -.29$, $p = .04$), but was not associated with cortisol or the NE/cortisol ratio.

Exploratory Question: Depressive Symptoms and Stress Hormones

The present also explored the relationships between depressive symptoms with total levels of cortisol, norepinephrine, and NE/cortisol ratio using partial correlations that controlled for income, education, and substance use (lifetime use of crack/cocaine/heroin in partial correlations in which cortisol was an outcome, and beta blockers and lifetime use of crack/cocaine/heroin in partial correlations in which NE/cortisol was an outcome). Findings revealed that depressive symptoms did not significantly relate to total levels of cortisol, norepinephrine, and NE/cortisol ratio.

Exploratory Question: Depressive Symptoms Mediating Relationships among Resilience, Positive Self-esteem, Stress Hormones and CHD risk

Prerequisite conditions (Holmbeck, 1998) were not satisfied to explore whether depressive symptoms mediated any relationships between resilience and positive self-esteem with stress hormones, between stress hormones and CHD risk. The present study showed that resilience significantly and inversely related to depressive symptoms, however depressive symptoms did not significantly relate to the outcomes (i.e. stress hormones and CHD risk) or one of the predictors (i.e. positive self-esteem). Therefore depressive symptoms did not mediate any relationships among resilience, positive self-esteem, stress hormones, and CHD risk.

Discussion

Our findings indicate that in women with HIV, resilience was significantly associated with lower cortisol levels and tended to relate to lower NE levels and positive self-esteem was significantly related to lower NE levels. The relationship between resilience and cortisol levels corroborates findings by other researchers that problem-engaging coping and personal mastery were associated with lower cortisol levels (O'Donnell, Badrick, Kumari, & Steptoe, 2008; Vedhara et al., 2006). The relationships found between positive self-esteem and higher resilience with lower norepinephrine levels add to previous findings that higher self-efficacy was associated with lower NE levels and that decreased action

oriented coping overtime was also related to higher NE levels (Bandura, Taylor, Williams, Mefford, & Barchas, 1985; Kilbourn, 1997).

Stress Hormones, CHD Risk, and Abuse Histories

CHD risk was significantly related to higher NE/cortisol ratio as well as to higher cortisol levels. The relationship between CHD risk and NE/cortisol ratio is a new contribution to the literature and is in accordance with studies that have linked high norepinephrine levels and low cortisol levels (measured independently) with heart disease (Bennett et al., 2004; Zoccali et al., 2002). In addition, the present study's finding that higher cortisol levels significantly predicted lower CHD risk score supports previous literature noting the anti-inflammatory benefits of cortisol (Fantidis et al., 2002; Straub et al., 2002). In contrast, many other studies have noted the seemingly opposite finding: that higher, not lower, cortisol levels relate to negative cardiovascular consequences (Vogelzangs et al., 2010; Whitworth, Williamson, Mangos, & Kelly, 2005). These results together (a) emphasize that both high and low levels of stress hormones can be indicative of HPA dysregulation and relate to risk for CHD and (b) suggest that the ratio of NE/cortisol may be a useful clinical marker of CHD risk. This is similar to the noted sensitivity of the NE/cortisol ratio in distinguishing between PTSD and non-PTSD diagnoses: patients with PTSD had a higher NE/cortisol ratio than patients without PTSD (Mason et al., 1988).

Higher proportions of visits in which current sexual abuse, physical abuse and any abuse were reported approached significance in relating to higher NE levels and this is consistent with previous literature that found higher NE levels among individuals with PTSD compared to those without (Geraciotti et al., 2001). However, in the present study, abuse histories were not significantly associated with levels of cortisol or NE/cortisol ratio. Previous literature has indicated that trauma/abuse histories have been associated with higher norepinephrine and lower cortisol levels as well as higher cortisol (following exposure to reminders of previous traumas) (Elzinga, Schmahl, Vermetten, van Dyck, & Bremner, 2003; Mason et al., 1988; Yehuda et al., 2001; Yehuda et al., 1995). Perhaps the complexity of the HPA as reflected by the inconsistencies in the literature in combination with our relatively small sample size impacted our null findings between abuse histories and cortisol and NE/cortisol ratio.

CHD risk, Resilience, Positive Self-esteem, and Abuse Histories

Positive self-esteem also approached significance in relating to lower CHD risk, a finding that is similar to previous findings that adolescents with severe heart disease reported lower self-esteem in comparison to adolescents with mild heart disease. The finding that CD-RISC resilience did not relate to CHD risk is in contrast to studies that found that higher ego resilience and higher hardiness/resilience were associated with lower risk factors for CHD (i.e. low

blood pressure and high HDL cholesterol) (P.T. Bartone et al., 2009; J. H. Block & Block, 1980). However, none of these studies used the CD-RISC scale to measure resilience and there was a difference in how ego resilience and hardiness were defined/ conceptualized in comparison to self-reported resilience. In the study by Block and colleagues (1996; 1980) ego resilience was defined as the capacity to modify impulse expression based on contextual factors and was measured by the Ego Resilience Scale and Bartone and colleagues captured hardiness with the Dispositional Resilience Scale (2007; 2009).

A higher proportion of visits in which women reported abuses (sexual, physical, domestic violence, and any abuse) were significantly related to higher CHD risk, and these relationships confirm the limited number of previous findings that have linked histories of abuse with risk for heart disease (Dong et al., 2004; Midei et al., 2013) and add to this body of literature. Abuse histories may lead to increased heart disease risk by the way of consequences of abuse such as obesity and substance use that are noted risk factors for heart disease as well as via elevated levels of stress hormones. As noted above, abuse histories showed a trend of relating to higher norepinephrine and higher NE/cortisol ratio was related to higher CHD risk.

A higher proportion of visits in which current physical abuse was reported tended to relate to lower positive self-esteem, but proportions of current domestic violence, sexual abuse, and any abuse were not significantly related to positive

self-esteem. These results are puzzling, but perhaps physical abuse is especially damaging to the development of self-esteem, or perhaps we were limited by our small sample size in detecting significant relationships between other types of abuse and self-esteem. Similarly, sexual abuse, physical abuse, and domestic violence (measured as proportion of visits for which each were reported) were not significantly associated with resilience. This corroborates previous studies using the CD-RISC scale to measure resilience, which also did not report a significant relationship between abuse/trauma and resilience (Campbell-Sills & Stein, 2007; Wingo et al., 2010).

CD-RISC resilience and positive self-esteem tended to be positively associated with each other. However, as noted they were each related to other variables somewhat differently (e.g. higher CD-RISC resilience alone related to lower cortisol and only positive self-esteem showed a trend of relating to lower CHD risk), which was not necessarily unexpected given that they used different assessment methods. Positive self-esteem was assessed qualitatively from autobiographically narratives and CD-RISC resilience scale is a quantitative measure that captures adaptive personality traits and coping strategies (e.g. “I try to see the humorous side of things when I am faced with problems”). However, both measures may relate to each other because CD-RISC resilience has a few items that touch on how the women view themselves (e.g. “I am able to adapt when changes occur” and “I am not easily discouraged by failures”).

Depressive Symptoms, Abuse Histories, Resilience, Positive Self-esteem, Stress Hormones and CHD Risk

Depressive symptoms were investigated in relation to the primary variables of interest in the current study (i.e. abuse histories, resilience, positive self-esteem, stress hormones and CHD risk) and also as a potential mediator of the relationships among the variables. However, inconsistent with the literature, depressive symptoms were not significantly related to abuse histories and positive self-esteem (Boudewyn & Liem, 1995; Butler et al., 1994; Franck & De Raedt, 2007; Hegarty et al., 2004). The finding that positive self-esteem did not relate to depressive symptoms may be because the stability of self-esteem is more predictive of depression than are levels of self-esteem (Franck & De Raedt, 2007). Similarly, depressive symptoms were not associated with CHD risk and these findings were also inconsistent with literature showing that depression is related to increased risk for CHD and cardiac mortality (Khawaja et al., 2009). Perhaps these null findings were due to limited power of the analyses in detecting significant relationships because of the small sample size. In addition, depressive symptoms were not significantly associated with stress hormones levels, a finding that is not surprising given the inconsistencies in literature, with studies noting both higher and lower cortisol levels and higher norepinephrine levels in relation to depressive symptoms (2007; Burke et al., 2005; Hughes et al., 2004; Knight et al., 2010; Otte et al., 2005).

Conclusion

With effective medications, HIV + women have increased life expectancies, but are at increased risk for heart disease, especially women with histories of abuse. In a sample of HIV+ women this study presents new findings that (a) resilience significantly related to lower cortisol levels and tended to relate to lower norepinephrine levels (b) positive self-esteem significantly related to lower norepinephrine levels (c) a higher NE/cortisol ratio relates to higher CHD risk and (d) positive self-esteem approached significance in relating to lower heart disease risk. Our findings also confirmed existing literature in that histories of abuse significantly related to higher CHD risk and approached significance in relating to lower positive self-esteem and higher norepinephrine; and that lower urinary cortisol levels are significantly associated with higher CHD risk. These results suggest that resilience and positive self-esteem may be important psychological factors to target in interventions in order to lessen the negative impact of stress hormones and abuse histories on the cardiovascular health of women with HIV.

Table 4.1 *Sample characteristics and socio-demographic statistics of hormone sub-study participants.*

Characteristics	Mean (SD)
Age	48.33 (8.92)
Resilience (CD-RISC)	27.77 (7.50)
Proportion of current domestic violence	.07 (.13)
Proportion of current physical abuse	.05 (.11)
Proportion of current sexual abuse	.03 (.11)
Proportion of any abuse	.09 (.16)
CHD risk score	4.21 (6.35)
Cortisol (mcg/g cr)	21.58 (32.19)
Norepinephrine (mcg/g cr)	24.26 (12.16)
Depressive Symptoms (CES-D)	13.75 (9.51)
	<u><i>n</i> (%)</u>
Positive Self-esteem	32 (60.4)
Race	
White / non-Hispanic	3 (5.7)
White / Hispanic	2 (3.8)
African-American / non- Hispanic	46 (86.8)
Other / Hispanic	1 (1.9)
Other	1 (1.9)
Education	
Grade 11 or less	22 (41.5)
Completed high school	19 (35.8)
Some college	11 (20.8)
Attended/completed graduate School	1 (1.9)
Income	
\$6,000 or less	15 (28.3)
\$6,001-\$12,000	24 (45.3)
\$12,001 or more	14 (26.4)
Unemployed	46 (86.8)
Marital Status	
Legally/common- law marriage	3 (5.7)
Not married but living w partner	2 (3.8)
Widowed	7 (13.2)

Divorced/Annulled	8 (15.1)
Separated	6 (11.3)
Never married	27 (50.9)

Note. CD-RISC= Connor Davidson Resilience Scale (10-item);
CHD= Coronary Heart Disease; and Mcg/g cr = Micrograms of
creatinine per liter of urine.

Table 4.2 *Partial correlations among Resilience, positive self-esteem, abuse histories, depressive symptoms, stress hormones and coronary heart disease risk*

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Resilience (CD-RISC) ^a	-	.25 ^t	.01	.05	.10	.05	.29*	-.23 ^t	.09	.16	-.36**
2. Positive Self-esteem ^b		--	.10	-.21 ^t	-.10	-.15	-.02	-.29*	.01	-.23 ^t	-.16
3. Proportion of current domestic violence ^c			--	.89***	.72***	.92***	.06	.10	-.05	.35**	.11
4. Proportion of current physical abuse ^c				--	.63***	.88***	-.03	.19	.03	.42**	.15
5. Proportion of current sexual abuse ^c					--	.82***	.16	.22 ^t	-.12	.29*	.08
6. Proportion of any abuse ^c						--	.07	.25 ^t	-.04	.38**	.17
7. Cortisol log10 transformed (mcg/g creatinine) ^d							--	.09	-.81***	-.56***	.14
8. Norepinephrine log10 transformed (mcg/g)								--	.12	.16	.14

creatinine)

9.NE/Cortisol

Ratio^e

-- .43** .08

10. CHD risk

score^f

-- -.03

11.Depress-

ive

Symptoms

(CES-D)^g

--

Note. All tests are one-tailed. Covariates differed by analyses and are noted below. CD-RISC= Connor Davidson Resilience Scale (10-item); NE = Norepinephrine; and CHD= Coronary Heart Disease risk score computed based on the Framingham Risk Score guidelines.

* $p < .05$. ** $p < .01$. *** $p < .001$. ^t $p < .10$.

^aAnalyses controlled for age, education, and income

^bAnalyses controlled for age and income

^cAnalyses controlled for age

^dAnalyses controlled for lifetime history of crack/cocaine/heroin

^eAnalyses controlled for beta blockers and lifetime history of crack/cocaine/heroin

^fAnalyses controlled for age and employment

^gAnalyses controlled for income and education

CHAPTER FIVE

General Discussion

Literature on women with HIV has often focused solely on factors that place women “at risk” for poor health outcomes such as abuse/trauma, with only a limited number of studies investigating the positive psychosocial factors that may buffer the negative effects of abuse. Resilience is especially important among Black women, who account for over 60% of women with HIV and are faced with many environmental and societal stressors, such as racism, sexism, poverty and unstable neighborhoods. However, very few studies have looked at how resilience relates to health outcomes in a sample of women who are primarily Black and have HIV or who are at risk for HIV (Centers for Disease Control and Prevention, 2013b; Faison, 2007; Norman, 2002; Singleton, 2004).

In the current project, a series of three studies of women with and at risk for HIV investigated relationships among abuse and mental and physical health outcomes as moderated by stress hormones, resilience, and positive self-esteem. The sample was primarily Black women with a small number of Latina and White women. Physical health outcomes were both non-HIV specific (CHD risk) and HIV specific (CD4 cell count and viral load) and mental health outcomes included depressive symptoms and quality of life. Specifically, the study analyzed if: (a) in both HIV+ and HIV- women, higher resilience related to lower depressive symptoms and higher health-related quality of life (HRQOL), and (b)

among HIV+ women if resilience related to better health outcomes, including highly active antiretroviral (HAART) medication adherence, HIV viral load, CD4 cell count, stress hormones (i.e. norepinephrine and cortisol), and coronary heart disease risk (CHD), (c) whether depressive symptoms mediated relationships between resilience and the noted health outcomes, and (d) whether resilience moderated the relationships between histories of abuse/trauma and health outcomes, such that only for women scoring low on resilience would abuse relate to worse health outcomes.

Study 1 consisted of a sample of 138 HIV+ women and 64 HIV- sociodemographically matched women and examined the relationships among resilience, childhood sexual abuse (CSA), depressive symptoms, and HRQOL and whether resilience moderated the relationships between CSA and outcomes. Study 2 focused exclusively on 138 HIV+ women and investigated the relationships among resilience, abuse histories, HAART adherence, HIV viral load, and CD4 cell count and examined if resilience moderated the relationships between abuse histories and HIV health outcomes as well as whether depressive symptoms mediated relationships of resilience with HAART adherence, HIV viral load, and CD4 cell count. Study 3 also focused on HIV+ women to investigate the relationships among resilience, positive self-esteem, abuse histories, stress hormones, and CHD risk among 53 HIV+ women; and investigated depressive symptoms as a potential mediator of these relationships. In all studies it was

hypothesized that resilience (and positive self-esteem in study 3) would buffer the impact of abuse histories and relate to better health outcomes, and in study 3, would relate to less dysregulated stress hormones.

Summary of Results

In accordance with hypotheses, studies 1 to 3 demonstrated that higher levels of resilience related to better health outcomes for both women with and at risk for HIV. Resilience also moderated the relationships between histories of abuse and health outcomes, so that only for women scoring low on resilience did abuse relate to worse health outcomes. Resilience and positive self-esteem also related to lower stress hormone levels, which in turn related to a lower likelihood of a history of abuse and related to CHD risk in complex ways. These results consist of both novel findings that add to the literature as well as findings that corroborate existing literature.

Resilience and Mental and Physical Health Outcomes

In study 1, higher resilience significantly related to lower depressive symptoms and higher health related quality of life across both HIV+ and HIV- women, and resilience moderated the relationship between a history of childhood sexual abuse and depressive symptoms, so that only for women scoring low in resilience did abuse significantly relate to depression. Although this finding was supported by previous studies in community samples (Campbell-Sills & Stein, 2007; Wingo et al., 2010) this moderation finding has never been reported

among a sample of HIV+ and HIV- women. However, resilience as a moderator between childhood sexual abuse and depressive symptoms is especially relevant in the current sample given the extremely high prevalence of abuse histories and the link between abuse with higher depressive symptoms. Furthermore, higher depressive symptoms have been linked to other health outcomes for women with HIV such as medication nonadherence and mortality (M. Cohen et al., 2000; M. H. Cohen et al., 2004; Machtiger, Haberer, et al., 2012). Study 1 also found that higher resilience relates to lower depressive symptoms and better health-related quality of life, which is in accordance with studies among HIV infected individuals by Yu et al (2009b) and Farber et al. (2000) who that found that lower resilience was associated with higher depressive symptoms and hardiness (a construct similar to resilience) was related to lower psychological distress and higher physical health quality of life.

Study 2 revealed that among HIV+ women, resilience significantly related to having undetectable VL and resilience also moderated the relationship between sexual and multiple abuse histories and lower HAART adherence, so that only for women scoring low in resilience did abuse relate to lower HAART adherence. This is the first study to report that resilience was significantly associated with having undetectable HIV VL and that resilience moderated the relationship between abuse histories and HAART adherence so that sexual and multiple abuse histories related to lower HAART adherence only for women

scoring low in resilience. These findings are also consistent with previous studies reporting that positive psychological factors including conscientiousness (e.g., being organized, detail oriented and responsible), finding meaning in challenging circumstances, and being optimistic were related to higher medication adherence, lower HIV viral load, and lower HIV mortality (Ickovics et al., 2006; O'Cleirigh et al., 2007). In addition, Study 2 confirmed prior study findings that higher depressive symptoms are associated with lower HAART adherence. However, depressive symptoms did not mediate the relationship between resilience and HAART adherence, indicating that resilience does not influence HAART adherence via its effect on depressive symptoms.

Study 3 demonstrated that among HIV+ women, higher resilience related to lower cortisol levels; and higher PSE related to lower NE levels. Study 3 also indicated that higher CHD risk related to higher NE/cortisol ratio, lower cortisol levels, and histories of abuse. Higher resilience significantly relating to lower cortisol and higher positive self-esteem relating to lower norepinephrine are novel findings. These findings are supported by previous literature noting that problem-engaging coping and personal mastery were associated with lower cortisol levels (O'Donnell et al., 2008; Vedhara et al., 2006), that high self-efficacy was associated with lower NE and that decreased action oriented coping overtime was related to higher NE (Bandura et al., 1985; Kilbourn, 1997). Study 3 also found that higher histories of abuse related to higher CHD risk, NE/cortisol ratio

related to higher CHD risk, and lower cortisol related to higher CHD risk. Only a limited number of studies have reported an association between histories of abuse and heart disease risk for women (Midei et al., 2013) and none have been in samples of HIV+ women who may be at increased risk for heart disease (Barbaro, 2003; Currier et al., 2003). In addition, while NE/cortisol ratio has been noted as sensitive in differentiating people who meet diagnostic criteria for post-traumatic disorder (higher NE/cortisol ratio) and those who do not (Mason et al., 1988), and PTSD has been associated with heart disease mortality among veterans (Boscarino, 2008), no previous study has linked a high NE/cortisol ratio with coronary heart disease risk. Perhaps NE/cortisol ratio may serve as a mediator between PTSD and heart disease. The finding that lower cortisol was associated with higher CHD risk may be related to previous findings on the anti-inflammatory benefits of cortisol. At low cortisol levels, anti-inflammatory benefits may be diminished (Fantidis et al., 2002; Straub et al., 2002). However, there are inconsistencies in the previous literature in that both higher and lower levels of cortisol been linked to heart disease (Cohn et al., 1984; Fantidis et al., 2002; Otte et al., 2007; Smith et al., 2005; Straub et al., 2002; Vogelzangs et al., 2010).

Across all three studies resilience was measured using the CD-RISC, a self-report scale which captures personal qualities and adaptive coping strategies including humor, persistence, being able to adapt to change, and believing in one's ability to surpass obstacles (Campbell-Sills & Stein, 2007; Connor &

Davidson, 2003). There are several possible explanations for the major findings that (1) higher resilience was related to lower depressive symptoms, higher health related quality of life, undetectable viral load, and lower stress hormones and that (2) resilience moderated the relationships between abuse histories and health outcomes so that abuse predicted nonadherence and depressive symptoms only for women scoring low in resilience, but not for women high in resilience.

First, women who scored high on resilience may have utilized adaptive coping strategies (e.g. seeking out treatment or resources and believing “I can deal with whatever comes my way” (item 2 of CD-RISC)) that made them either less likely to develop depressive symptoms or more likely to recover. Second, women scoring high in resilience may have also endorsed lower depressive symptoms and a higher health-related quality of life because being less depressed and more positive is consistent with a resilient self-identity, as captured in item 9 on the CD-RISC, “I think of myself as a strong person when dealing with life’s challenges and difficulties”. Third, women scoring high on resilience may also engage in more health promoting behaviors such as eating healthy foods, exercising, attending doctors appointments, and adhering to prescribed medications. Fourth, women who scored high on resilience may conceptualize successful management of their HIV and of having undetectable viral loads as goals and they work towards achieving those goals by adhering to

their medications consistently. Fifth, high resilience may act as a buffer between histories of abuse with depression and HAART adherence. Women who both have a history of abuse and also score high on resilience may view HIV as yet another hardship that they can bounce back from, given that they survived and bounced back following abuse, i.e. their previous experiences have given them the courage to feel that they can overcome adversity. Having this view may have buffered against the negative influence of abuse and translated into lower depressive symptoms, and more consistent adherence to their medications. It may also be that resilience buffers negative health outcomes by affecting levels of stress hormones, as study 3 showed that resilience related to lower cortisol levels. For instance, studies have found higher levels of cortisol among individuals diagnosed with depression and suggest that high cortisol may induce depression (Herbert, 2013). However, there have been some inconsistencies with other studies not reporting elevated cortisol in individuals with depression (Cowen, 2002; Strickland et al., 2002), similar to our findings that there was not a significant relationship between depressive symptoms and stress hormones in study 3. Nonetheless the literature that has noted higher cortisol levels among individuals with depression suggests that the relationship between resilience and lower cortisol may explain, or account for, the association between resilience and lower depressive symptoms.

The links between resilience and positive self-esteem with levels of cortisol and norepinephrine also support the growing field of psychoneuroimmunology, which posits reciprocal relationships between psychological factors and neural and immune functioning (Gidron, Gilutz, Berger, & Huleihel, 2002; Maier, Watkins, & Fleshner, 1994). Perhaps women scoring high in resilience had lower urinary output levels of stress hormones cortisol and norepinephrine, because they utilized adaptive coping strategies when faced with stressors and therefore stressors such as abuse did not result in dysregulation of their stress hormone levels. Additionally both stress hormone levels and personal characteristics such as extraversion and sociability have been linked to genetics (Kim et al., 2011; Velders et al., 2011; Weiss, Bates, & Luciano, 2008) so perhaps (a) the women who inherited adaptive traits also inherited genes associated with lower stress hormones (or were not exposed to prenatal conditions linked with higher cortisol, such as smoking)(Schuetze, Lopez, Granger, & Eiden, 2008), which placed them in a position to have better health outcomes or (b) women who were biologically predisposed to have lower stress hormones also grew up in an environment that may have been more nurturing and helped them to develop adaptive coping strategies.

Positive self-esteem was also related to lower norepinephrine levels and tended to relate to lower coronary heart disease. Perhaps individuals with positive self-esteem do not react strongly to stressors (especially those that are

in conflict with their beliefs about themselves) because they have a positive view of themselves. Positive esteem has been related to positive thinking and optimism (Caprara, Steca, Gerbino, Paciello, & Vecchio, 2006; Mäkikangas, Kinnunen, & Feldt, 2004) thus women with high positive esteem may regulate their stress response with adaptive strategies such as using alternative positive thoughts (e.g. “I am strong”) to counteract negative thoughts. These strategies may prevent their NE levels from becoming dysregulated. There is a great deal of evidence in the cognitive- behavioral therapy literature to support the idea that cognitively reframing negative thoughts into positive ones is beneficial in regulating distress (Barlow, Allen, & Choate, 2004). Positive esteem by way of positive thinking might therefore relate to women’s lower stress hormones, which may in turn relate to their lower risk for CHD risk as evidenced by the finding showing that lower NE/cortisol ratio is related to lower CHD risk from study #3.

CHD risk was assessed using the Framingham Risk Score, which is a composite score of measures of blood pressure, cholesterol, and smoking. Previous literature has indicated that elevated blood pressure is related to both high norepinephrine and high cortisol levels (Masuo, Kawaguchi, Mikami, Ogihara, & Tuck, 2003; Whitworth et al., 2005). Thus, women with positive self-esteem might have lower stress hormones, which in turn might relate to lower blood pressure and therefore lower CHD risk as evidenced by study 3. In addition, if women with positive self-esteem engage in adaptive coping strategies

in lieu of maladaptive coping such as smoking this would also lower their CHD risk score.

Depressive Symptoms in Relation to Abuse Histories, Positive Self-esteem, Stress Hormones, and CHD Risk

Depressive symptoms were not significantly associated with abuse histories, positive self-esteem, stress hormones, and CHD risk; and therefore was not a significantly mediator of relationships among these variables or between resilience and these variables. These null findings were somewhat surprising given that higher depressive symptoms have been linked with abuse histories, low self-esteem, dysregulated levels of stress hormones, and increased CHD risk (2007; Kernis et al., 1991). However these null findings may be attributed to or explained in the context of several issues. First, while prior literature has linked abuse histories with higher depressive symptoms, this relationship has sometimes been moderated by other variables. This was demonstrated in study 1, in which childhood sexual abuse was associated only with higher depressive symptoms for women low in resilience. Thus, in the current studies we may not have tested variables that may have been significant moderators of relationships between depressive symptoms and other variables. Second, positive self-esteem may not have been related to depressive symptoms because previous studies investigating self-esteem utilized quantitative measures of self-esteem and in the current research, autobiographical narratives

were used to rate the presence or absence of positive self-esteem (Kernis et al., 1991; Orth et al., 2008). Third, a lack of association between depressive symptoms with cortisol, norepinephrine, and the cortisol/NE ratio is not surprising because associations between depressive symptoms and stress hormones have been inconsistent in the literature. Studies have noted that both higher and lower levels of stress hormones are related to depressive symptoms (2007; Burke et al., 2005; Otte et al., 2005). Fourth, the absence of significant findings between depressive symptoms and CHD risk may have been due to the relatively small sample size in study 3. The small sample size may also have accounted for other null findings regarding the relationship between depressive symptoms and other variables.

Strengths and Limitations of the Present Studies

Overall the findings from these three studies make novel contributions to the literature about the relationships among resilience, abuse, and health outcomes among women with and at risk for HIV. However, these findings may have been limited by several factors. First, the cross-sectional study design used in all three studies prevents conclusions about causality and possible relationships between variables overtime. Second, the use of self-report measures to capture resilience, abuse, depressive symptoms, health-related quality of life, and HAART adherence may have been affected by social desirability constraints. Third, we were limited by participants' retrospective

reports of abuse that may not have been accurate reflections of their experiences. Fourth, due to our somewhat small sample size, we may have been inadequately powered to detect significant direct relationships between some variables (e.g. abuse histories and depressive symptoms). Fifth, study 3 assessed total stress hormone levels via overnight urine collection. However, researchers have begun to look at the reactivity of a person's stress response system using repeated measures over the course of one day or more because this may yield useful information (Vedhara et al., 2006). It is not clear whether total levels or levels and trajectories in response to specific stressors are more predictive of negative health outcomes. Future studies with larger samples and longitudinal designs are needed to increase our understanding of changes in resilience over time in relation to health outcomes in women with HIV and at risk for HIV.

An additional limitation of the study was that the CD-RISC resilience self-report measure administered at one time point did not fully capture all of the components of resilience (e.g. personality traits, adaptive functioning) nor conceptualizations of resilience that have been posited in the literature, including thinking of resilience as an outcome, a process, or a trajectory of health functioning following a traumatic event (Bonanno, 2012). Given the diverse perspectives on what constitutes resilience and how it should be conceptualized, the ideal research approach may be a multi-measure and methods study that

includes personality attributes, coping strategies, and adaptive functioning outcomes overtime and that may be supplemented with other types of measures, including qualitative data. Short of this, the present study defined the specific approach taken to capture to resilience and was careful not to generalize about resilience beyond the specific assessment measure used.

Despite these limitations, there were several strengths of the existing studies. One, these studies utilized widely used and validated measures for assessing HAART medication adherence, depressive symptoms, health-related quality of life, undetectable viral load, coronary heart disease risk and urinary stress hormones. Two, both qualitative methods (which were used to measure positive self-esteem) and quantitative methods (used to measure resilience) in assessing psychological factors in relation to health proved to be useful. Three, important sociodemographic variables (e.g. education, income and employment) were controlled in all analyses. Four, research staff members who have an established rapport with participants orally administered self-report measures (e.g. histories of abuse, HAART adherence, depressive symptoms, etc.), which may have increased the likelihood that women would respond honestly even when asked about histories of abuse. Five, steps were taken to limit recall bias in capturing HAART adherence (e.g. showing participants pictures of their current medications, or having participants bring their medication bottles). Six, although one cannot deduce causality from a cross-sectional design, most of the findings

in these studies were corroborated by existing literature, thereby giving credibility to the results. The novel findings extend our understanding of resilience and health outcomes among women with HIV and suggest additional areas for research and intervention efforts.

Implications of Findings and Future Directions

Taken together, the findings across all three studies that resilience and positive self-esteem relate to better health outcomes (a) highlight the power of resilience in directly relating to better health outcomes as well as in moderating the negative impact of abuse, (b) echo how important it is for providers and researchers to think about resilience in the context of caring for women infected with and at risk for HIV, and (c) strongly suggest that interventions that target resilience may improve the health outcomes of women with HIV. Despite histories of abuse, some women score high on resilience, endorsing adaptive coping strategies and personal qualities, which buffer the potential untoward impact of abuse on their health outcomes. As such using the 10 item CD-RISC resilience scale (Campbell-Sills & Stein, 2007) as a screening measure might help health care providers to detect women who are at risk for depressive symptoms and HAART nonadherence and who might benefit from additional interventions, treatment and/or resources. Furthermore, knowing which patients score high on resilience may highlight women who could potentially serve as

peer mentors to other women with HIV and/or as co-facilitators for HIV interventions.

The findings of these three studies also highlight the deleterious impacts of childhood and adulthood abuse on the health outcomes of women with HIV, and support the ongoing call for an end to violence against women and children at the societal level. Second, providers for women with and at risk for HIV may need to assess for abuse histories because women with abuse histories are especially vulnerable for depressive symptoms and medication nonadherence as shown in this study and previous literature (M. Cohen et al., 2000; M. H. Cohen et al., 2004; Machtinger, Haberer, et al., 2012).

Possible Clinical Interventions

Findings across the three studies suggest that an intervention promoting resilience and positive self-esteem among women with and at risk for HIV (especially women with histories of abuse) may help women to achieve better health outcomes. A resilience intervention for women with HIV or at risk HIV-women may consist of sessions on (1) psychoeducation about abuse and its impact on the health of women with HIV or at risk (2) psychoeducation about different response patterns to stress/trauma (3) resilient coping strategies that are especially relevant for women with HIV or women at risk (e.g. believing that you can take control and manage stressors in your life such as motherhood or HIV) (4) prominent themes for abuse survivors and women with HIV (e.g. self-

esteem, stigma, self-blame) and (5) personal reflections by having women write about (a) evidence of their resilience based on their past and present experiences and (b) new strategies women will try to enhance their resilience and attain future goals. The CD-RISC resilience measure might be used at baseline as an assessment tool, after each session of the intervention, and following treatment completion (Campbell-Sills & Stein, 2007).

There is evidence to support the feasibility of such an intervention. For instance, among college students, Steinhardt and colleagues (2008) found that a resilience intervention was effective in increasing resilience and self-esteem scores and effective coping strategies and decreasing depressive symptoms, negative affect, and perceived stress. The four session intervention covered topics on (1) Transforming Stress Into Resilience, with resilience defined as an ability to return to levels of functioning prior to the stressor (2) Taking Responsibility which focused on participants' power and responsibility in managing their stressors and life situations; and described responsibility as being closely linked to self-esteem (3) Focusing on Empowering Interpretations, which assisted participants in replacing negative/disempowering cognitions with positive/empowering cognitions using a cognitive-behavioral model and (4) Creating Meaningful Connections, which encouraged participants to maintain interpersonal relationships with supportive family and friends.

In addition, some elements of Cognitive Processing Therapy and Prolonged Exposure treatments, two evidence-based treatments for survivors of trauma who suffer from PTSD, may be beneficial in an intervention for women with HIV and HIV- women with histories of abuse who score low on resilience and low on positive self-esteem (Foa, Rothbaum, Riggs, & Murdock, 1991; Resick, Nishith, Weaver, Astin, & Feuer, 2002). Cognitive Processing Therapy treats PTSD via psychoeducation about PTSD, exploration of the individual's cognitions regarding the traumatic event, cognitive restructuring of maladaptive cognitions, and addressing themes such as trust, self-esteem and power (Resick et al., 2002). The individual is also asked to write about the traumatic event and include any emotions around themes such as self-blame. They are then asked to read the narrative a few times at home and then to the therapist. Similar to CPT, Prolonged Exposure Therapy involves psychoeducation about PTSD and writing a narrative about the traumatic event, but differs in that PE includes the participant listening to and retelling the story repeatedly at home and in therapy as well as conducting in vivo exposures to stimuli that are reminiscent of the event (Foa et al., 1991). While the proposed intervention for women with HIV or at risk women may not necessarily entail writing about a traumatic account, women may benefit from discussions about themes such as self-esteem and empowerment as well as writing and re-reading their personal reflections.

In conclusion, findings across all three studies highlighted that resilience and positive self-esteem related to better health outcomes for women with HIV and sociodemographically matched at risk women. Resilience also buffered against the negative influence of abuse histories on depressive symptoms for women with and at risk for HIV and on medication adherence for women with HIV. Future studies are needed to (a) further increase our understanding of resilience among women with HIV and women at risk for HIV infection and (b) develop interventions aimed at increasing resilience and positive self-esteem that could potentially improve the physical and mental health outcomes of this population.

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GRANT AWARDS

- National Research Service Award**, Award Number F31MH095510 from the National Institute of Mental Health, Project Title: Resilience, Norepinephrine, and Health Outcomes in Women with HIV, 09/11 – 08/13
- Diversity Research Supplement**, Award Number U01AI034993-16S1 from the National Institute Of Allergy and Infectious Diseases under the American Recovery and Reinvestment Act of 2009, 09/09 – 08/11
- Travel Scholarship for Ethnic Minority Researchers and Community-Based Providers**, 5th International Conference on HIV Treatment Adherence, 05/10

HONORS

- George F. and Jean W. Bemis Award**, 2004, Awarded for service to the BC community
- M. Copithorne Scholarship**, 2004, For exhibiting qualities of character and intelligence
- Boston College Order of the Cross and Crown**, 2004-present, Leadership and merit
- Golden Keys National Honor Society**, 2004-present, For high academic achievements
- Amanda Houston Fellowship**, 2003, Travel fellowship to aid in research endeavor
- National Society of Collegiate Scholars**, 2002-present, For academic merits
- Certificate of Leadership**, 2003, Due to leadership on the BC campus
- Thea Bowman AHANA Scholar Award**, 2000-2004, For academic achievements

LEADERSHIP POSITIONS

- Publicity Manager**, Colloquium Committee, Boston University, 07/09 – 08/10
- Student Chair**, Minority Collective, Boston University, 08/09 – 08/10

Secretary, Student Government, Harvard Graduate School of Education, 09/04-05/05
Co-Chair, African, Latino, Asian and Native American Alliance, HGSE, 09/04-05/05

CONSULTATION EXPERIENCES

American Psychological Association's Behavioral and Social Science Volunteer (BSSV) Program

Office on AIDs, Program funded by the Center for Disease Control

Volunteer, 07/10-present

- Trained and certified by APA to provide capacity building assistance to community based organizations implementing three HIV evidence based preventions/ interventions: SISTA (Sisters Informing Sisters about Topics on AIDS), 3MV (Many Men Many Voices) and Healthy Relationships
- Help to diffuse evidence based HIV protocols through capacity building assistance to community based organizations

American Psychological Association's HOPE Program

HIV Office for Psychology Education (HOPE)

Program funded by the Center for Mental Health Services (CMHS) of the Substance Abuse and Mental Health Services Administration (SAMHSA) and the SAMHSA Minority AIDS Initiative Targeted Capacity Expansion (MAI-TCE) 12 Cities Program

Volunteer HIV/AIDS Mental Health Trainer, 05/12-present

- Completed a training-of-trainer workshop on May 31–June 3, 2012
- Trained on two curricula: Short-Term Evidence- Based Interventions for People Living With or at High Risk for HIV; and HIV Integrated Care: Integrating Mental Health, Substance Abuse Screening, Brief Assessment, and Referral to Treatment into HIV Prevention
- Responsible for training at least 30 mental health professionals within 2 years
- Belong to a national network of HOPE trainers who are psychologists, psychiatrists, and mental health clinicians who volunteer their time to provide their communities with the knowledge and skills necessary to better serve their HIV infected or at risk clients

EXTERNAL PSYCHOLOGY TRAININGS

American Psychological Association, Minority Fellowship Program

Psychology Summer Institute (PSI), July 8 – 14, 2012

Washington, DC

PSI provides educational, professional development and mentoring experiences to advanced doctoral students of psychology and psychologists who are in the early stage of their careers.

- Received guidance and one-on-one mentoring on my dissertation project from Dr. Miriam Martinez, Chief of Clinical Strategy, St. Luke's Roosevelt Hospital Center, Department of Psychiatry and Behavioral Health
- Participated in seminars on topics such as grant writing, publishing and specific areas of research or service delivery. Seminars were led by expert faculty such

as Dr. Norman Anderson (CEO, American Psychological Association), Dr. Nakamura (Acting Director, Center for Scientific Review, National Institute of Health), and Dr. Cheryl Boyce (Associate Director of Child and Adolescent Research, National Institute of Health).

- Networked with representatives from federal funding agencies (e.g. NIH) and foundations

PUBLICATIONS

- Brody, L.R., **Dale, S.**, Kelso, G., Cruise, R., Weber, K., Watson, C., Stokes, L., & Cohen, M. (in press). Gender roles and coping in relation to depression and quality of life in women with and at risk for HIV. In S. Dworkin, P. Passano, & Gandhi (Eds). In *Justice and In Health: A New Era in Women's Health and Empowerment*. California: UC Press.
- Henderson Daniel, J & **Dale, S.K.** (2013). Violence and Trauma. In L. Comas-Diaz, & B. Greene (eds). *Psychological Health of Women of Color: Intersections, Challenges, and Opportunities*. Westport, CT: Praeger.
- Dale, S.K.** & Henderson Daniel, J. (2013). Talking about the Trayvon Martin Case in Psychology Training and Psychotherapy. *Journal for Social Action in Counseling and Psychology*, 5 (1), 37-49.
- Dale, S.K.** & Henderson Daniel, J. (2011). Spirituality/Religion as a Healing Pathway for Survivors of Sexual Violence. In: Thema Bryant-Davis (Ed.), *Pathways to Healing: Empowerment for Survivors of Sexual Violence*. Rowman & Littlefield Publishers.
- Tummala-Narra, P., Saleem, R., **Dale, S.**, Claudius, M., Gomez, C., & Narain, N. (2011). Report on trafficking of women and girls, American Psychological Association Division 35 (Society for the Psychology of Women) Special Committee on Violence against Women and Girls, <http://www.apadivisions.org/division-35/news-events/trafficking-report.pdf>
- Dale, S.** (2006). My Home Away from Home. *Ya Yuan - Yali Boarding Middle School Bi-Monthly Magazine*. Published: Changsha.
- Dale, S.** (Ed.). (2005). *Our Voices: Harvard University Graduate School of Education Annual ALANA Anthology*. Fellows of Harvard: Cambridge.
- Dale, S.** (2005). Who AM I- A Look at Racial, Cultural, and Personal Experiences that Have Impacted My Own Cultural Competency. *Our Voices: Harvard University Graduate School of Education Annual ALANA Anthology*. Fellows of Harvard: Cambridge.
- Dale, S. K.**, Kelso, G., Cruise, R.C, Watson, C., Cohen, M., Weber, K., Burke-Miller, J., & Brody, L. R. (2012). *Resilience among women with HIV and uninfected women: Impact of gender roles and socioeconomic factors*. Manuscript revised and resubmitted for publication.
- Brody, L.R., Stokes, **Dale, S. K.**, L., Kelso, G., Cruise, R., Weber, K., Burke-Miller, J., Cohen, M. (2012). *Gender Roles in Women with HIV: Relationship to Depressive Symptoms and Quality of Life*. Manuscript revised and resubmitted for publication.
- Dale, S. K.**, Kelso, G., Cruise, R.C, Watson, C., Cohen, M., Weber, K., Burke-Miller, J., & Brody, L. R. (2012). *Resilience among women with HIV and uninfected women: Impact of gender roles and socioeconomic factors*. Manuscript revised and resubmitted for publication.

- Dale, S. K.**, Cruise, R.C., Kelso, G., Cohen, M., Weber, K., Burke-Miller, J., & Brody, L. R. *Gender roles and abuse among women with HIV infection and women at risk for HIV*. Manuscript in preparation.
- Dale, S.K.**, Cohen, M., Weber, K., Kelso, G., Cruise, R.C., & Brody, L. *Abuse and Resilience in Women with HIV in Relation to HAART Medication Adherence and HIV Viral Load*. Manuscript submitted for publication.
- Dale, S.K.**, Cohen, M., Kelso, G., Cruise, R.C., Weber, K., & Brody, L. *Resilience, Childhood Sexual Abuse, Depressive symptoms, and Health-Related Quality of Life in Women with and at Risk for HIV*. Manuscript submitted for publication.
- Kelso, G., Cohen, M., **Dale, S. K.**, Cruise, R. C., Weber, K., & Brody, L. *Critical consciousness, racial and gender discrimination, and HIV disease markers in African-American women with HIV*. Manuscript submitted for publication.
- Kelso, G., Weber, K., **Dale, S. K.**, Cruise, R. C., Cohen, M., & Brody, L. *Social and health correlates of critical consciousness in African-American women with and at risk for HIV*. Manuscript submitted for publication.
- Kelso, G., Cohen, M., Weber, K., **Dale, S. K.**, Cruise, R. C., & Brody, L. *Incarceration, critical consciousness, depressive symptoms, and HIV in Black women*. Manuscript submitted for publication.

PRESENTATIONS

- Dale, S.K.**, Cohen, M., Weber, K., Kelso, G., Cruise, R.C., & Brody, L. (2013). Resilience in Women with HIV: Relationships with Abuse History, Medication Adherence and Viral Load [Oral presentation]. Abstract accepted for presentation at the 8th International Conference on HIV Treatment Adherence, Miami, Florida.
- Dale, S.K.**, Bogart, L.M., Wagner, G.J., Galvan, F.H., & Klein, D.J. (2013). Medical Mistrust Predicts Lower Longitudinal Medication Adherence Among African American Men [Oral presentation]. Abstract accepted for presentation at the 8th International Conference on HIV Treatment Adherence, Miami, Florida.
- Dale, S.K.**, Franklin, M., Kelso, G., Cruise, R., Burke, M., Weber, K., Cohen, M. & Brody, L. (2012). Childhood Sexual Abuse, Traditional Gender Roles, and Coronary Heart Disease Risk Among Women with HIV. 2nd International Workshop on HIV & Women. Bethesda, Maryland.
http://www.natap.org/2012/HIVwomen/HIVwomen_11.htm
- Dale, S.K.**, M., Kelso, G., Cruise, R., Burke, M., Weber, K., Cohen, M. & Brody, L. (2012). Among Women with HIV, Interaction between Childhood Sexual Abuse and Denial Predicts Medication Adherence and Quality of Life. Poster presented at the 7th International Conference on HIV Treatment Adherence, Miami, Florida.
- Dale, S.K.** (2012). Perspective of a National Research Service Award (F31) recipient [Oral Presentation]. In A.M.Breland-Noble and C.A. Boyce (Co-chairs). Racially Diverse Investigators and Research Careers Psychologists Respond to the 2011 Science Article. Symposium held at the 120th Annual APA Convention, Orlando, Florida.
- Dale, S.K.**, M., Kelso, G., Cruise, R., Burke, M., Weber, K., Cohen, M. & Brody, L. (2012). Traditional gender roles and disempowering coping strategies among women with HIV predict low treatment adherence and poor health outcomes [Oral

- presentation]. The Public Health Implications of Global Violence on Women and Youth. Abstract presented at the 140th APHA Annual Meeting in San Francisco, California.
- Dale, S.K.** (2012). Mental health among adolescent females. Workshop presentation at the NAASC 6th Annual Blueprint Conference for Middle & High School Girls, Boston, Massachusetts.
- Cruise, R., Kelso, G., **Dale, S.K.**, Weber, K., Cohen, M. & Brody, L. (2012). Substance abuse and gender roles in women with and at risk for HIV. Poster presented at the 120th Annual APA Convention, Orlando, Florida.
- Kelso, G., **Dale, S.K.**, Cruise, R. Weber, K., Cohen, M. & Brody, L. (2012). Depressive Symptoms, Self-Silencing, Critical Consciousness and HIV in African American Women. Poster presented at the Association of Psychological Sciences Annual Convention, Chicago, Illinois.
- Kelso, G., Cruise, R., **Dale, S.K.**, Weber, K., Cohen, M. & Brody, L. (2012). Critical consciousness, perceived racial discrimination, and gender discrimination in relation to demographics and HIV status in African American women [Oral presentation]. Abstract presented at the XIX International AIDS Conference, Washington, DC.
- Kelso, G., **Dale, S.K.**, Cruise, R. C., Weber, K., Cohen, M., & Brody, L. (2012). Critical consciousness and discrimination stress in relation to CD4 cell count and viral load in African American women with HIV [Oral Presentation]. Abstract presented at the 12th Annual Diversity Challenge, Boston College, Boston, MA.
- Kelso, G., **Dale, S.**, Cruise, R., Weber, K., Cohen, M., & Brody, L.(2012). Discrimination-related stress, critical consciousness, and depressive symptoms in HIV-infected African American women. Poster presented at the CFAR Joint Symposium on HIV Research in Women, Providence, RI.
- Salimian, P., Bark, J., David, J., Cruise, R., **Dale, S.K.**, M., Kelso, G., Weber, K., Cohen, M. & Brody, L. (2012). How do coping strategies affect HIV disclosure? Poster presented at the 140th APHA Annual Meeting in San Francisco, California.
- Dale, S. K.**, Kelso, G., Watson, C., Weber, K., David, J., Linh, V., Cohen, M., & Brody, L. R. (2011). Trauma History, Resilience and Gender Roles among Women with HIV or at risk for HIV. Poster presented at a Division 35 round table at the 119th Annual APA Convention.
- Dale, S. K.**, Brody, L. R., Kelso, G. W., Stokes, L., Weber, K., Hoffman, A., Chen, B., Patena, J., Ramones, S., & Cohen, M. (2011). *Gender Roles and Knowledge of Partner's HIV Status among Women With or At Risk for HIV*. Poster presented at the Women's Health 2011: The 19th Annual Congress.
- Kelso, G., **Dale, S. K.**, Watson, C., Weber, K., Lee, Y., Piepenburg, A., Gizzi, A., Friedman, J. Byun, J., Cohen, M., & Brody, L. R. (2011). Relationships between responsibility placement in autobiographical narratives and health in HIV-positive women with abuse histories. Poster presented at the 119th American Psychological Association Convention, Washington, D.C.
- Dale, S. K.**, Brody, L. R., Kelso, G. W., Stokes, L., Cohen, M., Weber, K., Lefkowitz, A., Spencer, T.A., Lombardo, L., & Yan, D. (2010). *Resilience and Coronary Heart Disease Risk in Women with or at risk for HIV*. Poster presented at the Women's Health 2010: The 18th Annual Congress.
- Dale, S. K.**, Brody, L. R., Cohen, M., Kelso, G., Weber, K., Piepenburg, A., Hoffman, A.,

- Lee, Y., Chen, B. & Stokes, L. (2010). *Gender Roles, Resilience, and Coronary Heart Disease Risk Among Women*. Poster presented at the 118th Annual APA Convention.
- Brody, L. R., **Dale, S. K.**, Kelso, G. W., Stokes, L., Jeong, H. K., Weber, K., & Cohen, M. (2010). *Gender roles, HIV disclosure, and medication adherence among women with HIV*. Poster presented at the 5th International Conference on HIV Treatment Adherence.
- Ghidei, L., **Dale, S. K.**, Brody, L. R., Cohen, M. & Weber, K. (2010). *The Expression of Words Related to Race, Gender, and Discrimination in Autobiographical Narratives in Relation to Coronary Heart Disease Risk in Women with or at Risk for HIV*. Poster presented at the 13th Annual Boston University UROP Symposium.
- Kelso, G. W., Stokes, L., **Dale, S. K.**, Kim, J. H., Lombardo, L., Cohen, M., Weber, K. & Brody, L.R. (2010). *Self-Silencing and Quality of Life in Women as a Function of HIV status*. Poster presented at the Association of Psychological Sciences Annual Convention

RESEARCH EXPERIENCE

Boston University Emotion, Gender, Culture and Health Laboratory Boston, MA
Graduate Research Assistant for Dr. Leslie Brody, 09/08 to 05/13

The lab is a co-investigative site for NIH grant # U01-AI-34994, Chicago site of the Women's Interagency HIV Study (WIHS); PI: Mardge Cohen, co-I: Leslie Brody. WIHS is a multisite longitudinal observational study that began in 1994 and is the largest U.S. cohort to date of HIV-seropositive women with a comparison cohort of seronegative women. The current project seeks to provide a clearer understanding of factors that may contribute to the health outcomes of black and other ethnic minority women with and at risk for HIV infection, many of whom have histories of trauma, including violence and abuse, by exploring three interrelated processes: coping skills, self-silencing, and unmitigated communion. The study aims to: (1) explore the relationship between coping styles (including self-silencing, and unmitigated communion) and HIV status and trauma history and (2) To explore the role of coping, self-silencing, and unmitigated communion in moderating the relationship between trauma history and health outcomes in HIV+ women, including HIV disease progression, medication adherence and other health outcomes. My duties include assisting in the development of procedures, themes and manuals for coding autobiographical narratives; utilizing SPSS to organize and analyze data from self-report measures as well as evaluate the psychometric properties of instruments; and conducting exploratory analysis on the relationship between trauma, coping, resilience and health outcomes.

Harvard Children's Hospital and Fenway Health Boston, MA
HIV Research Collaborator with Dr. Laura Bogart, 06/12 to present

The current project is a pilot intervention on addressing discrimination and mistrust among African American MSM who are HIV seropositive. The two major aims are to 1) develop an intervention to address mistrust and improve coping responses to discrimination by working with community stakeholders and conducting qualitative semi-

structured interviews with Black MSM and 2) explore pilot intervention effects on mistrust, coping, mental health, antiretroviral treatment adherence, and engagement in care. My duties include consulting with the research team about project design and development and conducting qualitative interviews with Black MSM. In addition, I am drafting data analysis plans and exploring findings for potential manuscripts using data previously collected by Dr. Bogart on HIV treatment attitudes and behaviors among Black and Latino men with HIV.

Psychology Department of Boston College

Chestnut Hill, MA

Senior Thesis under the supervision of Dr. Gilda Morelli, 09/02-5/04

- Initiated an independent research project on the “Future Expectations of Adolescents in Kingston, Jamaica”
- Received Institutional Review Board approval, conducted interviews and administered surveys in Jamaica
- Transcribed interviews, organized themes, analyzed data and composed a report (50pgs)

CLINICAL EXPERIENCE

Brown University Medical School/ Bradley Hasbro Children's Research Center/Rhode Island Training School

Practicum Trainee, 10 hours/week, 09/12 to 05/13

Providence, MA

- Lead two substance abuse psychotherapy groups for adolescent male juvenile delinquents aimed at teaching cognitive behavioral and emotion regulation skills to use in problem solving
- Lead a psychotherapy group for adolescent female juvenile delinquents using the curriculum from *VOICES – A program of self discovery and empowerment for girls*
- Attend weekly individual supervision, groups supervisions with detention and community providers, and client case review meetings

PTSD Program in the Behavioral Science Division of the National Center for PTSD VA Boston Healthcare System, Jamaica Plain Campus

Boston, MA

Practicum Trainee, 16 hours/week, 09/12 to 06/13

Practicum students working in the PTSD clinic of the Behavioral Science Division have the opportunity to acquire both assessment and treatment experience working with veterans diagnosed with PTSD and other trauma-linked disorders. Trainees learn state-of-the-art assessment procedures, are trained in semi-structured interviewing for PTSD, and evidence-based treatments for PTSD (e.g., cognitive processing therapy, prolonged exposure).

- Provide individual psychotherapy to 5 adult veterans with PTSD and other trauma-linked disorders
- Co-facilitate an introduction to PTSD group and a processing group for WWII veterans
- On a weekly basis receive 2.5 hours of individual supervision from licensed

psychologists

- Participate in a 2 day training on Cognitive Processing Therapy (CPT) led by Dr. Patricia Resick

Boston University Center for Anxiety and Related Disorders (CARD) Boston, MA
Supervisor Trainee in Adult *CARD*, 5 hours/week, 09/11 to 08/12

- Supervise adult therapy provided by a second year PhD student via weekly supervision sessions, session audio reviews and live observations

Practicum Trainee in Child *CARD*, 15 hours/week, 09/11 to 08/12

- Conduct child psychological assessments for treatment utilizing the Anxiety Diagnostic Interview Schedule for DSM-IV and other relevant questionnaires
- Provide individual child cognitive behavioral therapy to treat anxiety and related disorders
- Supervised by a licensed psychologist who specializes in cognitive behavioral therapy for child and adolescents

Department of Veterans Affairs-Edith Nourse Rogers Memorial VA Medical Center Center for Psychotherapeutic Change (CPC)

Practicum Trainee, 24 hours/week, 09/10 to 05/11

Bedford, MA

CPC provides a range of short-term and longer-term individual and couples psychotherapy, incorporating dynamic, cognitive, behavioral, experiential, and humanistic/transpersonal perspectives in an integrative approach to treatment. The PTSD & Returning Veterans Program, in cooperation with the CPC, provides individual and group psychotherapy services for veterans with PTSD using a phase treatment model that includes assessment, psychoeducation, skills training, trauma processing and relapse prevention. Through this collaboration the CPC also offers training in evidence-based treatments including CBT for PTSD, Cognitive Processing Therapy, and Seeking Safety. Practicum trainees can also participate in several therapy groups for CBT, Mindfulness and PTSD.

- Provided individual psychotherapy to 10 adult veterans (75% with PTSD diagnoses)
- Co-facilitated a Beyond Trauma psychotherapy group (for female veterans) and an Anger Management group
- Conducted 2 hour intakes (interview and administration of relevant scales) on a bi-weekly basis
- On a weekly basis received 2 hours of individual supervision from licensed psychologists and 1 hour of group supervision from post-doctoral fellows and peers
- Attended a weekly mindfulness training seminar
- Participated in a 3 day training on Prolonged Exposure Therapy (PE) led by trained PE consultants

**Boston University Center for Anxiety and Related Disorders
 Psychological Services Center**

Boston, MA

Practicum Trainee, 15 hours/week, 08/09 to 08/10

- Conducted adult psychological assessments for treatment utilizing the Mini-Anxiety Diagnostic Interview Schedule for DSM-IV and other relevant questionnaires (e.g. Beck Depression Inventory, PTSD Questionnaire)
- Performed neuropsychological assessments with instruments such as the WAIS and Woodcock Johnson
- Provided individual cognitive behavioral therapy to treat mood and anxiety disorders
- Supervised by a licensed psychologist who specializes in cognitive behavioral therapy

TEACHING EXPERIENCE/ EMPLOYMENT

Boston University Metropolitan College Boston, MA

Clinical Psychology (PS 273), Instructor, 09/11 to 12/11, 09/12 to 12/12

- Provide an overview and general understanding of the field of Clinical Psychology
- First half of this course covers topics such as the evolution of clinical psychology, controversies, ethics, diagnosis and assessment
- Second half of the course survey different schools of psychotherapy (e.g. cognitive behavioral therapy and psychodynamic); and review a few areas of concentration in clinical psychology (e.g. health psychology).

Creativity in Psychology (PS 222), Instructor, 07/11 to 08/11, 05/13 to 06/13

- Covered the psychological and social contexts under which creativity and its products are able to flourish (or perish) and reviewed research studies on the personality characteristics of creative individuals

Abnormal Psychology, Instructor (PS 371), 01/10 to 05/11, 01/12 to 05/12, 01/13 to 05/13

- Assisted undergraduate students in developing an understanding of abnormal behavior and psychological diagnoses through lectures, movies, presentations, and discussions of information presented in readings

MEMBERSHIPS

American Psychological Association of Graduate Students

Division 12 - Society of Clinical Psychology, American Psychological Association

Division 35 - Society for the Psychology of Women, American Psychological Association

Division 45 – Society for Psychological Study of Ethnic Minority Issues, American Psychological Association

Division 56 - Trauma Psychology, American Psychological Association