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Reserve Capacity Model and Metabolic Syndrome in Black and White Seventh-day Adventists

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Reserve Capacity Model and Metabolic Syndrome in Black and White Seventh-day Adventists

by

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the requirements for the degree
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Each person whose signature appears below certifies that this thesis in his/her opinion is adequate, in scope and quality, as a thesis for the degree Master of Arts.

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ABSTRACT OF THE THESIS

Reserve Capacity Model Prediction of Metabolic Syndrome in Older Black and White Seventh-day Adventists

by

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Past research has identified a robust, monotonic relationship between socioeconomic status (SES) and cardiac health. Psychosocial factors may contribute to SES-related gradients in cardiac health. The Reserve Capacity Model (RCM; Gallo & Matthews, 2003) is a framework for examining psychosocial pathways in cardiac health disparities on the SES gradient. The model posits that a lower SES experience leads to more environmental stressors and fewer psychosocial resources (e.g., reserve capacity) to cope with these stressors subsequently eroding health. A number of studies have used the RCM to explain SES-related disparities in cardiac health in Whites and Latinos; few examine the model in Blacks. The results indicate a relationship between SES, RC, and metabolic syndrome in older Black and White adults. The current study found that RC partially mediated the SES and metabolic syndrome relationship in all subjects, and both Black and White adults. This finding illustrates that reserve capacity operates similarly in older adults when facing the risks associated with current poverty.

CHAPER ONE

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

The Reserve Capacity Model (RCM) was developed by Gallo and Matthews (2003) to understand SES-related health disparities. The model includes a set of psychosocial resources (mastery, optimism, self-efficacy, social support) known as reserve capacity, that moderate low-SES and poor health relationship (Gallo & Mathews, 2003). The psychosocial components are believed to ameliorate stress experienced by those living in poverty via biobehavioral pathways. These components, if well developed, mitigate the effects of poverty on cardiac health outcomes by improving stress perceptions, positive expectancies, and adaptive coping strategies that ultimately buffer stress reactivity to result in better health outcomes (Gallo, Espinosa de los Monteros, & Shivpuri, 2009). However, in a low SES environment it is more likely that the reserve capacity components are depleted or under developed and that poor health is the result.

RCM authors posit that a low-SES environment exposes individuals to a greater frequency of stressful stimuli (e.g., unemployment, threat of injury, and threat of losing resources); the longer an individual lives in a low-SES environment the lower their reserve capacity becomes leading to poor health outcomes. As low-SES individuals experience fewer psychosocial reserves their cardiac health suffers as a result of chronic stress reactivity and poor lifestyle choices (e.g., poor diet, substance abuse). One measure of cardiac health is the presence of metabolic syndrome, a set of risk factors associated with cardiovascular disease (CVD) and all-cause mortality (Räikkönen, Kajantie, Rautanen, & Eriksson, 2007). Metabolic syndrome includes any three of the following five criteria: (a) Fasting glucose >110 mg/dl, (b) Waist circumference >35

inches (women) or > 40 inches (men), (c) Systolic blood pressure >130 mmHg or diastolic blood pressure > 85mmHg, (d) Triglycerides >150 mg/dl, and (e) HDL cholesterol < 50 mg/dl (women) or < 40 mg/dl (men; Carnethon, Loria, Hill, Savage & Liu, 2004). The present study will predict metabolic syndrome with SES and reserve capacity (e.g., mediating psychosocial resources) in a cohort of older Seventh-day Adventist Black and White adults.

The proposed study will add to the RCM literature by including Blacks and Whites to predict metabolic syndrome, two dimensions of SES (income in the last year, household income in the last year) and by including males.

Ethnicity and SES

Studies including socio-structural (e.g. SES, education) variables are potentially confounded by ethnicity in the U.S. as ethnicity varies systematically by social strata so it is difficult to discern the independent contribution of each (Betancourt & López, 1993; Rohner, 1984). For example, Frerichs, Aneshensel, and Clark (1981) depressive symptoms varied by ethnicity in Los Angeles County, California. Initially, investigators found Latinos had the greatest levels of depressive symptoms though after controlling for SES all ethnic groups had similar levels of depressive symptoms. Blacks and Whites also have similar depression levels only after SES controls again indicating the SES and ethnicity confound (Comstock & Helsing, 1976; Husanini, Neff, & Stone, 1979).

It is also possible to misattribute the effects of ethnicity to SES. For example, Sobal and Stunkard (1989) reviewed 144 studies and found a strong relationship between SES and obesity among men, women, and children in developing countries, with higher

SES associated with more obesity. After reviewing body image attitudes in these countries, investigators found that the study cultures placed higher value on "fat body shapes." These findings demonstrate that the effects of cultural values (e.g., body shape) can be misattributed to SES (e.g., access to food). As such, the current study will test the relative individual contribution of SES in the model while examining possible moderation by ethnicity.

SES and Cardiac Health

SES disparities in health have long been identified in the health psychology literature (Albert, Glynn, Buring, & Ridker, 2006; Alley, Seeman, Kim, Karlamangla, Hu, & Crimmins, 2006). SES can be defined in many ways (e.g. education level, income level, neighborhood characteristics, occupational status), to stratify individuals on both social and economic status variables. This stratification system has a monotonic relationship with cardiac health; high-SES individuals have better cardiac health than low-SES individuals at each point along the SES gradient. The SES-cardiac health relationship can be explained by stress reactivity. Low-SES is associated with increased levels of stress and poor psychosocial coping skills which adversely affects physiological stress reactivity within the autonomic nervous system via hormone levels, metabolic function, inflammatory markers, and atherosclerotic risk characteristics. As such, low-SES is hypothesized to be related to poor cardiac health outcomes via a stress reactivity mechanism (Das & O'Keefe, 2006; Ecob & Smith, 1999; Ferrie, Shipley, Stansfeld, Smith, & Marmot, 2003).

The inverse relationship between SES and cardiac health is difficult to study because of the many pathways linking SES to cardiac health. For example, factors such

as access to health care, residential characteristics, environmental exposure, stress reactivity, health behaviors, and psychosocial factors provide only a minimal understanding for the graded relationship (Adler, Boyce, Chesney, Folkman, & Syme, 1993; Adler & Ostrove, 1999; Albert, Glynn, Buring, & Ridker, 2006). However, recent models that include psychosocial factors as pathways for the SES-cardiac health relationship have been supported and offer potential explanatory mechanisms (Chen & Matthews, 2001; Gump, Mathews, & Räikkönen, 1999; Pulkki, Kivimäki, Elovainio, Viikari, & Keltikangas-Järvinen, 2003).

Reserve Capacity, Ethnicity, and SES

According to the RCM, the stress low-SES individuals experience can be mitigated by a set of psychosocial resources (mastery, optimism, self-esteem, and social support) that improve emotional reactions thereby improving cardiac health. However, these resources are depleted rapidly in a low-SES environment with chronic stress and the need to overutilize the psychosocial resources (Brown & Bifulco, 1990; Brown & Moran, 1997; Gallo & Mathews, 2003).

A few studies directly test the RCM in ethnic minorities, and some examine cardiac health outcomes, such as metabolic syndrome (Gallo, 2003). Most studies examining the RCM include Whites and no single study has compared the RCM across ethnicities with one exception. Gallo, Espinosa de los Monteros, Ferent, Urbina, and Talavera (2007) investigated the RCM in a sample of Latinas to test the relationship between low-SES and metabolic syndrome with reserve capacity as a mediator. One hundred and forty-five, middle-aged Latinas from southern California health clinics

completed measures on education, reserve capacity resources, and metabolic syndrome . SES significantly predicted both reserve capacity and waist circumference. Finally, the SES and waist circumference relationship was mediated by reserve capacity. However, the model did not predict metabolic syndrome. What remains to be tested is whether this meditational relationship can be replicated in Blacks and Whites and whether metabolic syndrome is predicted in older adults. The present study will investigate both of these issues. The current investigation is based on research asserting that reserve capacity may vary by ethnicity (Williams, 1999; Williams & Rucker, 1996). The following section will discuss findings in the literature related to reserve capacity variations according to SES and ethnicity (African-Americans and Whites) with the following reserve capacity components: mastery, optimism, self-esteem, and social support (informational, emotional, instrumental).

Mastery

Mastery is the degree to which a person believes that his or her life circumstances are the consequence of his or her own actions (Midlarsky, 1991; Ross & Sastry, 1999; Wallhagen, Strawbridge, Kaplan, & Cohen, 1994). Individuals with high levels of mastery have low levels of psychological distress (Benassi, Sweeney, & Dufour, 1988). Grote, Ross and Mirowsky (1989) observed that mastery predicted greater active coping to resolve problems fewer depressive symptoms and better health (Menaghan 1983; Ross & Mirowsky, 1989; Thompson, et al., 2007). An increased sense of mastery is related to less negative emotions and better mental health regardless of SES and ethnicity (African-

Americans, Hispanics, and Whites; Jang, Chiriboga, & Small, 2008; Kiecolt & Hughes, 2009).

African-Americans reported significantly higher levels of mastery in response to health and financial-related threats compared to Hispanics, but not to Whites (Thompson & Schlehofer, 2008), and, in both African Americans and Whites mastery predicts better cardiac health (Bledsoe, Larkin, Lemay, & Brown, 2007; Gallo, Espinosa de los Monteros, & Shivpuri, 2009; Keith, Lincoln, Taylor, Jackson, & Jackson, 2010). Low-SES individuals are less likely to believe that they have a sense of mastery over events in their lives compared to their high-SES counterparts (Bailis, Segall, Mahon, Chipperfield, & Dunn, 2001; Galanos, Strauss, & Pieper, 1994; Mirowsky & Ross, 1990; Ross & Mirowsky, 1989; Thoits, 1995) and as such, mastery mediates the association between SES and health (Bailis et al., 2001; Bobak, Pikhart, Hertzman, Rose, & Marmot, 1998). Stressors themselves do not negatively affect health; rather, it is the individual's psychological capacity to manage and cope with stress that results in health consequences (Bandura, 2002).

Optimism

Dispositional optimism, the expectation that good rather than bad things will occur, has been related to better psychological and physical health, especially during times of elevated stress (Scheier & Carver, 1985). One way in which dispositional optimism benefits health is by its effect on coping strategies. Optimism is positively associated with approach coping that reduces stress and negative emotions and is negatively associated with avoidance coping such as ignoring, or withdrawing from

stressors. In addition, optimists may adjust their coping strategies to meet the demands of specific stressors resulting in more successful adjustment (Nes & Segerstrom, 2006; Taylor & Stanton, 2007). Further, optimism is associated with a reduced risk of coronary heart disease (CHD; Kubzansky, Sparrow, Vokonas, & Kawachi, 2001).

For both African Americans and Whites, greater levels of optimism are associated with less depression and fewer stressful events. Baldwin, Chambliss, and Towler (2003) found that optimism was negatively correlated with perceived stress in African Americans. Further, Scott (2003) found that African Americans with higher levels of optimism were more likely to be self-reliant and used more problem-solving coping strategies when facing stressors. Few studies have compared African Americans and Whites on levels of optimism though there is some indication they do not differ (Richman, Bennett, Pek, Siegler, & Williams Jr., 2007). Dispositional optimism is believed to mediate the graded relationship between SES and health (Lynch, Kaplan, & Shema, 1997; Robb, Simon, & Wardle, 2009; Scheier &Carver, 1985).

Self-esteem

Self-esteem can be defined as a positive evaluation of one's self concept and a sense of confidence and self-acceptance. Similar to the resources described above, levels of self-esteem are positively associated with increased psychological health (Schmit & Allik, 2005) and better problem solving (Baumiester, Campbell, Krueger, & Vohs, 2003; Crocker & Park, 2004). Increased levels of self-esteem can protect psychological health with a self-serving bias (Campbell & Sedikides, 1999); a tendency of low-SES individuals to ascribe their condition (e.g. low-SES) to external forces, not internal ones,

thereby removing any feelings of personal responsibility for their status. Crocker and Major (1989) find low-SES individuals protect self-esteem by ascribing their status to prejudice, or by devaluing the metrics in which the group performs poorly (e.g., education level, job prestige). These self-protective strategies explain why low-SES individuals actually have higher levels of self-esteem than their high SES counterparts (Gray-Little & Hafdahl, 2000; Twenge & Crocker, 2002). Researchers have found that African Americans reported greater levels of self-esteem compared to Latinos, Asian-Americans, and Whites. For African Americans, greater levels of self-esteem were related to less emotional distress (Gray-Little & Hafdahl, 2000; Twenge & Crocker, 2002).

Instrumental Social Support

Instrumental support is a provision of material goods, money, transportation, assistance with household chores, and childcare (Cohen & Hoberman, 1983; Dakof & Taylor, 1990; Neuling & Winefield, 1988) and it buffers emotional dysregulation by reducing maladaptive appraisals and a sense of control (Barrera, 2000; Cohen, 1988; Cohen & Wills, 1985; Gore, 1981; Lin, 1986; Treiber et al., 2003; Wortman & Dunkel-Schetter, 1987). Individuals with high levels of instrumental support tend to have lower levels of anxiety and depression (Collins & Feeney, 2000; Karademas, 2005; Paykel, 2007), and higher levels of approach and problem solving coping (Carver, Weintraub, & Scheier, 1989). Boutin-Foster (2005) found that individuals with coronary artery disease receiving more instrumental social support were more likely to make lifestyle changes to stay healthy (e.g. dietary changes, reducing responsibilities, keeping doctors'

appointments, taking medications, and exercising more) than those receiving less. These psychological benefits from social support may also moderate endocrine and immunologic changes associated with stressful experiences (Esterling et al., 1996).

Fogel, Albert, Schnabel, Ditkoff, and Neugut (2003) studied White, African American, and Hispanic American breast cancer patients and found Whites had the least instrumental social support. Unfortunately, few studies directly compare Blacks and Whites on levels of instrumental social support and how these levels interact with SES.

However, individuals living in poor neighborhoods have less instrumental social support (Bosma, Van Jaarsveld, Tunistra, Sanderman, Ranchor, et al., 2005; Kristenson, Eriksen, Sluiter, Stark, & Ursin, 2004; Taylor & Seeman, 1999) and more depression (Koster, Bosma, Kempen, Penninx, Beekman, et al., 2006). It is believed that with less psychosocial resources like instrumental social support, low SES individuals will have difficulty regulating psychological distress.

Informational Social Support

Informational support is the provision of information used to guide, advise, solve problems, answer questions, and provide feedback (Dakof & Taylor, 1990; Helgeson & Cohen) and buffers maladaptive appraisals that lead to emotional distress to increased cardiovascular reactivity. Informational social support may help individuals define stressors as being less overwhelming; allow the expression of fears and frustrations, and feel connected to others (Zuckerman & Antoni, 1995). Informational social support is related to an enhanced quality of life, self-esteem, personal empowerment, social standing, development of personal relationships, and less anxiety and depression

(Anderson and Tracey, 2001; Bier and Gallo, 1997; Henderson, 2001; Jacobs, Ross, Walker, & Stockdale, 1983; Leung & Lee, 2004).

In terms of ethnic differences in using or benefitting from informational social support, evidence is still lacking. Blacks, Hispanics, and Asians report significantly lower satisfaction with, and use of, informational social support and are less likely to use informational social support compared to Whites (Singh, Berman, Swindells, Justis, & Mohr, et al., 1999). Additionally, differences on the use of informational social support along the SES gradient are also lacking. One study found that low SES Black women greatly benefitted from an online resource guide that provided informational social support on women's health (Herman, Mock, Blackwell, & Hulsey, 2005). Another study found that low SES individuals benefit from informational social support from a patient advocate to acquire low-cost healthcare (Black, Priolo, Akinyemi, Gonzalez, & Jackson, et al., 2010).

Emotional Social Support

Emotional social support is defined as an expression of caring, love, empathy, affect, (Sherbourne & Stewart, 1999) and venting (Cohen, 1985). Emotional social support is believed to affect health through psychological processes involving appraisals and the expressive emotional support of others that provide an opportunity to reappraise situations (Barrera, 2000; Cohen, 1988, 1985; Gore, 1981; Lin, 1986; Sherbourne & Stewart, 1999). Similar to other types of social support, understanding how emotional social support affects cardiac health relies on using stress reactivity models. Studies show relationships between emotional social support and cardiac health such as atherosclerotic progression (Angerer, Siebert, Kothny, Muhlbauer, and Mudra, et al.

2000) and heart disease by SES gradient (Rosengren, Wilhelmsen, & Orth-gomer, 1993). In addition, Light, Kothandapani, and Allen (1997) report low emotional support was related to depression and higher blood pressure.

African-Americans have greater emotional support than Whites from spouses, children, and friends (Fogel, Albert, Schnabel, Ditkoff, & Neugut, 2002). However, Reynolds et al. (1994) found that the association of poorer survival rate with few sources of emotional support was greater for African Americans than Whites. This difference between ethnicities is believed to occur because Whites tend to have higher SES and better access to healthcare than African-Americans. In terms of SES, low SES is associated with less emotional social support and a higher risk of coronary heart disease, compared to higher SES strata. In summary, the reserve capacity model posits that a bank of psychosocial resources (mastery, optimism, self esteem, social support) may protect health by mitigating emotional distress that is related to greater stress reactivity and poor lifestyle choices. For both African Americans and Whites across the SES spectrum, resource deficiencies contribute to emotional reactivity to stress (Gallo & Matthews, 2003; Holahan, Moos, Holahan, & Cronkite, 1999; Wells, Hobfoll, & Lavin, 1997). With greater levels of reserve capacity, an individual is better equipped to attenuate stress perceptions, expect positive outcomes, and use adaptive coping; resulting in fewer negative emotions (Miller, Chen, & Cole, 2009). Additionally, findings show that psychosocial resources have a greater benefit on emotional outcomes in low SES compared to high SES individuals (Griffin, Fuhrer, Stansfeld, & Marmot, 2002; Lachman & Weaver, 1998). Further, findings also show that levels of emotional distress related to levels of reserve capacity for both low and high SES individuals (Bailis, Segall, Mahon,

Chipperfield, & Dunn, 2001; Link, Lennon, & Dohrenwend, 1993; Turner, Lloyd, & Roszell, 1999).

Cardiac Health and the RCM

It has been estimated that twenty-five percent of adults living in the U.S. have metabolic syndrome (Ford, Giles, & Mokdad, 2004). Metabolic syndrome can be described as a cluster of cardiac health risk factors including hypertension, dyslipidemia, insulin sensitivity, and central adiposity (NCEP, 2001). The presence of metabolic syndrome is associated with atherosclerosis, diabetes, coronary heart disease (CHD), cardiovascular disease (CVD), and early mortality (Malik, Wong, Franklin, Kamath, L'Italien, et al., 2004; McNeill, Rosamond, Girman, Golden, Schmidt, et al., 2005; McNeill, Rosamond, Girman, Golden, Schmidt, et al., 2004). Metabolic syndrome can be conceptualized as a particular combination of risk factors or an aggregate sum of risk factors (Grundy, Brewer, Cleeman, Smith, & Lenfant, 2004).

Recent studies have found that African Americans are significantly more likely to develop metabolic syndrome than Whites (Karlamanga, Merkin, Crimmins, & Seeman, 2010; Scuteri, Vuga, Najjar, Mehta, Everson-Rose, et al., 2008). More specifically, African American women experience a higher likelihood of the presence of metabolic syndrome than White women (Chichlowska, Rose, Diez-Roux, Golden, McNeill, et al., 2009). The relationship between metabolic syndrome and ethnicity is also affected by SES-- low-SES African Americans are more likely to develop metabolic syndrome than low-SES Whites (Lucove, Kaufman, & James, 2007; Salsberry, Corwin, & Reagan,

2007). The ethnic and SES-cardiac health related disparities will be examined with the RCM.

Few studies have used the RCM to explain SES-related cardiac health disparities. Gallo, Bogart, Vranceanu, and Matthews (2005) tested the RCM in 108 White (N = 94) and Black (N = 11) women (mean age = 41.07) of varying SES levels. Reserve capacity resources (mastery, optimism, self-esteem, social support) and positive and negative psychosocial experiences were assessed over two days. Lower SES was associated with less reserve capacity, and greater emotional reactivity. Unfortunately, the study did not include a health outcome variable so could not determine whether RCM explains SES-related health disparities. Matthews, Räikkönen, Gallo, and Kuller (2008) tested the RCM using 401 women (90% White; .08% Black; .01% Hispanic; .01% Indian American) across SES levels over 12 years. During this time, participants were measured on three reserve capacity resources (e.g. optimism, self-esteem, and social support), negative emotions (e.g. depressive symptoms and anger), and metabolic syndrome variables. The models indicated that (a) low SES predicts metabolic syndrome, (b) low reserve capacity predicts negative emotions, and (c) negative emotions predict metabolic syndrome.

Going a step further, Gallo, Espinosa de los Monteros, Ferent, Urbina, and Talavera (2007) tested the RCM using 145 Latinas from health clinics along the California-Mexico border. Women were measured on reserve capacity resources and positive and negative psychosocial experiences over two days. The results confirmed that (a) lower SES predicted less reserve capacity, (b) lower SES predicted a greater risk for some, but not all, metabolic syndrome variables (blood pressure, glucose, and waist

circumference), (c) increased reserve capacity predicted reduced waist circumference, and (d) SES indirectly affected waist circumference through reserve capacity. Compared to previous studies, Gallo, Espinosa de los Monteros, Ferent, Urbina, and Talavera (2007) provides the most comprehensive test of the RCM. In this study, SES, reserve capacity, and a health outcome were each included, and the evidence suggests that health is indirectly affected by SES through reserve capacity.

In summary, evidence supporting the RCM is limited but consistent. Together, the previous studies provide data for each component of the RCM; (a) SES predicts health, reserve capacity, and negative emotions, (b) reserve capacity predicts negative emotions and health, and (c) the relationship between SES and health is mediated by reserve capacity. Most importantly with regard to the current study, two of these studies found evidence for the RCM to predict cardiac health differences based on SES and reserve capacity.

The Present Investigation

The present investigation will: assess SES status (income in the last year, household income in last year); assess three types of intrapersonal psychosocial resources (mastery, optimism, self-esteem), and three types of interpersonal resources (instrumental, emotional, and informational social support); to predict metabolic syndrome in Blacks and Whites (see Figure 1.1). This investigation will be the first to test the RCM as an explanatory framework for the SES-related cardiac health disparity among Blacks and Whites.

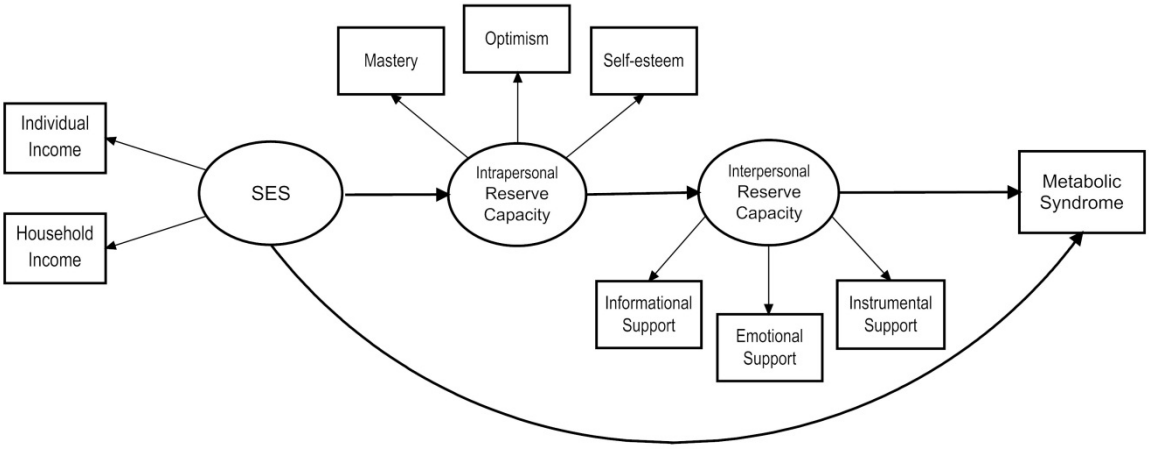

Figure 1.1. Hypothesized direct and indirect effects of SES and reserve capacity on metabolic syndrome.

Aims and Hypotheses

Aim 1

To evaluate whether intrapersonal and/or interpersonal reserve capacity mediates the relationship between SES and metabolic syndrome risk.

Hypothesis 1. SES will be negatively associated with metabolic syndrome and positively associated with intrapersonal and interpersonal reserve capacity.

Hypothesis 2. Intrapersonal and interpersonal reserve capacity will be negatively associated with metabolic syndrome risk.

Hypothesis 3. The association between SES and metabolic syndrome risk will be substantially reduced when intrapersonal reserve capacity is statistically controlled indicating mediation.

Hypothesis 4. The association between SES and metabolic syndrome will be substantially reduced when interpersonal reserve capacity is statistically controlled indicating mediation.

Aim 2

To evaluate whether the predictive ability of the reserve capacity model is moderated by ethnicity.

Hypothesis 5. Blacks will have lower SES, lower levels of reserve capacity and subsequently greater metabolic syndrome risk than Whites.

CHAPTER TWO

METHOD

Participants and Procedures

The data were gathered in the Biopsychosocial Religion and Health Study (BRHS), a cohort study of 10,988 Seventh-day Adventists, to address whether religious engagement mediates the effect of lifetime cumulative risk exposure on health (Lee, Morton, Walters, Bellinger, Butler, et al., 2009). All individuals for the current archival, secondary data analysis were those who completed usable questionnaires from a random sample of 20,000 participants from the Adventist Health Study 2 (AHS-2) cohort study of 96,000 participants on lifestyle, diet, and health. Of the 10,988 BRHS participants, 508 within a 60 mile radius of the Loma Linda University campus also completed a clinic to have blood pressure, body measures, blood, urine and saliva samples taken along with memory and physical performance testing. The inclusion criteria for the present study is being either Black or White and complete data on all relevant variables (Blacks include Caribbean American Blacks and African Americans).

An outline for methods and sampling procedures for AHS-2 recruitment are described elsewhere (Butler et al., 2008). The BRHS response rates for ethnicity were 60% White and 31% Black. Missing data on scales were handled as follows: all scores were means of the completed scale questions. In creating a mean, one missing item was allowed for scales with three to five items, and two for scales with six to 10 items. The original sample included 508 participants, however based on the ≥50 years age criteria, nine participants were dropped ($N = 499$). Based on the ethnicity criteria (Black or White) 14 participants were dropped ($N = 485$). Further, based on whether participants

were active or inactive SDA resulted in the exclusion of 5 more participants ($N = 480$). Finally, 93 participants were dropped for incomplete data on the observed variables, resulting in a sample size $N = 387$. Further six Whites and four Blacks were dropped because they were outliers, defined as 3.5 standard deviations above the mean, resulting in a final sample of 377 participants (Blacks: $n = 154$, Whites: $n = 223$). Compared to the 131 excluded participants, the included were more likely to be White (included: 60.74%; excluded: 45.21%, $p < .001$) and were more educated (included: $M = 6.87$, $SD = 1.57$; excluded: $M = 6.45$, $SD = 1.84$, $p = .013$).

Measures

Control Variables

Age and gender were controlled in all analyses. The distributions of these variables are shown in Table 3. Participants ranged in age from 50 to 96 years; mean age was 67.38 (SD = 11.10).

Latent Constructs

For the structural equation models (SEM), an SES and a Reserve Capacity construct were formed. Each was formed from two to three manifest variables described below.

Socioeconomic Status (SES)

SES was defined as your income in the last year and household income in the last year. Income in the last year and household income in the last year are both ordinal

variables (“less than $10,000”, “$11,000-$20,000”, “$21,000-30,000”, “$31,000-$50,000”, “$51,000-$75,000”, “$76,000-$100,000”, “$101,000-$200,000”, and “more than $200,000”).

Reserve Capacity

Mastery was assessed with the 4-item version of the Self-Mastery Scale (SMS; Pearlin & Schooler, 1978; Pudrovska et al., 2005). The SMS is a self-report scale that measures feelings of personal mastery over life outcomes (α = .73). The SMS is a widely used measure and has shown good reliability and validity in studies of health and wellbeing (Marshall & Lang, 1990; Pearlin & Schooler, 1978; see Appendix A).

Optimism was measured with the Life Orientation Test, revised (LOT-R; Scheier & Carver, 1994). The LOT is an eight-item self-report measure of expectancies for positive and negative outcomes (α = .89). Items include a five-point response scale ranging from 0 (strongly disagree) to 4 (strongly agree; See Appendix B).

Self-esteem was measured by using the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). Four items from the RSES were used as a measure of global attitudes about the self-rated on a five-point response scale ranging from 0 (strongly disagree) to 4 (strongly disagree). The RSES is a widely used measure of self-esteem, and has demonstrated good reliability (α = .92) and validity in other studies of health and wellbeing (Crandall, 1973; Rosenberg, 1965; see Appendix C).

Social support was measured using the informational, instrumental, and emotional support subscales from the Positive Social Exchange Measure scale rated on a five-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree; Newsom, 2002).

Informational social support was measured with 2 items related to social exchanges including useful suggestions and information about resources provided to the recipient (α = .87; Newsom, Nishishiba, Morgan, & Rock, 2003; Newsome, Rook, Nishishiba, Sorkin, & Mahan, 2005; see Appendix D). Emotional support was measured with 2 items related to efforts by others to help the recipient feel more positive. (α = .82; see Appendix E). Instrumental social support was measured with 2 items related to having received favors and help from others (α = .91; see Appendix D).

Metabolic Syndrome

Biological markers capturing dysregulation in metabolic processes were used to create a metabolic syndrome composite variable. Five biomarkers were used to derive the final metabolic syndrome score: (a) fasting glucose, (b) waist circumference, (c) systolic blood pressure, (d) triglycerides, and (e) HDL cholesterol. Scores for the five metabolic syndrome variables were transformed into *z* scores and then summed to create an index for metabolic syndrome risk (e.g. higher z-scores represent a greater risk for developing metabolic syndrome). The valence of the HDL cholesterol variable was reversed by multiplying the Z-score by negative one before aggregating, so that higher values represented increased risk. Metabolic syndrome composite scores ranged from -5.76 to 5.96, with higher scores representing greater metabolic dysregulation (Carnethon, Loria, Hill, Savage & Liu, 2004).

Waist circumference was measured using a plastic tape calibrated in millimeters for waist and hip circumference. Waist was defined as the mid-point between the lower rib and the upper margin of the iliac crest. Diastolic and systolic blood pressures were

measured using an automatic Omron Blood Pressure cuff and monitor three times after resting for 10 minutes in a quiet place-the variables in the present study are the average of these three readings. Glucose, as well as, triglycerides and HDL cholesterol were measured using the Cholestech GDX.

Statistical Analyses

Analyses were performed using the Statistical Package for the Social Sciences (SPSS 16.0 for Windows, Chicago IL, USA). Prior to analysis, normality and outliers were examined. Structural equation modeling was conducted to examine the hypothesized associations among SES, reserve capacity, and metabolic syndrome risk. EQS 6.1 was used to test a model including SES (income in the last year, household income in the last year), intrapersonal reserve capacity (mastery, optimism, self-esteem), interpersonal reserve capacity (informational, emotional, and instrumental social support), and metabolic syndrome risk (cumulative Z-score for all of the following; glucose, diastolic blood pressure, HDL cholesterol, waist-to-hip ratio, and triglycerides) for Blacks and Whites. In order to maintain a parsimonious model and preserve model degrees of freedom (Kammeyer-Mueller & Wanberg, 2003), the covariates of age and gender were partitioned from each of the observed variables prior to SEM analyses. Multi-group structural equation modeling was performed to test for potential differences in the magnitude of relations among the model variables by ethnicity.

The potential mediating effects of Reserve Capacity were evaluated using structural equation modeling in accordance with McKinnon (2008). According to McKinnon (2008), mediation can be determined only if: (a) the IV (independent variable;

SES) predicts the DV (dependent variable; Metabolic Syndrome); (b) the IV predicts the potential mediator (intrapersonal/interpersonal Reserve Capacity); (c) the potential mediator predicts the DV; and (d) the relationship between the IV and DV is reduced when the potential mediator is included. Additionally, Sobel's test will be performed to evaluate whether the SES-Metabolic Syndrome relationship is significantly reduced when Reserve Capacity is added to the model. If the Sobel test is significant, and the direct effect of SES on Metabolic Syndrome is not significant, then the mediation is full. If the Sobel test is significant but the direct effect of SES on Metabolic Syndrome remains significant, then Reserve Capacity will be deemed a partial mediator.

Multivariate analysis of covariance (MANCOVA) was employed to test associations between ethnicity and variables representing SES (i.e., individual income in the last year, household income in the last year) Reserve Capacity (i.e., mastery, optimism, self-esteem, and informational, emotional, and instrumental social support), while controlling gender and age. Pillai's Trace was used as the multivariate statistic because it is generally more robust than the other multivariate statistics (Field, 2005). For significant MANCOVA main effects, follow-up one-way univariate tests were performed. The association between ethnicity and metabolic syndrome was tested using analysis of covariance (ANCOVA), with age and gender controlled.

CHAPTER THREE

RESULTS

Sample Characteristics

A total of 377 participants (Black $n = 154$, White $n = 223$) were included in the study. Table 1 shows demographic characteristics of the sample. The sample consisted of 222 females and 155 males, with an average age of 68.56 years. Compared to the White sample, the Black sample was younger, $t(375) = -6.37$, $p < .001$, more likely to be female, $\chi^2(1) = 4.03$, $p = .045$, less educated, $\chi^2(6) = 68.70$, $p < .001$, and had less individual and household income in the last year, $\chi^2(4) = 10.95$, $p = .027$ (see Table 1.1).

Preliminary Analyses

Based on a review of descriptive statistics for all variables, the data generally appears to approximate a normal distribution (see Table 1.2). Standardized values of skewness and kurtosis fell within acceptable limits. Screening for multivariate outliers was conducted through evaluation of Mahalonobis distance as a chi square statistic with no cases exceeding the critical value for Chi-square. Table 1.3 presents correlations among the study variables. None of the correlations are so strong as to risk multicollinearity. Overall, correlation results were in the expected direction, indicating preliminary support for the model depicted in Figure 1.1.

Table 1.1

Demographics by ethnicity and total sample

	Black (n = 154)	White (n = 223)	Total (N = 377)
	n (%)	n (%)	N (%)
Gender*			
Male	53 (34.42)	102 (45.70)	155 (41.10)
Female	101 (65.58)	121 (54.30)	222 (58.90)
Your Income, last year			
< $10,000	17 (11.0)	27 (12.10)	44 (11.70)
$11-20,000	26 (16.9)	25 (11.20)	51 (13.50)
$21-30,000	19 (12.3)	31 (13.90)	50 (13.30)
$31-50,000	42 (27.3)	64 (28.70)	106 (28.10)
$51-75,000	35 (22.7)	36 (16.10)	71 (18.80)
$76-100,000	10 (6.5)	14 (6.30)	24 (6.40)
$101-200,000	4 (2.6)	18 (8.10)	22 (5.80)
> $200,000	1 (.6)	8 (3.60)	9 (2.40)
	M (SD)	M (SD)	M (SD)
Age in years*	64.19 (9.66)	71.58(11.96)	68.56(11.65)

*$p < .05$ for difference between ethnic groups.

Table 1.2

Descriptives for variables of interest by ethnicity and total sample

	M (*SD*)	Min	Max	Skew	Kurtosis
Blacks					
Individual income, last year	3.67 (1.36)	1.00	8.00	-.016	-.586
Household income, last year	4.59 (1.09)	1.00	8.00	-0.49	-.700
Mastery	5.76 (1.21)	1.00	7.00	-1.20	1.68
Optimism	5.65 (1.15)	1.00	7.00	-0.74	.539
Self-esteem	5.92 (1.10)	2.25	7.00	-1.07	.477
Informational support	3.24 (0.95)	1.00	5.00	-0.08	-.681
Emotional support	3.53 (0.82)	1.50	5.00	-0.08	-.448
Instrumental support	3.09 (1.03)	1.00	5.00	-0.06	-.617
Metabolic syndrome risk	0.42 (2.38)	-4.46	21.81	4.80	42.26
Whites					
Individual income, last year	3.95 (1.85)	1.00	8.00	0.22	-0.47
Household income, last year	5.26 (1.78)	1.00	8.00	-0.46	-0.17
Mastery	5.69 (1.06)	2.50	7.00	-0.76	.045
Optimism	5.68 (1.03)	2.00	7.00	-0.83	.574
Self-esteem	5.96 (1.03)	1.50	7.00	-1.53	2.79
Informational support	3.27 (1.07)	1.00	5.00	-0.31	-0.50
Emotional support	3.64 (.83)	1.00	5.00	-0.36	-0.24
Instrumental support	3.15 (1.11)	1.50	5.00	-0.07	-0.72
Metabolic syndrome risk	-.27 (1.89)	-4.52	5.26	0.42	-0.05
Total sample					
Individual income, last year	3.83 (1.75)	1.00	8.00	0.18	-.411
Household income, last year	5.01 (1.87)	1.00	8.00	-0.50	-0.33
Mastery	5.72 (1.12)	1.00	7.00	-0.97	0.92
Optimism	5.66 (1.08)	1.00	7.00	-0.80	0.58
Self-esteem	5.95 (1.06)	1.50	7.00	-1.32	1.66
Informational support	3.26 (1.02)	1.00	5.00	-0.23	-0.54
Emotional support	3.60 (0.82)	1.00	5.00	-0.24	-0.37
Instrumental support	3.13 (1.08)	1.00	5.00	-0.06	-0.68
Metabolic syndrome	0.01 (2.13)	-4.52	21.81	2.99	28.39

Table 1.3

Correlations among variables of interest for total sample (N = 377)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Socioeconomic status	–									
2. Individual income	.196***	–								
3. Household income	.230***	.357***	–							
4. Mastery	.367***	.072	.354***	–						
5. Optimism	.794***	.156**	.183***	.291***	–					
6. Self-esteem	.286***	.056	.066	.263***	.227***	–				
7. Informational Support	.269***	.053	.062	.099	.214***	.077	–			
8. Emotional Support	.069	.013	.016	.025	.054	.020	.254***	–		
9. Instrumental Support	.229***	.045	.053	.084	.182***	.065	.849***	.216***	–	
10. Metabolic syndrome risk	.194***	.038	.045	.071	.154**	.055	.720***	.183***	.612***	–

The Reserve Capacity Model

The causal model shown in Figure 1.1 includes direct paths from SES to Intrapersonal Reserve Capacity, and Metabolic Syndrome. Additionally there are direct paths from Intrapersonal Reserve Capacity to Interpersonal Reserve Capacity and from Interpersonal Reserve Capacity to Metabolic Syndrome. To determine whether the hypothesized model is an acceptable fit for the data Hu and Bentler's (1999) criteria were used; a Comparative Fit Index (CFI) > 0.90 and a Root Mean Square Error of Approximation (RMSEA) < 0.05 (Hu and Bentler, 1999). Based on the above criteria, the hypothesized model yielded an excellent fit to the data, CFI = 1.00, $\chi^2(23) = 21.45$, p = .554, RMSEA < .001, SRMR = .037. No post hoc model modifications were performed, and the model with standardized path coefficients is presented in Figure 1.2.

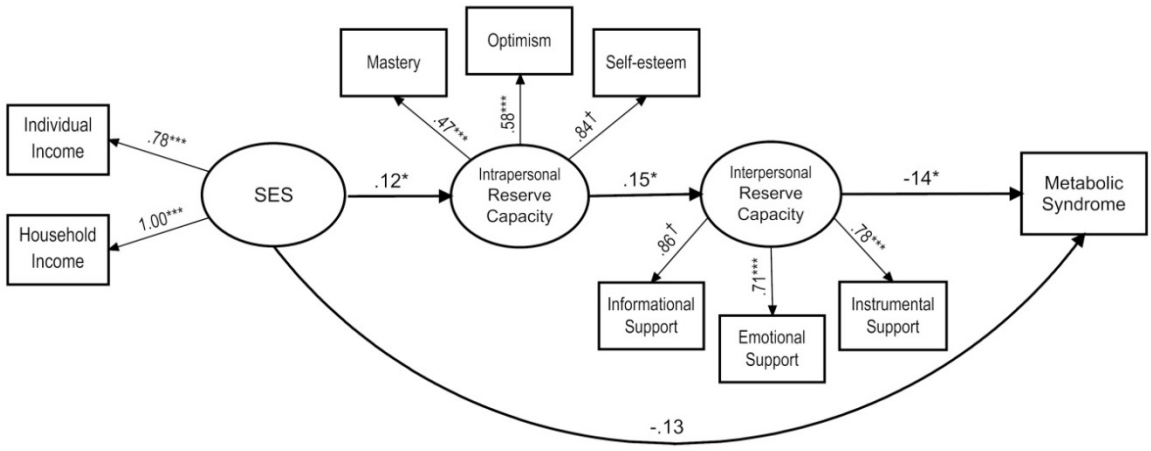

Figure 1.2. Final model with standardized path coefficients.
Note. †pathway set to 1.0.
*p < .05; **p < .01; ***p < .001.

Examination of the path coefficients in the final model (see Figure 1.2) yields support to the first and second study hypotheses. Consistent with Hypothesis 1, SES was positively associated with Intrapersonal Reserve Capacity ($\beta = .12$, $p = .038$). SES was also negatively, albeit marginally, associated with Metabolic Syndrome ($\beta = -.13$, $p = .053$). Hypothesis 2 was also confirmed as Interpersonal Reserve Capacity was shown to be negatively associated with Metabolic Syndrome ($\beta = -.14$, $p = .011$). Preliminary support was also found for Hypothesis 3, which states that Reserve Capacity will mediate the SES-Metabolic Syndrome relationship. Specifically, when SES was the sole predictor in the model, the effect of SES on Metabolic Syndrome was significant ($\beta = -.18$, $p < .001$, see Figure 1.3). The direct effect of SES on Metabolic Syndrome was no longer significant after Intrapersonal and Interpersonal Reserve Capacity were added to the model ($\beta = -.13$, $p = .053$, see Figure 1.2), indicating that Reserve Capacity partially mediates the SES-Metabolic Syndrome relationship.

The potential mediator effects of Intrapersonal Reserve Capacity as well as Interpersonal Reserve Capacity were each investigated on the SES-Metabolic Syndrome relationship. As shown in Figure 1.4, Intrapersonal Reserve Capacity did not mediate the relationship between SES and Metabolic Syndrome as there was no direct effect of Intrapersonal Reserve Capacity on Metabolic Syndrome ($\beta = -.10$, $p = .219$; see criterion 3 of Hu & Bentler, 1999). Therefore, Hypothesis three was not supported with regard to this aspect of Reserve Capacity. Interpersonal Reserve Capacity was tested for partial mediation because although the path from SES to Metabolic Syndrome remained significant, the paths from SES (IV) to Reserve Capacity (mediator) and from Reserve Capacity to Metabolic Syndrome (DV) were also significant (see Figure 1.5). The Sobel

test was not significant however (Sobel test Z =1.52, p = .130), indicating that Interpersonal Reserve Capacity does not mediate the relationship between SES and Metabolic Syndrome.

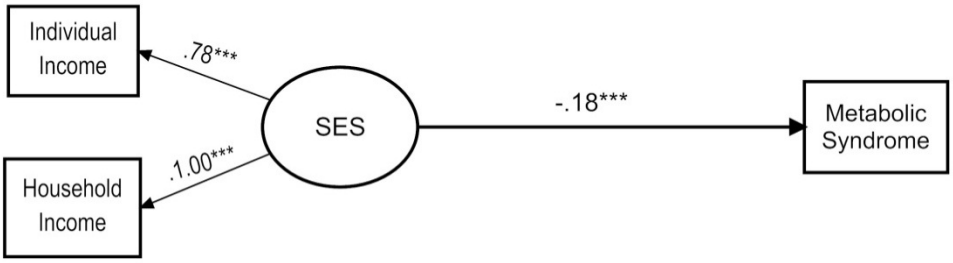

Figure 1.3. SES-Metabolic Syndrome relationship with standardized path coefficients.
Note. CFI = 1.00; $\chi^2(1) = 1.22$, p =.27; RMSEA = 0.02.
***p < .001.

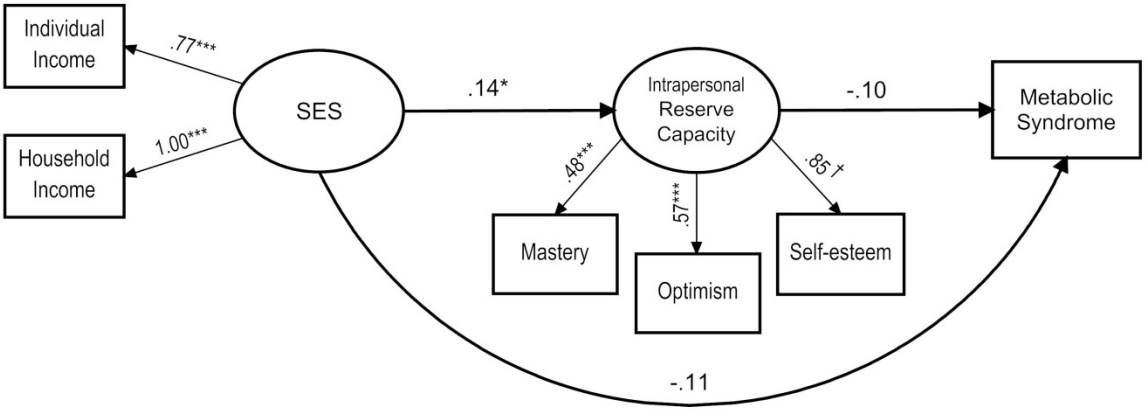

Figure 1.4. Testing Intrapersonal Reserve Capacity as a mediator for the SES-metabolic syndrome relationship.
Note. CFI = ; $\chi^2()$ = , p =.; RMSEA = .; †pathway set to 1.0.
*p < .05; **p < .01; ***p < .001.

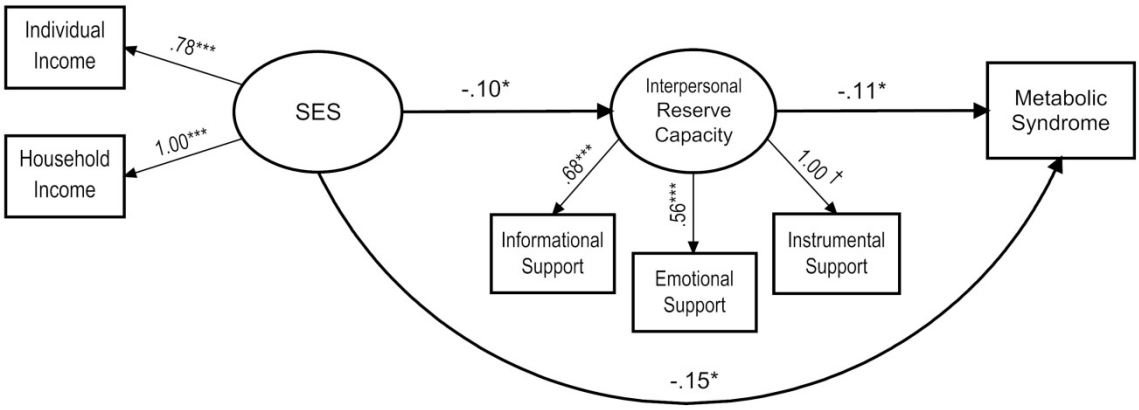

Figure 1.5. Testing Interpersonal Reserve Capacity as a mediator for the SES-metabolic syndrome relationship.
Note. CFI = ; χ^2() = , p =.; RMSEA = .; †pathway set to 1.0.
*p < .05; **p < .01; ***p < .001.

Test of Model Invariance by Ethnicity

Prior to the test of invariance, the model was first evaluated for the Black and White samples independently. The data were screened and results revealed a normal distribution and no multivariate outliers. Furthermore, a review of the bivariate correlations for Blacks and Whites did not indicate multicollinearity among the study variables (see Table 4). Similar to the combined sample, the model fit the data well for the Black sample, CFI = 1.00, $\chi^2(25) = 24.84$, $p = .471$, RMSEA < .001, and the White sample, CFI = 1.00, $\chi^2(23) = 23.77$, $p = .417$, RMSEA = .012. The model with standardized path coefficients for each group is presented in Figure 1.6.

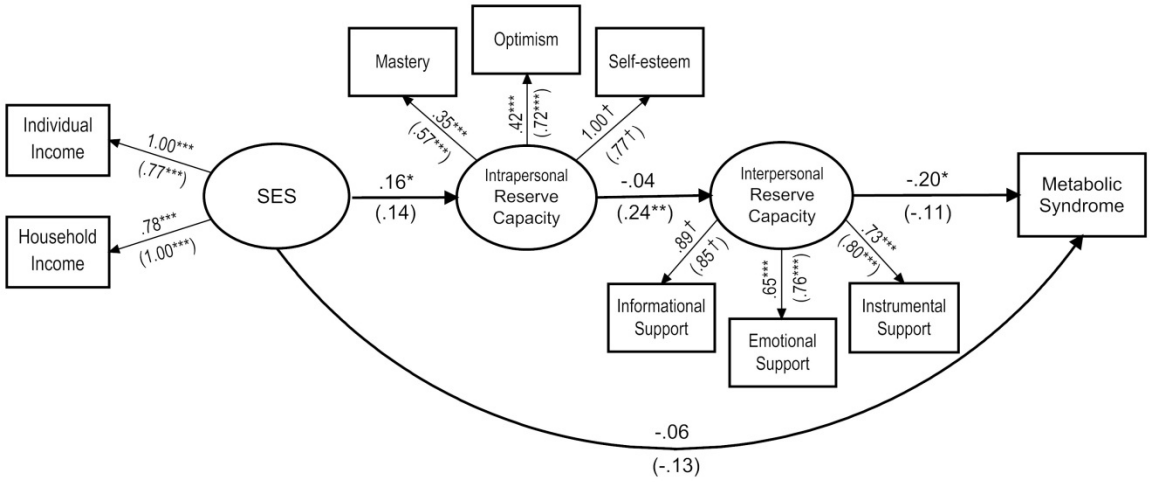

Figure 1.6. Final model with estimated path coefficients and factor loadings for both ethnic groups (path coefficients for Whites are in parentheses).
Note. †pathway set to 1.0.
*$p < .05$; **$p < .01$; ***$p < .001$.

Table 1.4

Correlations among variables of interest by ethnicity

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Socioeconomic status	–										
2. Individual income	.998*** (.773***)	–									
3. Household income	.779*** (.277***)	.778*** (.772***)	–								
4. Intrapersonal Reserve Capacity	.160* (.110)	.160* (.110)	.125 (.142*)	–							
5. Mastery	.056 (.082)	.068 (.063)	.044 (.081)	.349*** (.573***)	–						
6. Optimism	.068 (.102)	.159* (.079)	.053 (.102)	.422*** (.716***)	.147 (.410***)	–					
7. Self-esteem	.160 (.109)	.159 (.084)	.124 (.109)	.160 (.767***)	.348*** (.440***)	.420*** (.549***)	–				
8. Interpersonal Reserve Capacity	-.006 (.034)	-.006 (.026)	-.005 (.034)	-.040 (.237***)	-.014 (.136*)	-.017 (.170*)	.040 (.182***)	–			
9. Informational support	-.006 (.029)	-.006 (.022)	-.004 (.029)	-.035 (.202**)	-.012 (.116)	-.015 (.144)	-.035 (.155*)	.886*** (.849***)	–		
10. Instrumental support	-.005 (.027)	-.005 (.021)	-.004 (.027)	-.029 (.190**)	-.010 (.109)	-.012 (.136)	-.029 (.146*)	.730*** (.800***)	.647*** (.680***)	–	
11. Emotional support	-.004 (.026)	-.004 (.020)	-.003 (.026)	-.026 (.180**)	-.009 (.103)	-.011 (.129)	-.026 (.138*)	.647*** (.758***)	.573*** (.644***)	.473*** (.607***)	–
12. Metabolic syndrome	-.060 (-.136*)	-.060 (-.105)	-.133 (-.171*)	-.002* (-.044)	-.001* (-.181**)	-.001 (-.031)	-.002 (-.034)	-.196* (-.110)	-.006 (-.094)	-.143* (-.088)	-.127 (-.084***)

Note. Intercorrelations for Blacks (n = 154) are in upper portion of cell, values in parentheses represent Whites (n = 223).

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

Tests of measurement equivalence and structural invariance of the model across Blacks and Whites were used to evaluate whether the paths in the model were moderated by ethnic group. Prior to the test for measurement equivalence, configural invariance was first established in which the number of factors and the factor-loading patterns were checked for equality across ethnic groups. The requirement for this basic level of measurement invariance is that both Blacks and Whites must have the same indicators for the same factor. For example, both Blacks and Whites would have the same three variables representing Interpersonal Reserve Capacity (e.g. Information Support, Emotional Support, and Instrumental Support). The fit indices revealed an excellent fit to the data, CFI = .988; $\chi^2(48) = 59.38$, p = .126; RMSEA = .036, supporting configural invariance across ethnic groups (see Table 5).

In the second level of measurement equivalence, the factor loadings of the baseline model were constrained to be equal across ethnic groups, making these coefficients (e.g. loadings) invariant between Blacks and Whites. The constrained measurement model also showed a good fit to the data, CFI = .987, $\chi^2(54) = 66.91$, p = .112, RMSEA = .036. Because the difference between the fit of the measurement model and the configural model was not significant [$\Delta\chi^2(6) = 7.53$, p = .275], measurement equivalence was supported. Lastly, to test for between-group differences in the magnitude of structural paths in the model, constraints were imposed on structural paths to examine the moderating effects of ethnicity on the structural paths of the hypothesized model. The constrained structural model also met the criteria of an adequate fit, CFI = .984, $\chi^2(58) = 73.16$, p = .087, RMSEA = .037, and did not show a significant decrement

in fit as compared to the configural model, $\Delta\chi^2(10) = 13.78$, $p = .183$. These findings indicate that the structural model operated similarly for both Blacks and Whites.

Table 1.5

Summary for tests of configural, measurement, and structural invariance across ethnicity

Model	χ^2	*Df*	CFI	RMSEA (90% CI)	$\Delta\chi^2$	Δdf	ΔCFI
1 Configural invariance	59.38	48	.988	.036 (.000, .062)	—	—	—
2 Measurement invariance	66.91	54	.987	.036 (.000, .061)	7.53	6	-.001
3 Structural invariance	73.16	58	.984	.037 (.000, .061)	13.78	10	-.004

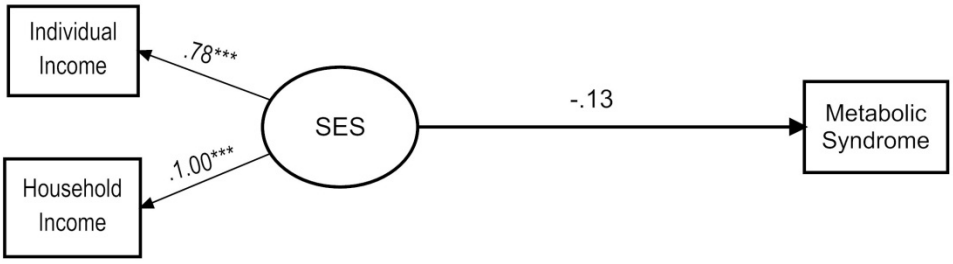

Figure 1.7. SES-Metabolic Syndrome relationship with path coefficients for Blacks.
Note. CFI = 1.00; $\chi^2(1) = 0.41$, $p = .522$; RMSEA < .001.
***$p < .001$.

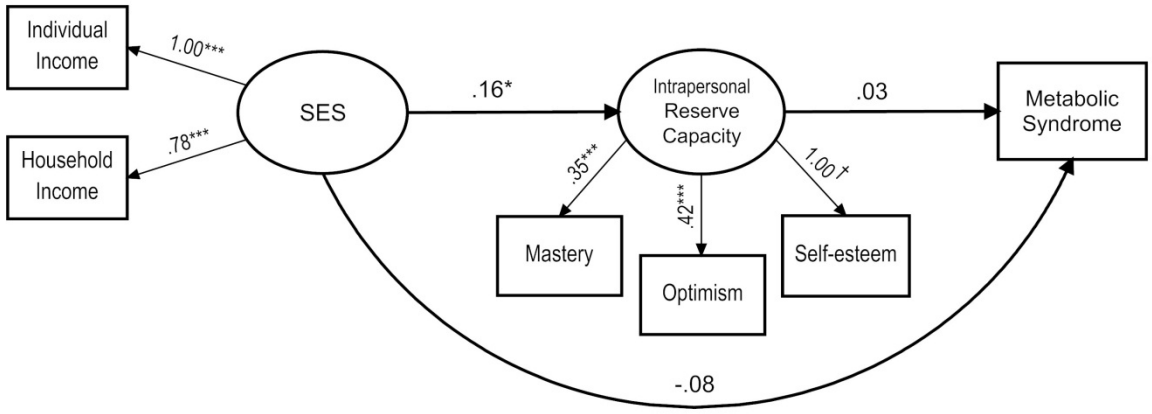

Figure 1.8. Testing Intrapersonal Reserve Capacity as a mediator for the SES-metabolic syndrome relationship for Blacks.
Note. CFI = 1.00; $\chi^2(8) = 5.47$, $p = .707$; RMSEA < .001; †pathway set to 1.0.
*$p < .05$; **$p < .01$; ***$p < .001$.

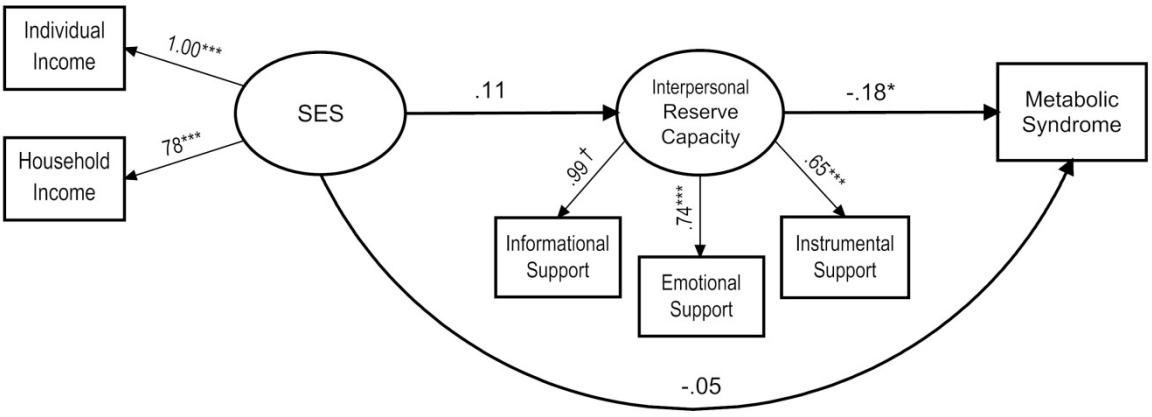

Figure 1.9. Testing Interpersonal Reserve Capacity as a mediator for the SES-metabolic syndrome relationship for Blacks.
Note. CFI = 1.00; $\chi^2(7) = 13.38$, $p = .063$; RMSEA = .077; †pathway set to 1.0.
*$p < .05$; **$p < .01$; ***$p < .001$.

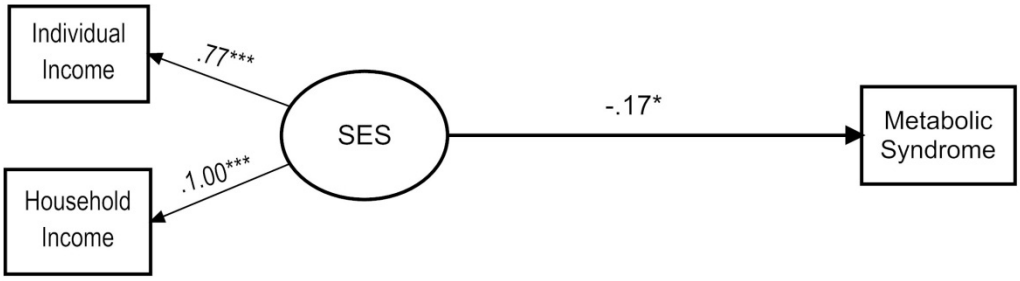

Figure 1.10. SES-Metabolic Syndrome relationship with path coefficients for Whites.
Note. CFI = 1.00; $\chi^2(1) = 0.58$, p =.445; RMSEA <.001.
*p < .05; **p < .01; ***p < .001.

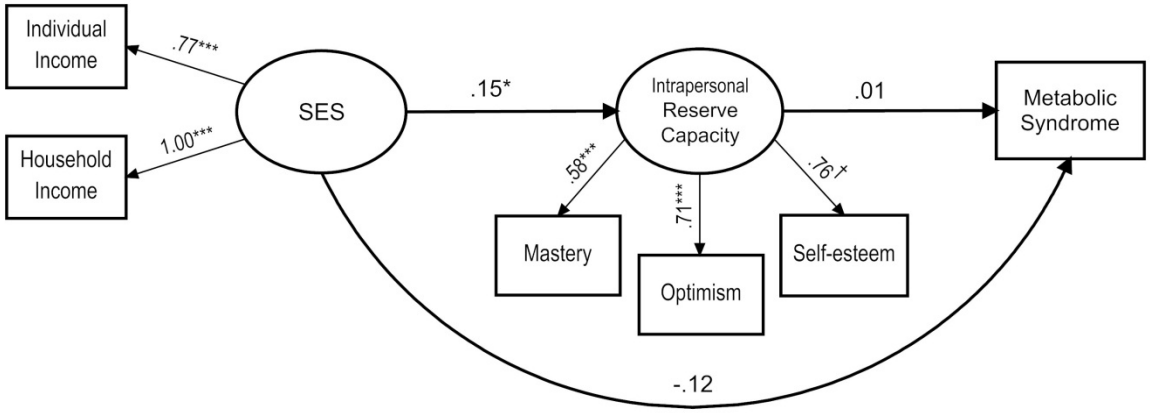

Figure 1.11. Testing Intrapersonal Reserve Capacity as a mediator for the SES-metabolic syndrome relationship for Whites.
Note. CFI = 1.00; $\chi^2(6) = 3.43$, p =.753; RMSEA < .001; †pathway set to 1.0.
*p < .05; **p < .01; ***p < .001.

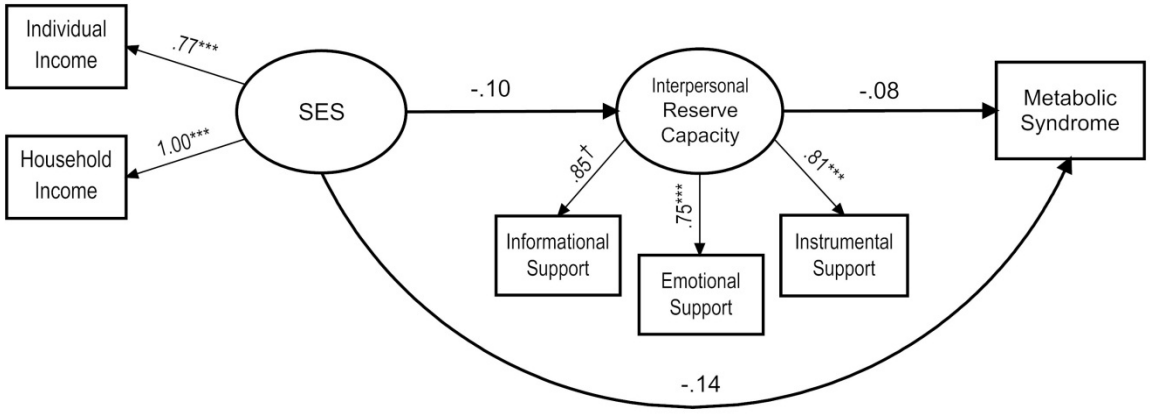

Figure 1.12. Testing Interpersonal Reserve Capacity as a mediator for the SES-metabolic syndrome relationship for Whites.
Note. CFI = 1.00; $\chi^2(7) = 4.15$, p =.762; RMSEA < .001; †pathway set to 1.0.
*p < .0-5; **p < .01; ***p < .001.

Ethnic Group Differences on Measured Variables

A series of multivariate analyses of covariance (MANCOVA) were conducted to investigate the effects of ethnicity on SES, Intrapersonal Reserve Capacity and Interpersonal Reserve Capacity while controlling for gender and age (see Table 1.6). Additionally, analysis of covariance (ANCOVA) was used to assess the effects of ethnicity on Metabolic Syndrome while controlling for gender and age.

The SES variables (personal income and household income) varied by ethnic group, Pillai's trace, $V = .045$, $F(2, 372) = 8.67$, $p < .001$. Significant main effects for ethnicity were observed for household income, $F(1, 377) = 13.88$, $p < .001$; Whites reported an average household income of \$51,000-\$75,000 ($M = 4.43$, $SE = 0.11$), while Blacks reported an average household income of \$31,000-\$50,000 ($M = 3.75$, $SE = 0.14$).

The Interpersonal Reserve Capacity variable also varied by ethnic group, Pillai's trace, $V = .052$, $F(4, 319) = 4.41$, $p = .002$. For ethnicity, main effects were observed for Informational Support, $F(1, 322) = 5.14$, $p = .024$, Emotional Support, $F(1, 322) = 13.37$, $p < .001$, and Instrumental Support, $F(1, 322) = 5.39$, $p = .021$; compared to Blacks, Whites reported higher levels of Informational Support ($M_{\text{Whites}} = 3.31$, $SD = 1.00$; $M_{\text{Blacks}} = 3.04$, $SD = 1.03$), Emotional Support ($M_{\text{Whites}} = 3.68$, $SD = 0.77$; $M_{\text{Blacks}} = 3.34$, $SD = 0.79$), and Instrumental Support ($M_{\text{Whites}} = 3.18$, $SD = 1.07$; $M_{\text{Blacks}} = 2.89$, $SD = 1.10$). Further, it was found that none of the Intrapersonal Reserve Capacity variables significantly differed by ethnicity.

The Metabolic Syndrome variable did vary by ethnic group, after controlling for age and gender, $F(1, 373) = 16.50$, $p < .001$. Blacks demonstrated higher average scores

on Metabolic Syndrome risk than Whites (M_{Blacks} = 0.56, *SE* = 0.18; M_{Whites} = -0.38, *SE* = 0.14).

Table 1.6

MANCOVA and ANCOVA F values and estimated marginal means by ethnicity

	Blacks		Whites		Multivariate		Univariate	
	M	*SE*	*M*	*SE*	*F*	*df*	*F*	*df*
SES					8.67***	2, 372		
Personal income	3.80	.135	4.07	.110			2.27	1, 373
Household income	3.75	.138	4.43	.112			13.88***	1, 373
Intrapersonal Reserve Capacity					0.23	3, 371		
Mastery	5.77	.095	5.72	.077			0.20	1, 373
Optimism	5.70	.091	5.67	.074			0.08	1, 373
Self-esteem	5.93	.090	5.97	.073			0.12	1, 373
Interpersonal Reserve Capacity					3.54*	3, 371		
Information support	3.08	.082	3.33	.067			5.56*	1, 373
Emotional support	3.40	.066	3.68	.054			10.26***	1, 373
Instrumental support	2.95	.088	3.18	.071			3.77	1, 373
Metabolic Syndrome	0.56	.175	-.038	.142			16.50***	1, 373

Note. Multivariate *F* ratios were generated from Pillai's statistic.

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

CHAPTER FOUR

DISCUSSION

Reserve Capacity, defined as interpersonal and intrapersonal resources, partially mediated the relationship between SES and metabolic syndrome in models of all participants, Blacks only, and Whites only. Our first three study hypotheses were supported by direct SES and metabolic syndrome, the SES and Reserve Capacity (intrapersonal and interpersonal), and the Reserve Capacity (intrapersonal and interpersonal) and metabolic syndrome relationships. In addition Reserve Capacity partially reduced the SES and metabolic syndrome-risk relationship when entered into the model. These findings provide support for the Reserve Capacity Model as an explanatory framework for understanding the SES-metabolic syndrome relationship. Further, these findings add to the literature on Reserve Capacity in a number of ways: (1) SES was positively associated with both inter- and intrapersonal Reserve Capacity variables, (2) both inter- and intrapersonal Reserve Capacity variables were negatively associated with metabolic syndrome risk, (3) both types of Reserve Capacity partially mediated the relationship between SES and metabolic syndrome risk similarly in two ethnic groups, and (4) the Reserve Capacity Model was invariant across ethnic groups, indicating that it can serve as an explanatory framework for the SES-metabolic syndrome risk relationship.

Socioeconomic Findings

First, the finding that our SES construct is negatively associated with metabolic syndrome adds to past research by examining two measures of current SES, rather than focusing on educational and financial history (Matthews, Räikkönen, Gallo, & Kuller,

2008; Prescott, Godtfredsen, Osler, et al., 2007). This SES construct includes individual income in the last year and household income in the last year. Past Reserve Capacity studies have typically only included education as a proxy for SES (Gallo et al., 2009a; Gallo et al., 2005; Gallo et al., 2009b; Matthews et al., 2010; Matthews et al., 2008). This indicates that current income is predictive of a global metric of poor health across multiple cardiovascular markers.

Reserve Capacity Findings

Reserve Capacity in this study included three types of social support and three intrapersonal reserve resources. These two main constructs are similar to the mediators defined in the Repetti, Taylor and Seeman risky family model which posits that emotional regulation skills (defined here as mastery, optimism, self-esteem) and social competence skills (garnering positive social support) are predictive of health outcomes following exposure to childhood poverty and family dysfunction (Morton, Lee, Haviland, & Fraser, 2012). In terms of interpersonal resources, past studies have included; social integration, social support, social capital, (Gallo, Bogart, Vranceanu, & Matthews, 2005; Matthews, Räikkönen, Gallo, & Kuller, 2008; Gallo, Espinosa do los Monteros, & Shivpuri, 2009; Gallo et al., 2007). In terms of intrapersonal resources, past studies have included mastery, optimism, self-esteem, and positive affect (Gallo, Bogart, Vranceanu, & Matthews, 2005; Matthews, Räikkönen, Gallo, & Kuller, 2008; Gallo, Espinosa do los Monteros, & Shivpuri, 2009; Gallo, Penedo, Espinosa, & Arguelles, 2009). The finding from the current study of the significant association between SES and Reserve Capacity is meaningful because it illustrates the possibility of a psychosocial pathway from

poverty to cardiac health outcomes though the psychological and the social facets are separate constructs. Higher-SES did lead to greater psychosocial reserves; fewer reserves are in place for those living in lower-SES environments either because the skills were not adequately developed in early life (Morton et al, 2011) or because the overexposure to stressors leads to a depletion of resources resulting in poor coping (Cohen, Alper, Doyle, et al., 2008; Gallo & Matthews, 2003; Kubzansky, Kawachi, Weiss, & Sparrow, 1998; Lehman, Taylor, Kiefe, & Seeman, 2005; Matthews, Räikkönen, Gallo, & Kuller, 2008). As such, because low-SES environments have more stressors, low-SES individuals deplete their Reserve Capacity rapidly, eventually eroding mental and subsequently physical health (Bolger, Foster, Vinokur, Ng, 1996; Cohen & Willis, 1985).

Similar to other studies, we found both Reserve Capacity latent variables were inversely associated with metabolic syndrome (Gallo, de los Monteros, Ferent, et al., 2007; Lehman, Taylor, Kiefe, & Seeman, 2005; Liu, Hermalin, & Chuang, 1998; Matthews, Räikkönen, Gallo, & Kuller, 2008). This direct relationship of more positive cognitions and social connections is directly related to better cardiac health likely because there is a lowered stress response in the face of negative life events (Everson-Rose & Lewis, 2005; Grundy et al., 2005; Krantz & McCeney, 2002; Kristenson, Eriksen, Sluiter, et al., 2004; McEwen & Seeman, 1999). Reserve Capacity components mitigate the effects of low SES on stress reactivity by improving stress perceptions, positive expectancies, adaptive coping strategies, and adaptive health behaviors that ultimately buffer stress reactivity and maintain cardiac health (Chaix, Isacsson, Rastam, et al., 2007; Cohen, Kaplan, & Salonen, 1999; Gallo, Espinosa de los Monteros, & Shivpuri, 2009;

Gallo, Bogart, Vranceanu, & Matthews, 2005; Matthews, Räikkönen, Everson, et al., 2000).

Ethnic Differences

The present study adds to the growing literature on ethnic differences to indicate that poverty works similarly in both Blacks and Whites to harm cardiac health and that Reserve Capacity works similarly to partially buffer these effects. The relationship between SES and metabolic syndrome was reduced when Reserve Capacity was included as a mediator in the model for each ethnic group (see Figures 1.7-1.12). This finding is different from past studies testing the Reserve Capacity Model in two significant ways. First, no past studies have found that the Reserve Capacity Model mediates the relationship between SES and metabolic syndrome for both Blacks and Whites. Secondly, no past studies have tested whether ethnicity moderates the ability of the Reserve Capacity Model to explain the SES-metabolic syndrome relationship. The current study found that ethnicity does not moderate the Reserve Capacity Model when explaining the SES-metabolic syndrome relationship. Further, past studies have focused on participant groups that were exclusively White, Hispanic, or Black or did not have a large enough sample to test ethnic differences.. In the current study, we found that though Whites and Blacks were demographically different on SES and Reserve Capacity, the relationships operated similarly in both groups to support the Reserve Capacity model. This is interesting because these comparisons indicate that health outcomes are changed by poverty, not ethnicity.

Study Limitations

The present study has several limitations. First, this is a cross sectional study and so we cannot determine whether the SES and Reserve Capacity factors did occur before the cardiac outcomes; therefore, cause and effect cannot be determined with these data. Second, many of the Black participants were recruited in and around south central Los Angeles which is a somewhat economically deprived area; the Whites were recruited in a suburban area in San Bernardino county, also an economically deprived area. These regional differences may systematically impact the ethnic groups more than actual underlying cultural differences. Third, the SES latent factor was made from two measures of current income, and this leaves out other SES measures such as education and occupational prestige. Because the SES factor in the current study was limited, we cannot adequately assess the effects of SES on the other variables in the model. Finally, the sample were older Seventh-day Adventists and may not be generalizable to the population at large.

Conclusion

This is the first study to examine the connection between SES, Reserve Capacity, and metabolic syndrome in older Black and White adults. The current study found that Reserve Capacity partially mediated the relationship between SES and metabolic syndrome in all subjects, and both Black and White adults similarly. This finding is particularly important as it illustrates that reserve resources operate similarly in older adults when facing the risks associated with poverty.

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APPENDIX A

MASTERY MEASURE

This set of questions consists of a number of words and phrases that describe different feelings and emotions. Mark a bubble to show to what extent you have felt this way **during the past year.**

		Very Slightly or Not At All	A Little	Moderately	Quite A Bit	Extremely
1.	I have little control over the things that happen to me.	○	○	○	○	○
2.	There is really no way I can solve some of the problems I have.	○	○	○	○	○
3.	I often feel helpless in dealing with the problems of life.	○	○	○	○	○
4.	Sometimes I feel that I am being pushed around in life.	○	○	○	○	○

APPENDIX B

OPTIMISM MEASURE

This set of questions consists of a number of words and phrases that describe different feelings and emotions. Mark a bubble to show to what extent you have felt this way **during the past year.**

		Very Slightly or Not At All	A Little	Moderately	Quite A Bit	Extremely
1.	In uncertain times, I usually expect the best.	○	○	○	○	○
2.	If something can go wrong for me, it will.	○	○	○	○	○
3.	I'm always optimistic about my future.	○	○	○	○	○
4.	I hardly ever expect things to go my way.	○	○	○	○	○
5.	I rarely count on good things happening to me.	○	○	○	○	○
6.	Overall, I expect more good things to happen to me than bad.	○	○	○	○	○

APPENDIX C

SELF-ESTEEM MEASURE

This set of questions consists of a number of words and phrases that describe different feelings and emotions. Mark a bubble to show to what extent you have felt this way **during the past year.**

		Very Slightly or Not At All	A Little	Moderately	Quite A Bit	Extremely
1.	I take a positive attitude toward myself.	○	○	○	○	○
2.	On the whole I am satisfied with myself.	○	○	○	○	○
3.	I certainly feel useless at times.	○	○	○	○	○
4.	At times I think I am no good at all.	○	○	○	○	○

APPENDIX D

SOCIAL SUPPORT MEASURE

In the past month, how often did the people you know (spouse, family, friends, relatives etc.) . . .	Never	Seldom	Occasion -ally	Often	Very Often
Informational Social Support					
25. offer helpful advice when you needed to make important decisions?	○	○	○	○	○
26. suggest ways that you could deal with problems you were having?	○	○	○	○	○
Instrumental Social Support					
27. provide you with aid and assistance?	○	○	○	○	○
28. help you with an important task or something that you could not do on your own?	○	○	○	○	○
Emotional Social Support					
29. do or say things that were kind or considerate toward you?	○	○	○	○	○
30. include you in things they were doing?	○	○	○	○	○