THE INFLUENCE OF RACE AND CULTURE ON REHABILITATING VETERANS WITH STROKE THROUGH INFORMAL CAREGIVING

By

PAUL B. PERRIN

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To my family
ACKNOWLEDGMENTS

I thank my family for their support through this process and my advisor Dr. Martin Heesacker for his guidance and mentorship. They have been instrumental throughout my entire graduate school career. Without their support, I would not be where I am today.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>4</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>7</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>8</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>9</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>1 INTRODUCTION</td>
<td>11</td>
</tr>
<tr>
<td>2 LITERATURE REVIEW</td>
<td>14</td>
</tr>
<tr>
<td>Background</td>
<td>14</td>
</tr>
<tr>
<td>Mental Health of Stroke Caregivers</td>
<td>14</td>
</tr>
<tr>
<td>Caregiver Mental Health and Functioning of Persons with Stroke</td>
<td>15</td>
</tr>
<tr>
<td>Causal Reciprocity of Caregiver Mental Health and Functioning of Persons with Stroke</td>
<td>16</td>
</tr>
<tr>
<td>Race/Ethnicity and Caregiving</td>
<td>22</td>
</tr>
<tr>
<td>Implications for Caregiver Interventions</td>
<td>26</td>
</tr>
<tr>
<td>Hypotheses</td>
<td>27</td>
</tr>
<tr>
<td>3 METHOD</td>
<td>30</td>
</tr>
<tr>
<td>Participants</td>
<td>30</td>
</tr>
<tr>
<td>Procedure</td>
<td>32</td>
</tr>
<tr>
<td>Measures: Caregiver</td>
<td>33</td>
</tr>
<tr>
<td>Geriatric Depression Scale (GDS)</td>
<td>33</td>
</tr>
<tr>
<td>Sense of Competence Questionnaire (SCQ)</td>
<td>34</td>
</tr>
<tr>
<td>Sense of Coherence (SOC)</td>
<td>34</td>
</tr>
<tr>
<td>Measures: Veteran with Stroke</td>
<td>35</td>
</tr>
<tr>
<td>Geriatric Depression Scale (GDS)</td>
<td>35</td>
</tr>
<tr>
<td>Functional Independence Measure (FIM)</td>
<td>35</td>
</tr>
<tr>
<td>Frenchay Activities Index (FAI)</td>
<td>36</td>
</tr>
<tr>
<td>Data Analysis Plan</td>
<td>36</td>
</tr>
<tr>
<td>Repeated Measures Multivariate Analyses of Variance</td>
<td>36</td>
</tr>
<tr>
<td>Canonical Correlations</td>
<td>38</td>
</tr>
<tr>
<td>4 RESULTS</td>
<td>41</td>
</tr>
<tr>
<td>Hypotheses 1a and 2a</td>
<td>41</td>
</tr>
<tr>
<td>Hypotheses 1b and 2b</td>
<td>43</td>
</tr>
<tr>
<td>Hypothesis 3</td>
<td>45</td>
</tr>
</tbody>
</table>
Comparisons of Canonical Correlations by Race/Ethnicity ........................................ 46
Dyads with a White Caregiver ......................................................................................... 47
Dyads with a Latino/Puerto-Rican Caregiver ................................................................. 49
Dyads with a Black Caregiver ......................................................................................... 51

5 DISCUSSION ........................................................................................................... 55

Overview of Findings .................................................................................................. 55
Caregivers: Hypotheses 1a and 2a ................................................................................. 55
Veterans with Stroke: Hypotheses 1b and 2b .............................................................. 57
Hypothesis 3 ................................................................................................................ 59
Implications: Dyads with a White Caregiver ............................................................. 60
Implications: Dyads with a Latino/Puerto-Rican Caregiver ......................................... 61
Implications: Dyads with a Black Caregiver .............................................................. 62
General Implications .................................................................................................. 63
Limitations and Future Directions .............................................................................. 66
Conclusions ................................................................................................................ 68

APPENDIX

A GERIATRIC DEPRESSION SCALE ........................................................................... 70
B SENSE OF COMPETENCE QUESTIONNAIRE ..................................................... 71
C SENSE OF COHERENCE ....................................................................................... 72
D FUNCTIONAL INDEPENDENCE MEASURE ......................................................... 73
E FRENCHAY ACTIVITIES INDEX .......................................................................... 74
LIST OF REFERENCES ............................................................................................... 75
BIOGRAPHICAL SKETCH .......................................................................................... 83
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>Care recipient ICD-9 classifications</td>
<td>30</td>
</tr>
<tr>
<td>4-1</td>
<td>Caregiver scale alphas and means and standard deviations by racial/ethnic group over time</td>
<td>42</td>
</tr>
<tr>
<td>4-2</td>
<td>Veteran scale alphas and means and standard deviations by racial/ethnic group over time</td>
<td>44</td>
</tr>
<tr>
<td>4-3</td>
<td>Standardized canonical coefficients over time in dyads with a White caregiver</td>
<td>49</td>
</tr>
<tr>
<td>4-4</td>
<td>Standardized canonical coefficients over time in dyads with a Latino/Puerto Rican caregiver</td>
<td>51</td>
</tr>
<tr>
<td>4-5</td>
<td>Standardized canonical coefficients over time in dyads with a Black caregiver</td>
<td>53</td>
</tr>
<tr>
<td>4-6</td>
<td>Correlation coefficients among all variables</td>
<td>54</td>
</tr>
</tbody>
</table>
### LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Perrin et al.’s (2008) confirmatory factor analysis with adequate fit indices.</td>
<td>18</td>
</tr>
<tr>
<td>2-2</td>
<td>Perrin et al.’s feedback loop incorporating quality of informal caregiving.</td>
<td>19</td>
</tr>
<tr>
<td>2-3</td>
<td>Perrin et al.’s (2009) cross-lagged panel of canonical correlations 1 and 6 months after hospital discharge.</td>
<td>20</td>
</tr>
<tr>
<td>2-4</td>
<td>Perrin et al.’s (2009) cross-lagged panel of canonical correlations 6 and 12 months after hospital discharge.</td>
<td>21</td>
</tr>
<tr>
<td>2-5</td>
<td>Perrin et al.’s (2009) cross-lagged panel of canonical correlations 1 and 12 months after hospital discharge.</td>
<td>22</td>
</tr>
<tr>
<td>2-6</td>
<td>Conceptual framework for the current study.</td>
<td>28</td>
</tr>
<tr>
<td>3-1</td>
<td>Visual depiction of the canonical correlation model applied separately for Black, Latino/Puerto-Rican, and White caregivers.</td>
<td>38</td>
</tr>
<tr>
<td>4-1</td>
<td>Canonical correlations between veteran- and caregiver-variable sets over time by caregiver race/ethnicity.</td>
<td>47</td>
</tr>
</tbody>
</table>
The purpose of this study was to create a set of culturally sensitive mental-health-intervention recommendations for the caregivers of Latino/Puerto-Rican, Black, and White veterans with stroke. Accordingly, the study examined whether the mental health of stroke caregivers and functioning of veterans with stroke differed according to race/ethnicity, changed differentially over time according to race/ethnicity, and showed relationships between the two sets of constructs that differed according to race/ethnicity. Data on caregiver mental health and functioning of veterans with stroke were collected from 124 (n = 248) ethnically diverse dyads at 1, 6, and 12 months post-hospital-discharge, with approximately equal representation from White, Black, and Latino/Puerto-Rican dyads. Out of the three racial/ethnic groups, Latino/Puerto-Rican veterans with stroke consistently showed the lowest functioning, and their caregivers showed the poorest mental health, though the mental-health effects did not reach statistical significance. Consistent patterns emerged over time in the relationships between caregiver mental health and functioning of individuals with stroke, though the patterns differed as a function of race/ethnicity. Critical knowledge may be lost regarding the connections between caregiver mental health and veteran functioning.
when researchers and clinicians look only across caregiver race/ethnicity as opposed to also within race/ethnicity. A monolithic approach to stroke rehabilitation, in particular one that ignores the role of race/ethnicity, is likely to limit the quality of care. Race/ethnicity may affect the nature of the reciprocal influences of caregiver mental health and the functioning of veterans with stroke. Accordingly, a first step in stroke rehabilitation may and perhaps should involve culturally-sensitive mental-health interventions for stroke caregivers.
CHAPTER 1
INTRODUCTION

African-American and Latino individuals face tremendous disparities in the prevalence and course of stroke as compared to White individuals (Ayala et al., 2001; McGruder, Malarcher, Antoine, Greenlund, & Croft, 2004; Scheinart et al., 1998), a trend that is especially pronounced in the southern United States (Borhani, 1965; Cushman et al., 2008; Howard, Labarthe, Hu, Yoon, & Howard, 2007). For example, Sheinart et al. (1998) found that African Americans who had sustained a stroke were twice as likely as Whites to sustain a second stroke, whereas Latinos were 2.6 times as likely. Though many cultural, economic, and social factors have been implicated in the causes for these disparities, one major factor may be the differential types of care that informal caregivers provide to individuals with stroke within each racial/ethnic group.

Indeed, individuals with stroke from differing racial/ethnic backgrounds can often have very different caregiving experiences because of family structure, cultural norms, and living arrangements (Hinojosa, Zsembik, & Rittman, 2009). For example, as more people take on informal caregiving in a family, as has been reported in some ethnic minority families, the burden on the primary caregiver may decrease (Hinojosa, Zsembik, & Rittman, 2009). A consistent link has been established between the mental health of informal caregivers and the functioning of individuals with stroke (e.g. Perrin, Heesacker, Stidham, Rittman, & Gonzalez-Rothi, 2008), but this link has been established broadly across racial/ethnic groups. One vital area of research for culturally sensitive stroke rehabilitation, then, involves examining the links between caregiver mental health and the functioning of veterans with stroke within and between racial/ethnic groups. Better understanding the relationships among race/ethnicity and
caregiving is an important step in creating culturally sensitive mental-health interventions for stroke caregivers, a process that may improve caregiver mental health and ultimately improve informal care for veterans with stroke.

Based on American Heart Association (2007) ratios of stroke incidence and prevalence, as many as 80,000 veterans receiving health care in the Veterans Health Administration (VHA) have sustained a stroke, and 9,000-11,000 veterans are hospitalized annually with a new stroke (Veterans Health Administration, 2003). Informal caregivers are so critical in assisting individuals with stroke who need long-term care to live independently that caregivers save over $200 billion annually in health care costs in the United States (Arno, Levine, & Memmott, 1999). When one considers the disparities in the prevalence and course of stroke among African Americans and Latinos compared to Whites, informal caregiving may be a central contributor. Therefore, identifying the culturally specific psychosocial factors that optimize the quality of care that informal caregivers provide is crucial in achieving one of the VHA’s top priorities: improving the quality of life of veterans receiving long-term care.

The central purpose of this project is to create a set of culturally sensitive mental-health-intervention recommendations for the caregivers of Latino/Puerto-Rican, Black, and White veterans with stroke. To achieve that goal, this project will examine whether the mental health of stroke caregivers and functioning of veterans with stroke differ according to race/ethnicity, whether the mental health of stroke caregivers and functioning of veterans with stroke change differentially over time according to race/ethnicity, and whether there are racial/ethnic differences over time in size of the relationship between the mental health of stroke caregivers and the functioning of
veterans with stroke. Because published research points to caregiver mental health and veteran-with-stroke functioning having a reciprocal causal relationship (e.g., Perrin, Heesacker, Sberna Hinojosa, Uthe, & Rittman, 2009), a better understanding of the role of race/ethnicity in the connections between these two sets of variables is a critical step in creating caregiver-mental-health interventions that could improve the informal care they provide to veterans with stroke.
CHAPTER 2
LITERATURE REVIEW

Background

Each year, approximately 700,000 Americans suffer a new or recurrent stroke, and currently over 5.6 million Americans are living with the effects of stroke. These statistics position stroke as the leading cause of disability in the United States (American Heart Association, 2007). Although the death rate from stroke has decreased in recent years as a result of innovative medical technology, the prevalence of stroke-related disability has increased because more Americans are living with stroke’s often debilitating effects (National Heart, Lung, and Blood Institute, 2004).

The high prevalence of stroke has accelerated healthcare’s dependence on informal caregivers, usually family members or friends, to assume primary care of persons with stroke. A National Alliance for Caregiving/American Association of Retired Persons (NAC/AARP, 1997) survey revealed that within a span of 8 years, the number of informal caregivers in the United States had tripled, and a significant upward trend in the number of stroke caregivers is expected to continue (Hirst, 2001). The efforts by these informal caregivers have a substantial impact on health care costs in the United States, saving over $200 billion a year (Arno, Levine, & Memmott, 1999). Research on the functioning of stroke caregivers is vital in order to help caregivers optimally perform their challenging work.

Mental Health of Stroke Caregivers

The difficult job of caregiving for people with stroke often takes a psychological and emotional toll on caregivers through stress, anxiety, depression, and decreased quality of life (Dorsey & Vaca, 1998; Doty, 1986; O’Connell & Baker, 2004; Rombough,
Howse, Bagg, & Bartfay, 2007). As many as 40-50% of stroke caregivers experience depression (Anderson, Linto, & Stewart-Wynne, 1995; Silliman, Fletcher, Earp, & Wagner, 1986; Stein, Gordon, Hibbard, & Sliwinski, 1992), and many experience high rates of anxiety and social isolation (Buck et al., 1997; Schulz, O’Brien, Bookwala, & Fleissner, 1995; Thommessen et al., 2002). Stroke typically has a sudden and unexpected onset, which forces people who are experiencing stroke and their caregivers to make major life changes very quickly (Van Puymbroeck & Rittman, 2005). As a result, there is little time for stroke caregivers to adjust to the role they must immediately fulfill, perhaps contributing to “substantial strain” in approximately 37% of caregivers (Bugge, Alexander, & Hagen, 1999). The first month following hospital discharge is one of the most stressful periods for stroke caregivers, as the limitations of the person with stroke become salient at home (Grant, Glandon, Elliott, Giger, Weaver, 2004). This stress can exacerbate the already-high rates of physical health problems to which stroke caregivers are vulnerable (Baumgarten et al., 1992; Schulz et al., 1995).

**Caregiver Mental Health and Functioning of Persons with Stroke**

Specific links exist among reduced functioning of persons with stroke and poor mental health in stroke caregivers. Research has shown that as the mental health and cognitive ability of persons with stroke decrease, caregiver burden increases (Tooth, McKenna, Barnett, Prescott, & Murphy, 2005). Perhaps accordingly, caregiver burden is more prevalent with left hemisphere strokes than with right hemisphere strokes (Blonder, Langer, Pettigrew, & Garrity, 2007). White, Mayo, Hanley, & Wood-Dauphinee (2003) have suggested that because the left hemisphere is associated with language, left hemisphere stroke often creates poor verbal communication between caregivers and persons with stroke, resulting in caregiver fear, hopelessness, depression, and
burden. Grant, Weaver, Elliot, Bartolucci, and Giger (2004) found that the best
predictors of stroke caregiver depression were impaired coherence of the person with
stroke, coupled with a caregiver negative problem orientation and inadequate
preparedness. Other psychosocial factors linked with caregiver depression include a
disruption to family and marital life (Evans, Bishop, & Haselkorn, 1991), time constraints
(Kinney, Stephens, Franks, Ann, & Norris, 1995; Periard & Ames, 1993), reduced social
support (Kotila, Numminen, Waltimo, & Kaste, 1998), and caregiver physical health
(Bugge, Alexander, & Hagen, 1999).

Similarly, research has identified connections between caregiver mental health
and the physical functioning of individuals with stroke. For example, positive
associations have emerged between stroke severity and caregiver depression
(Carnwath & Johnson, 1987; Dennis, O'Rourke, Lewis, Sharpe, & Warlow, 1998).
Caregivers with physical and basic-care responsibilities experience more burden than
do caregivers with less physical and fewer basic-care responsibilities (Chumbler,
Rittman, Van Puymbroeck, Vogel, & Qin, 2004; Perrin et al., 2008).

**Causal Reciprocity of Caregiver Mental Health and Functioning of Persons with
Stroke**

A pervasive assumption in the research literature is that lower functioning of
persons with stroke *causes* a decline in caregiver mental health. Although this
assumption has a strong theoretical basis, study-based evidence has also suggested
the *opposite* causal direction. Poor caregiver mental health has been shown to lead to
lower functioning of people with stroke. For example, caregiver depression is positively
associated with less-than-optimal care of people with stroke (Evans, Bishop, &
Haselkorn, 1991) and inversely related to successful, long-term stroke recovery (Evans,
Hendricks, Haselkorn, Bishop, & Baldwin, 1992). Accordingly, overwhelmed caregivers who experience burnout are more likely to institutionalize dependent family members (Aneshensel, Pearl, Mullan, Zarit, & Whitlatch, 1995). High caregiver depression, high burden, and low social support may lead to higher depression in people with stroke (Suh et al., 2005). Investigating causal reciprocity, Perrin et al. (2008) uncovered a medium-sized negative correlation between caregiver mental health and the physical and emotional impact of stroke. See Figure 2-1 below of Perrin et al.'s (2008) structural equation model representing this relationship.
To explain this broad correlation, Perrin et al. (2008) proposed a causal feedback loop whereby the poor mental health of caregivers adversely impacts the quality of care they provide, thus slowing the recovery of people with stroke. This poor recovery then negatively affects the mental health of stroke caregivers, and the loop continues. See Figure 2-2 for a visual representation of Perrin et al.'s (2008) feedback model.

Figure 2-1. Perrin et al.'s (2008) confirmatory factor analysis with adequate fit indices. (Note. CR = Care recipient. CG = Caregiver).
Figure 2-2. Perrin et al.’s feedback loop incorporating quality of informal caregiving.

Perrin et al. (2009) then tested this theory using longitudinal data from a sample of stroke caregiver/care recipient dyads. They employed a cross-lagged panel design with canonical correlations to examine whether caregiver mental health or care-recipient functioning were more causally dominant in the relationships between the two variable sets. Visual representations of Perrin et al.’s (2009) cross-lagged panels examining these two variable sets across 1 to 6 months (Figure 2-3), 6 to 12 months (Figure 2-4), and 1 to 12 months (Figure 2-5) post-hospital discharge appear below. In these figures, larger correlations across time between earlier caregiver mental health and later care recipient functioning indicate a causal predominance of caregiver mental health in the relationship between the two sets of variables. Conversely, larger correlations across time between earlier care-recipient functioning and later caregiver mental health indicate a causal predominance of care-recipient functioning in the same relationship.
However, neither caregiver mental health nor care-recipient functioning were found to causally dominate the relationship between the caregiver and care-recipient variables, indirectly supporting the theory that the constructs operate in a feedback loop.

Figure 2-3. Perrin et al.'s (2009) cross-lagged panel of canonical correlations 1 and 6 months after hospital discharge. (Note. FIM-1(6) = Functional Independence Measure at one (six) month(s) after discharge. FAI-1(6) = Frenchay Activities Index at one (six) month(s) after discharge. CR(CG): GDS-1(6) = care recipient (caregiver) Geriatric Depression Scale at one (six) month(s) after discharge. SOC-1(6) = Sense of Coherence at one (six) month(s) after discharge. SCQ-1(6) = Sense of Competence Questionnaire at one (six) month(s) after discharge).
Figure 2-4. Perrin et al.'s (2009) cross-lagged panel of canonical correlations 6 and 12 months after hospital discharge. (Note. FIM-6(12) = Functional Independence Measure at six (twelve) months after discharge. FAI-6(12) = Frenchay Activities Index at six (twelve) months after discharge. CR(CG): GDS-6(12) = care recipient (caregiver) Geriatric Depression Scale at six (twelve) months after discharge. SOC-6(12) = Sense of Coherence at six (twelve) months after discharge. SCQ-6(12) = Sense of Competence Questionnaire at six (twelve) months after discharge.)
Figure 2-5. Perrin et al.’s (2009) cross-lagged panel of canonical correlations 1 and 12 months after hospital discharge. (Note. FIM-1(12) = Functional Independence Measure at one (twelve) month(s) after discharge. FAI-1(12) = Frenchay Activities Index at one (twelve) month(s) after discharge. CR(CG): GDS-1(12) = care recipient (caregiver) Geriatric Depression Scale at one (twelve) month(s) after discharge. SOC-1(12) = Sense of Coherence at one (twelve) month(s) after discharge. SCQ-1(12) = Sense of Competence Questionnaire at one (twelve) month(s) after discharge).

Race/Ethnicity and Caregiving

Research to date suggests that the effects of stroke are especially pronounced in African-American and Latino individuals, who have been reported to experience more strokes and to recover more slowly from stroke than White individuals (Ayala et al., 2001; McGruder, Malarcher, Antoine, Greenlund, & Croft, 2004; Scheinart et al., 1998). For example, Sheinart et al. (1998) reported that African Americans who sustained a stroke were twice as likely as Whites to sustain a second stroke, whereas Latinos were 2.6 times as likely. Further, evidence has been reported that these differences have been even more pronounced in the Southern states (Cushman et al., 2008; Howard, et
al., 2007), and research suggests that there has long been a 50% greater mortality rate from stroke in the “Stroke Belt,” which is located across the Southeastern United States (Borhani, 1965).

One of the major contributors to these racial/ethnic disparities in stroke could be the types of informal care that individuals with stroke receive. The socio-cultural contexts in which African-American, Latino, and White stroke caregivers provide care have some key differences. White culture is heavily influenced by individualism, a social outlook that stresses independence and self-reliance. On the other hand, Latino culture is generally collectivist, as Latinos often place significant value on the well-being of the group rather than on the individual (Marín & Marín, 1991; Triandis, 1995). Consequently, the care structures of each ethnic group tend to be individualist and collectivist, respectively (Dilworth-Anderson, Williams, & Gibson, 2002). African-American care structures exist somewhat in-between the extremes of White and Latino care structures, in that compared to that of Whites, African-American care structures are larger and more likely to include friends and neighbors than relatives (Cox, 1993; Lawton, Rejagopal, Brody, & Kleban, 1992).

In Puerto-Rican culture, individuals often display a strong adherence to the cultural value of familism, a feeling of loyalty and obligation to provide support when family members are sick or hurt, whether the interpersonal relationships are among members of the nuclear or extended family (Delgado & Tennstedt, 1997; Sánchez-Ayendéz, 1998; Villarreal, Blozis, & Widamen, 2005; Zea, Quezada, & Belgrave, 1994; Zsembik & Bonilla, 2000). In contrast, Whites, who have fewer cultural ties, are less likely to feel a sense of obligation toward all extended family members and more likely to have smaller,
less diverse networks, and African Americans tend to help people who are most important to them, rather than specifically helping those who are members of their family (Dilworth-Anderson, Williams, & Gibson, 2002).

Though research has examined differences in the structure of caregiving between ethnic groups, very little research has examined the connections between race/ethnicity and the mental health of stroke caregivers, and the little research that has been performed thus far appears inconsistent. For example, Wright, Hickey, Buckwalter, Hendrix, and Kelechi (1999) found that White stroke caregivers’ depression increased over time, whereas African-American stroke caregivers’ depression decreased. On the other hand, Grant (1999) found the opposite, that African-American stroke caregivers had a higher prevalence of depression than did White caregivers. The reliability and generalizability of these two studies would be difficult to determine if it were not for a study that investigated patients with stroke, dementia, and Parkinson’s disease (Thommessen et al., 2002). This study found a similar type and degree of poor mental health among caregivers independent of disease, thus cautiously extending the discussion of stroke caregiver mental health to dementia caregiver mental health, which has attracted a considerably greater amount of research.

A number of dementia caregiver studies have triangulated on a general consensus that African-American caregiver stress, burden, and depression tend to be lower than that of Whites. (Connell & Gibson, 1997; Covinski et al., 2003; Farran, Miller, Kaufman, & Davis, 1997; Janevic & Connell, 2001). Connell and Gibson (1997) attributed the disparities to the higher likelihood in African Americans of the caregiver being an adult child, friend, or other family member and the tendency to use prayer or faith as a coping
strategy. This line of thinking traces back to the general traits of the two racial/ethnic
groups found in the scientific literature; Whites lean toward individualism, whereas
African Americans find a greater balance between individualism and collectivism. Only
one study attributed more depressive symptoms to African-American caregivers than
Whites, though the study’s large sample size may have resulted in statistical
significance of a small effect (Williams, 2005).

Knight and McCallum (1998), in their study of heart rate reactivity and depression
in African-American and White dementia caregivers, developed two related
explanations for the high levels of African-American caregivers’ mental health. The first
of these, the “faking good hypothesis,” holds that African-American caregivers may
report less depression and burden than White caregivers, when in reality that may not
be the case. However, because most measures of depression and burden have been
self-report, this hypothesis is difficult to test. The second explanation is the positive
reappraisal hypothesis, which holds that, compared to Whites, African-American
caregivers tend to focus more on positive aspects of the stress experience. In principle,
this posited reappraisal reduces the negative emotional outcomes in response to
stressors. A follow-up study supported both hypotheses, as African-American dementia
caregivers, in comparison to Whites, reported lower levels of burden, but equal levels of
depression and anxiety (Knight, Silverstein, McCallum, & Fox, 2000).

Dilworth-Anderson, Williams, and Gibson’s (2002) have argued that Latino
caregivers face considerable “role engulfment” due to their collectivist roots—that is,
their strong identification with a cultural sense of duty, expectation, and obligation to
family members. Perhaps accordingly, Covinsky et al. (2003) compared African-
American, White, and Latino dementia caregivers, finding that Latino caregivers showed the highest rates of depression and personal-role strain. Further evidence for the implications of Dilworth-Anderson et al.’s (2002) argument surfaced in a study which found that Latino dementia caregivers delay institutionalization significantly longer than White caregivers do (Mausbach et al., 2004). This study also found that Latinos who were less American-acculturated, less individualistic, and more in touch with their collectivist Latino culture viewed caregiving more positively than did those who were more heavily influenced by American culture.

Implications for Caregiver Interventions

As the above review highlights, the majority of research examining the connections between race/ethnicity and caregiver mental health has been performed on dementia caregivers. With the strong racial/ethnic disparities in the prevalence and course of stroke, a vital next step is to bring a racial/ethnic lens to studying the relationships between the mental health of stroke caregivers and the rehabilitation of veterans with stroke. Better understanding of the role of race/ethnicity on this relationship could help the VA healthcare system create culturally sensitive mental-health interventions for caregivers targeting particular ethnic groups, a process that may improve caregiver mental health and ultimately improve informal care for veterans.

Visser-Meily, van Heugten, Post, Schepers, and Lindeman’s (2005) review of stroke-caregiver interventions suggested that of the predominant types of intervention, counseling programs had the most positive outcomes, especially those involving active problem-solving strategies. Therefore, based on the particular needs of caregivers in each ethnic group, one potential culturally sensitive intervention could involve cognitive-behavioral counseling for caregivers in the ethnic groups exhibiting the highest
depression and burden and the poorest coping. Accordingly, improved caregiver mental health in turn could lead to better informal caregiving and ultimately to more effective stroke rehabilitation, as based on the causal feedback loop theory articulated by Perrin et al. (2008). Such an assertion, if supported by findings from the proposed study, could prove invaluable in follow-up experiments examining whether counseling interventions for caregivers improve the quality of informal care provided to veterans with stroke in ethnic groups facing health disparities.

**Hypotheses**

The conceptual framework for this project encompasses two components diagrammed in Figure 2-6: (a) The top three boxes represent a feedback loop whereby poor functioning of veterans with stroke leads to poorer caregiver mental health, which lowers the quality of informal caregiving provided to veterans. This lowered quality of informal care results in reduced functioning of veterans with stroke, and ultimately in limited stroke rehabilitation. (b) The bottom box highlights the impact of race/ethnicity/cultural background on each stage in the feedback loop.
Understanding the ways in which racial/ethnic background affects caregiver mental health and the functioning of veterans with stroke over time is a key step in creating a set of culturally-sensitive mental-health-intervention recommendations for caregivers. With this theoretical model in mind, the current study has three overarching research questions and resulting sets of hypotheses:

(a) Do the mental health of stroke caregivers and functioning of veterans with stroke differ according to race/ethnicity?

- Hypothesis 1a: Black caregivers will have better mental health than White caregivers, who will in turn have better mental health than Latino/Puerto-Rican caregivers, across measures of burden, depression, and coping.

- Hypothesis 1b: Black and Latino/Puerto-Rican veterans with stroke will have poorer functioning than White veterans across measures of depression, activities of daily living, and quality of life.
(b) Does the mental health of stroke caregivers and the functioning of veterans with stroke change differentially over time as a function of race/ethnicity?

- Hypothesis 2a: The mental health of Black caregivers will improve at a more rapid rate than that of White caregivers, which will in turn improve at a more rapid rate than that of Latino/Puerto-Rican caregivers.

- Hypothesis 2b: The functioning of Black and Latino/Puerto-Rican veterans with stroke will improve more slowly than that of White veterans.

(c) Are there racial/ethnic differences over time in the size of the relationship between the mental health of stroke caregivers and the functioning of veterans with stroke?

- Hypothesis 3: The broad correlations between these two sets of variables at 1-, 6-, and 12-months post-discharge will be larger for dyads with a White caregiver than for dyads with a Black or Latino/Puerto-Rican caregiver. (See the Data Analysis section below for a visual model outlining Hypothesis 3.)
CHAPTER 3
METHOD

Participants

The sample was initially comprised of 135 ($n = 270$) stroke caregiver/veteran-with-stroke dyads. Veterans with stroke had all been discharged directly to home following hospital care for their strokes. The dyads were selected from five geographically and ethnically diverse VAMCs in Florida and Puerto Rico. These VAMCs are part of the Veterans Integrated Service Network (VISN 8, including South Georgia, Florida, Puerto Rico, and the U.S. Virgin Islands) and were selected specifically to gain a better understanding of how ethnically diverse veterans with stroke and their caregivers manage the stroke-recovery process. All veterans met classification for the International Classification of Diseases and Related Health Problems (ICD-9) codes 430-438 (See Table 3-1 for a breakdown of ICD classifications).

Table 3-1. Care recipient ICD-9 classifications.

<table>
<thead>
<tr>
<th>ICD-9 Code (Title)</th>
<th>$n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>430 (subarachnoid hemorrhage)</td>
<td>1</td>
</tr>
<tr>
<td>431 (intracerebral hemorrhage)</td>
<td>5</td>
</tr>
<tr>
<td>432 (other and unspecified intracranial hemorrhage)</td>
<td>0</td>
</tr>
<tr>
<td>433 (occlusion and stenosis of precerebral arteries)</td>
<td>18</td>
</tr>
<tr>
<td>434 (occlusion of cerebral arteries)</td>
<td>49</td>
</tr>
<tr>
<td>435 (transient cerebral ischemia)</td>
<td>3</td>
</tr>
<tr>
<td>436 (acute, but ill-defined, cerebrovascular disease)</td>
<td>49</td>
</tr>
<tr>
<td>437 (other and ill-defined cerebrovascular disease)</td>
<td>3</td>
</tr>
<tr>
<td>438 (late effects of cerebrovascular disease)</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>135</td>
</tr>
</tbody>
</table>

(Note. ICD-9 code 435 is a transient ischemic attack (TIA) and technically not a stroke, but these three participants were included in the current study because TIA effects often closely resemble those of strokes).

The stroke caregivers either identified themselves or were identified by veterans with stroke as the primary, informal caregiver. Veterans were recruited, gave consent, and were surveyed while they were in the hospital for the acute stroke event. In order to
be included in the 1-month follow up, they had to be discharged directly home (i.e. be medically stable), needed to have a score of 18 or higher on the Mini Mental State Exam (Folstein, Folstein, & McHugh, 1975), and must have been able to communicate orally at discharge. Of the veterans with stroke, 61 reported weakness on the right side of their bodies, 59 on the left side, 4 reported bilateral weakness, and 11 reported that they had no body weakness. No data were collected on whether the veterans had sustained prior strokes. There was no exclusion of participants based on comorbidities, but their diagnosis was coded throughout the study by reviewing patient records at each of the three time points.

One hundred thirty-five caregiver/veteran dyads were originally enrolled, and initial data were collected while the veterans were still in the hospital. At the 1-month follow-up visit, 11 dyads withdrew, reducing the final sample to 124 dyads (n = 248). Of the 124 caregivers, 45 (36.3%) identified as White, 28 (22.6%) as Black, 2 (1.6%) as Asian, and 49 (39.5%) as Latino/Puerto-Rican (8 residing in the U.S. and 41 residing in Puerto Rico). The two Asian caregivers were excluded from data analyses because the focus of this study was on Black, White, and Latino/Puerto-Rican caregivers. However, the care recipients of these two Asian caregivers, who were Latino/Puerto-Rican, were included in the analyses that examined veteran functioning by racial/ethnic group. Of the 124 veterans, 45 (36.3%) identified as White, 30 (24.2%) as Black, and 49 (39.5%) as Latino/Puerto-Rican (8 residing in the U.S. and 41 residing in Puerto Rico).

These racial/ethnic categories were used in the current study because they are the standard categories used by the United States Veterans’ Administration. It is important to note that “Black” and “White” are racial categories and “Latino/Puerto-Rican” is an
ethnic category, so it is possible to identify as both Black or White and Latino/Puerto-Rican. However, in the current study, participants were asked to choose only one category that best described their racial/ethnic identification. Of the veterans, 122 (98.4%) were men, and 2 (1.6%) were women, and of the caregivers, 16 (12.9%) were men, and 108 (87.1%) were women. The average age was 66.13 (SD = 10.61) for veterans and 59.0 (SD = 14.08) for caregivers. In terms of caregiving network size, dyads with a Latino/Puerto-Rican caregiver reported the largest caregiving network, with an average of 1.31 caregivers, whereas dyads with a White or Black caregiver reported an average caregiving network size of 1.13 and 1.11 caregivers, respectively.

At the 6-month visit, 12 dyads withdrew, and 13 more withdrew at the 12-month visit. At the end of the 12-month time period, 99 dyads remained, producing a retention rate of 74.1%. Of the dyads who withdrew, 2 veterans went into a nursing home, 3 veterans were too ill to continue, 7 veterans died, 12 dyads withdrew consent for study participation, 9 dyads moved away or were unable to be re-contacted at follow up, 1 caregiver became ineligible for study, and 1 caregiver died and was not replaced. Dyads received incentives of $25 for participating at the 1-month follow-up, $25 for the 6-month follow-up, and $50 for the 12-month follow-up.

**Procedure**

This project is part of a larger study that examined quantitative and qualitative aspects of post-stroke recovery and stroke caregiving. Data for the larger study were collected in the homes of persons with stroke at 1, 6 and 12 months after hospital discharge through four methods: in-depth face-to-face interviews, observations, questionnaires, and medical record abstraction. Interviews of persons with stroke and
caregivers occurred during three home visits and included qualitative and quantitative assessments.

Interviewers representing the three racial/ethnic groups were trained for data collection. Spanish-speaking data collectors were used for Puerto-Rican participants as needed. Data collectors of the same racial/ethnic origin as participants have been found to be more successful in obtaining authentic data (National Institutes of Health, 1995), and thus all the interviewers were matched to participants by race/ethnicity. Data collectors received training in the administration of the Functional Independence Measure and the Frenchay Activities Index. Caregivers were present during the interviews of the veterans with stroke and concurrently filled out a survey focusing on caregivers’ mental health. Each home visit lasted 2–2.5 hours.

**Measures: Caregiver**

**Geriatric Depression Scale (GDS)**

The GDS (Yesavage & Brink, 1983; Appendix A) contains 30 dichotomous-choice items and assesses the presence and degree of depression in older adults. Example items include “Do you feel pretty worthless the way you are now?” and “Do you feel like crying?” Higher scores reflect more depressive symptoms. Scores of 11 or higher reflect the presence of significant depressive symptoms. The GDS has been shown to successfully differentiate depressed from non-depressed older adults (Sheikh & Yesavage, 1986), and Yesavage and Brink (1983) reported the scale to have internal consistency (α = .94) and adequate reliability across one week (r = .85). Numerous other studies have provided support for the GDS’s validity and reliability (Montorio & Izal, 1998).
**Sense of Competence Questionnaire (SCQ)**

The SCQ (Vernooij-Dassen, Persoon, & Felling, 1996; Appendix B) contains 27 4-point items and assesses caregiver burden. Example items include “I feel that my health has suffered because of my involvement with my ____,” “I feel resentful about my interactions with my ____,” and “I wish that my ____ and I had a better relationship.” Higher scores indicate higher burden. The SCQ has been repeatedly used to assess caregivers of individuals with stroke (Scholte op Reimer, de Haan, Pijnenborg, Limburg, & van den Bos, 1998), as well as caregivers of persons with dementia (Vernooij-Dassen, Persoon, & Felling, 1996). The scale has been shown to have adequate reliability ($\alpha = .83$) and to be stable across one week (Intraclass Correlation = .93; Scholte op Reimer et al., 1998). Jansen et al. (2007) have also found the SCQ to have satisfactory Cronbach’s alpha and item-total correlations.

**Sense of Coherence (SOC)**

The SOC (Antonovsky, 1987; Appendix C) is comprised of 13 7-point items and assesses the extent to which a person views the world as comprehensible, meaningful, and manageable. Sense of coherence is defined as:

A global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) the stimuli deriving from one’s internal and external environments in the course of living are structured, predictable, and explicable; (2) the resources are available to meet the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement (Antonovsky, 1987).

In the stroke caregiver literature, “sense of coherence” has come to mean “coping,” and can be seen as “a measure of an individual’s resistance in the face of stress” (Schnyder, Buchi, Sensky, & Klaghofer, 2000, p. 296).
Example items from the SOC include “Do you have the feeling that you are being treated unfairly?” “How often do you have the feeling that there’s little meaning in the things you do in your daily life?” and “Has it happened in the past that you were surprised by the behavior of people whom you thought you knew well?” Higher scores indicate higher coherence, or in other words better coping ability. The scale has been shown to have high internal consistency (αs in the .90s; Frankenhoff, 1998) and adequate stability across time (rs > .70 for 6-12 months; Schnyder et al., 2000).

Measures: Veteran with Stroke

Geriatric Depression Scale (GDS)

A description of the GDS is omitted here. Please see the “Measures: Caregiver” section above. A full description of the scale appears in the above section.

Functional Independence Measure (FIM)

The FIM (Granger & Hamilton, 1990; Appendix D) is the most widely used method of assessing activities of daily living in persons with a disability. The FIM consists of 18 7-point items. The FIM has six subscales: self care, sphincter control, transfer capability, locomotion, communication, and social cognition. The validity and reliability of the FIM are well established (Hamilton, Laughlin, Fiedler, Granger, 1994; Corrigan, Smith-Knapp, & Granger, 1997; Stineman et al. 1996; Dodds, Martin, Stolov, & Deyo, 1993). In a meta-analysis study by Ottenbacher, Hsu, Grander, & Fiedler (1996), the median interrater reliability for the total FIM was .95, and the median test-retest and equivalence reliability values were .95 and .92, respectively. All data collectors in the current study were trained in completing the FIM assessment and were tested by professionals with appropriate training to certify inter-rater reliability.
Frenchay Activities Index (FAI)

The FAI (Holbrook & Skilbeck, 1983; Appendix E) contains 15 4-point items and was developed for measuring disability and handicap in persons with stroke relating to the instrumental activities of daily living. It assesses quality of life beyond the necessary skills for basic activities of daily living. Subscales include domestic, leisure/work, and outdoor activities. Schuling, de Haan, Limburg, and Groenier, (1993) found support for the scale’s validity through strong correlations with the Barthel Index (Mahoney & Barthel, 1965) and Sickness Impact Profile (Bergner, Bobbitt, Carter, & Gilson, 1981). Additionally, they found the FAI’s reliability coefficients to be between 0.78 and 0.87.

Data Analysis Plan

RMANOVAs

The first set of data analyses will be two omnibus repeated measures multivariate analyses of variance (RMANOVAs) to determine whether the mental health of stroke caregivers and functioning of veterans with stroke differ according to caregiver and veteran race/ethnicity, change over time, or change differentially over time according to caregiver and veteran race/ethnicity. In the first RMANOVA, the independent variables will be caregiver race/ethnicity, time, and the caregiver race/ethnicity*time interaction. The dependent variables will be caregiver Geriatric Depression Scale (depression), caregiver Sense of Competence Questionnaire (burden), and caregiver Sense of Coherence (coping). In the second RMANOVA, the independent variables will be veteran race/ethnicity, time, and the veteran race/ethnicity*time interaction. The dependent variables will be veteran Geriatric Depression Scale, veteran Functional Independence Measure (activities of daily living), and veteran Frenchay Activities Index (quality of life). In either of these analyses, if the effect of race/ethnicity on the
dependent variables is significant, it will indicate that the dependent variables differ in a multivariate manner by race/ethnicity. If the effect of time on any of the dependent variables is significant, it will indicate that the dependent variables change in a multivariate manner over time. And finally, if the effect of the race/ethnicity*time interaction on any of the dependent variables is significant, it will indicate that the dependent variables change in a multivariate manner differentially over time according to race/ethnicity. If the omnibus F-statistics from the independent variables in the RMANOVAs is significant, follow-up Bonferroni-corrected t-tests will be employed to determine the precise locations of mean differences among the different racial/ethnic groups or over time regarding caregiver mental health and functioning of veterans with stroke.

For the RMANOVAs, we used the statistical software G*Power to compute the sample size we would need in order to have sufficient statistical power. With a mixed-model RMANOVA, a sample size of 79 dyads would be needed to detect a large (Cohen, 1988) multivariate effect. As stated above, at 12 months post-discharge, through attrition, the sample size reached 99 dyads. Therefore, if the omnibus multivariate effect is large, the current sample size will be sufficient. However, an RMANOVA with the current sample size would not uncover many medium-sized effects, unless they were approaching a large-sized effect. Therefore, follow-up t-tests may need to be performed even in the absence of an omnibus RMANOVA effects, but these t-tests would be performed with Bonferroni corrections in order to control for family-wise error.
Canonical Correlations

The second data analysis will be three canonical correlation models run independently for dyads based on caregiver racial/ethnic identification. In other words, one canonical correlation model will be run for dyads with a White caregiver, one model for dyads with a Latino/Puerto-Rican caregiver, and one model for dyads with a Black caregiver. The purpose of these three models is to see whether the broad correlations between caregiver mental health and the functioning of veterans with stroke (care recipients) at each of the three points in time (1-, 6-, and 12-months post-discharge, denoted in Figure 7 below by correlations $x$, $y$, and $z$, respectively) differ according to the race/ethnicity of the caregiver.

Figure 3-1. Visual depiction of the canonical correlation model applied separately for Black, Latino/Puerto-Rican, and White caregivers
A canonical correlation uses shared variance from two sets of variables (in this case, caregiver mental-health variables and care-recipient functioning variables at each point in time) to create a correlation coefficient \( r \) indicating shared variance between the two sets (correlations x, y, and z). A canonical correlation is similar to a traditional Pearson r, but is calculated from two latent roots of shared variance (one root from each variable set) as opposed to two observed variables. In the above figure, amalgamations of latent, shared patterns of variance (shown in circles) are derivations of the two sets of measured variables (shown in boxes) at each point in time. A canonical correlation analysis produces a number of canonical correlations equal to the number of measured variables in the smallest variable set. In the current analyses, both variable sets at each point in time contain three measured variables, so each canonical correlation analysis will produce three canonical correlations. Each canonical correlation produced in a single analysis is comprised of variance unique from the variance within the other canonical correlations in that same analysis. The first canonical correlation is always the largest in magnitude, with each subsequent canonical correlation decreasing in magnitude and in statistical significance. In the analyses shown in Figure 7, the focus will be only on the first (and largest) canonical correlation, because a goal of this research is to simplify the complex web of interconnections between the veteran-with-stroke and caregiver variable sets and to increase generalizability to other settings by focusing only on relatively large effects.

Though power testing for canonical correlations is not as straightforward as in general linear models like RMANOVA, Mendoza, Markos, and Gonter (1978) have suggested that relatively small sample sizes of approximately 50 are sufficient to detect
strong effects in canonical correlations. In fact, with small sample sizes, canonical correlations are a much preferred method to other similar methods such as structural equation modeling which are more heavily dependent on large samples. It is important to note that the canonical correlation model shown in the figure above is not a structural equation model or a factor analysis, so there are no indices of fit and no focus on overall model fit. Weston, Gore, Chan, and Catalano (2008) cautioned against using structural equation models in rehabilitation research with samples of fewer than 200 participants. Due to attrition, the current sample reached 99 dyads at 12 months post-discharge, so canonical correlations are the ideal analytic tool for the study's sample size. Canonical correlations can answer with fewer participants many of the same modeling questions that structural equation models can. If the current project's sample size proves too small even for canonical correlations, bivariate correlations will be used to examine the connections between individual caregiver variables and individual veteran variables within racial/ethnic group and within each point in time, as outlined in the above model.
CHAPTER 4
RESULTS

Hypotheses 1a and 2a

It was hypothesized that Black caregivers would have better mental health than White caregivers across measures of burden, depression, and coping (Hypothesis 1a) and that White caregivers would have better mental health than Latino/Puerto-Rican caregivers. It was also hypothesized that the mental health of Black caregivers would improve at a more rapid rate than that of White caregivers, which would improve at a more rapid rate than that of Latino/Puerto-Rican caregivers (Hypothesis 2a). A repeated measures multivariate analysis of variance (RMANOVA) was performed in which the independent variables of interest were caregiver race/ethnicity, time, and the caregiver race/ethnicity*time interaction. The dependent variables were caregiver Geriatric Depression Scale (GDS; depression), caregiver Sense of Competence Questionnaire (SCQ; burden), and caregiver Sense of Coherence (SOC; coping).

The *Box-M* test for homogeneity of the variance-covariance matrices across design cells was non-significant, *Box-M* = 129.69, *F*(90, 8318.63) = 1.18, *p* = .116, indicating multivariate support for the homogeneity of variance assumption. Additionally, none of the nine Levene’s tests were significant, providing univariate support for the homogeneity of variance assumption. Taken together, these findings suggest that a more liberal estimate of *F*-statistics can be used, such as Wilk’s Lambda.

Hypothesis 1a nor 2a was supported. As strictly an exploratory analysis, follow-up Bonferroni-corrected t-tests for caregiver race/ethnicity were run within each dependent measure at each point in time. These t-tests showed no statistically significant differences on the GDS, SCQ, or SOC scores among White, Latino/Puerto-Rican, and Black caregivers at any point in time. See Table 4-1 for means and standard deviations of all caregiver measures from the current study broken down by time and racial/ethnic group.

Table 4-1. Caregiver scale Alphas and means and standard deviations by racial/ethnic group over time

<table>
<thead>
<tr>
<th>1-Month Measure</th>
<th>White (n = 43)</th>
<th>Latino/PR (n = 49)</th>
<th>Black (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS (α = .89)</td>
<td>7.02 (5.81)</td>
<td>7.49 (5.97)</td>
<td>4.84 (6.05)</td>
</tr>
<tr>
<td>SCQ (α = .88)</td>
<td>50.14 (10.34)</td>
<td>51.92 (10.29)</td>
<td>52.72 (12.56)</td>
</tr>
<tr>
<td>SOC (α = .85)</td>
<td>70.65 (14.08)</td>
<td>70.86 (13.34)</td>
<td>72.76 (17.34)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6-Month Measure</th>
<th>White (n = 38)</th>
<th>Latino/PR (n = 44)</th>
<th>Black (n = 21)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS (α = .88)</td>
<td>6.21 (5.44)</td>
<td>6.48 (5.45)</td>
<td>5.52 (6.17)</td>
</tr>
<tr>
<td>SCQ (α = .90)</td>
<td>51.34 (10.02)</td>
<td>53.16 (12.12)</td>
<td>51.57 (13.72)</td>
</tr>
<tr>
<td>SOC (α = .81)</td>
<td>70.47 (13.16)</td>
<td>68.95 (13.26)</td>
<td>73.81 (14.34)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>12-Month Measure</th>
<th>White (n = 34)</th>
<th>Latino/PR (n = 41)</th>
<th>Black (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS (α = .88)</td>
<td>6.97 (5.51)</td>
<td>5.54 (5.50)</td>
<td>3.45 (4.41)</td>
</tr>
<tr>
<td>SCQ (α = .90)</td>
<td>50.74 (11.07)</td>
<td>52.32 (10.72)</td>
<td>51.00 (12.19)</td>
</tr>
<tr>
<td>SOC (α = .79)</td>
<td>71.00 (12.26)</td>
<td>69.07 (11.91)</td>
<td>70.90 (13.74)</td>
</tr>
</tbody>
</table>

In Table 4-1, several visual trends in racial/ethnic differences emerged, though these trends should be interpreted with extreme caution due to statistical non-significance both in the overall RMANOVA and in the exploratory follow-up t-tests. Black caregivers seemed consistently to report lower depression than caregivers from the other two racial/ethnic groups did at each of the three time points. Similarly, Black caregivers appeared to report better coping at 1 and 6 months than did caregivers from the other two racial/ethnic groups. Conversely, in Table 4-1, Latino/Puerto-Rican caregivers had the lowest coping and highest burden out of the three racial/ethnic
groups at 6 and 12 months, though all of these effects failed to reach statistical significance. There were no visual trends in racial/ethnic differences for the rate of change in any caregiver mental-health measure over time.

**Hypotheses 1b and 2b**

It was hypothesized that Black and Latino/Puerto-Rican veterans with stroke would have poorer functioning than White veterans across measures of depression, activities of daily living, and quality of life (Hypothesis 1b). It was also hypothesized that the functioning of Black and Latino/Puerto-Rican veterans with stroke would improve more slowly than that of White veterans (Hypothesis 2b). An RMANOVA was performed in which the independent variables of interest were veteran race/ethnicity, time, and the veteran race/ethnicity*time interaction. The dependent variables were veteran Geriatric Depression Scale, veteran Functional Independence Measure (activities of daily living), and veteran Frenchay Activities Index (quality of life).

The Box-$M$ test for homogeneity of the variance-covariance matrices across design cells was significant, $\text{Box-M} = 226.21, F(90, 13487.43) = 2.13, p < .001$, indicating a multivariate violation of the homogeneity of variance assumption. Additionally, four of the nine Levene’s tests were significant, suggesting that the homogeneity of variance assumption was broken for four dependent variables individually: veteran GDS Time 2, $F(2, 95) = 3.22, p = .044$; veteran FIM Time 1, $F(2, 95) = 3.77, p = .027$; veteran FIM Time 2, $F(2, 95) = 12.93, p < .001$; and veteran FIM Time 3, $F(2, 95) = 8.14, p = .001$. Taken together, these findings suggest that a more conservative estimate of $F$-statistics should be used, such as Pillai’s Trace.

The overall omnibus RMANOVA revealed statistically significant main effects for veteran race/ethnicity, $F(2, 95) = 3.67, p = .029, \eta^2 = .072$, and time, Pillai’s Trace = .21,
$F(2, 94) = 12.58, p < .001, \eta^2 = .211$, though the veteran race/ethnicity*time interaction did not reach statistical significance, Pillai’s Trace = .019, $F(4, 190) = .45, p = .772, \eta^2 = .009$. These results fail to support Hypothesis 2b, suggesting that there were no racial/ethnic differences in the rate of change in veteran functioning. However, the RMANOVA’s significant race/ethnicity effect allows for follow-up Bonferroni-corrected $t$-tests within each dependent measure (GDS, FIM, and FAI) at each point in time to determine the specific locations of racial/ethnic differences in the functioning of veterans with stroke.

These $t$-tests showed no statistically significant differences among the GDS scores of White, Latino/Puerto-Rican, and Black veterans with stroke at any point in time. However, when examining a visual depiction of GDS means over time by racial/ethnic group (Table 4-2), a fairly clear, though statistically non-significant, trend emerged with Black veterans experiencing lower GDS scores (lower depression) that the other two racial/ethnic groups at each of the three time points.

Table 4-2. Veteran scale Alphas and means and standard deviations by racial/ethnic group over time

<table>
<thead>
<tr>
<th>Measure</th>
<th>1-Month</th>
<th>White ($n = 43$)</th>
<th>Latino/PR ($n = 48$)</th>
<th>Black ($n = 27$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS ($\alpha = .90$)</td>
<td>9.14 (6.75)</td>
<td>10.23 (7.12)</td>
<td>6.59 (4.89)</td>
<td></td>
</tr>
<tr>
<td>FIM ($\alpha = .94$)</td>
<td>112.28 (16.53)</td>
<td>107.92 (18.90)$^a$</td>
<td>116.56 (10.48)$^a$</td>
<td></td>
</tr>
<tr>
<td>FAI ($\alpha = .86$)</td>
<td>31.02 (10.21)</td>
<td>25.92 (10.92)$^a$</td>
<td>31.74 (9.25)$^a$</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measure</th>
<th>6-Month</th>
<th>White ($n = 40$)</th>
<th>Latino/PR ($n = 45$)</th>
<th>Black ($n = 24$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS ($\alpha = .90$)</td>
<td>9.48 (6.61)</td>
<td>10.11 (7.29)</td>
<td>5.83 (4.47)</td>
<td></td>
</tr>
<tr>
<td>FIM ($\alpha = .93$)</td>
<td>115.60 (10.90)$^a$</td>
<td>110.58 (17.96)$^b$</td>
<td>121.79 (5.59)$^{a,b}$</td>
<td></td>
</tr>
<tr>
<td>FAI ($\alpha = .87$)</td>
<td>34.95 (10.64)</td>
<td>28.76 (11.65)$^a$</td>
<td>34.83 (10.65)$^a$</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measure</th>
<th>12-Month</th>
<th>White ($n = 35$)</th>
<th>Latino/PR ($n = 41$)</th>
<th>Black ($n = 22$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDS ($\alpha = .88$)</td>
<td>8.14 (6.03)</td>
<td>8.34 (6.36)</td>
<td>5.82 (4.11)</td>
<td></td>
</tr>
<tr>
<td>FIM ($\alpha = .92$)</td>
<td>119.09 (6.92)</td>
<td>115.22 (15.91)</td>
<td>120.33 (10.34)</td>
<td></td>
</tr>
<tr>
<td>FAI ($\alpha = .88$)</td>
<td>35.17 (10.01)</td>
<td>29.85 (12.95)</td>
<td>34.55 (10.87)</td>
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(Note. Means within a row marked by the same superscript letter were significantly different after Bonferroni corrections).
This series of Bonferroni-corrected \( t \)-tests uncovered two racial/ethnic differences on FAI scores. At 1 month, Black veterans had higher FAI scores than Latino/Puerto-Rican veterans did, \( t(79) = -2.94, p = .012, \) Cohen’s \( d = .67 \), a medium-sized effect. This effect was also mirrored at 6 months, \( t(71) = -2.52, p = .042, \) Cohen’s \( d = .43 \), a small-sized effect. See Table 4-2 for a visual depiction of these trends.

The Bonferroni-corrected \( t \)-tests also uncovered three racial/ethnic differences on FIM scores. At 1 month, Black veterans had higher FIM scores than Latino/Puerto-Rican veterans did, \( t(79) = -2.46, p = .048, \) Cohen’s \( d = .58 \), a medium-sized effect. This effect was mirrored at 6 months, \( t(71) = -3.14, p = .006, \) Cohen’s \( d = .84 \), a large-sized effect. And Black veterans also had higher 6-month FIM scores than Whites veterans did, \( t(67) = -2.77, p = .021, \) Cohen’s \( d = .73 \), a medium-sized effect. See Table 4-2 for a visual depiction of these trends.

**Hypothesis 3**

It was hypothesized that the canonical correlations between caregiver and veteran variable sets at 1-, 6-, and 12-months post-discharge would be larger for dyads with a White caregiver than for dyads with a Black or Latino/Puerto-Rican caregiver. Three canonical correlation models were run independently for dyads based on caregiver racial/ethnic identification. Each of these three overall models was comprised of three canonical correlation analyses, one at each point in time. In each analysis, the caregiver variables were GDS, SCQ, and SOC, and the veteran variables were GDS, FIM, and FAI. Though a canonical correlation analysis with three variables in each set produces three canonical correlations, as outlined in the Data Analysis Plan section of this
manuscript, only the first canonical correlation will be reported and interpreted here in order to focus on the strongest patterns of connections between the two variable sets.

**Comparisons of Canonical Correlations by Race/Ethnicity**

In order to compare by caregiver race/ethnicity the magnitudes of canonical correlations between caregiver variables and veteran variables, Fisher $r$-to-$z$ transformations were performed on each of the nine canonical correlations, producing nine $z$-scores. Within each point in time, these $z$-scores were used to calculate three absolute-value-difference $z$-scores between groups of dyads with a White, Latino/Puerto-Rican, or Black caregiver. This process generated nine comparisons, three at each point in time, each comparison with its own absolute-value-difference $z$-score and $p$-value. None of these absolute-value-difference $z$-scores were statistically significant, all $zs < 1.35$, all $ps > .089$, suggesting that none of the canonical correlations between caregiver-mental-health variables and veteran-functioning variables differed as a function of caregiver race/ethnicity within each point in time. However, because of the study’s sample size, meaningful racial/ethnic differences in the size of canonical correlations may have gone undetected in the Fisher $r$-to-$z$ transformation analysis.

For reference, overall canonical correlations collapsing across racial/ethnic groups were calculated at each point in time. The first canonical correlation produced from the Time 1 analysis was $.34$, $11.6\%$ shared variance, $\lambda = .813$, $\chi^2(9) = 23.76$, $p = .005$; the first canonical correlation produced from the Time 2 analysis was $.33$, $10.9\%$ shared variance, $\lambda = .845$, $\chi^2(9) = 16.80$, $p = .052$; and the first canonical correlation produced from the Time 3 analysis was $.30$, $9.1\%$ shared variance, $\lambda = .886$, $\chi^2(9) = 11.04$, $p = .273$. A graph of the first canonical correlation within each racial/ethnic group as well as overall across racial/ethnic groups over time appears in Figure 4-1.
Figure 4-1 suggests that in comparison to dyads with a White or Black caregiver, dyads with a Latino/Puerto-Rican caregiver exhibited the smallest canonical correlations between caregiver mental health and veteran functioning. Additionally, dyads with a White caregiver exhibited the largest canonical correlations between caregiver mental health and veteran functioning, except at Time 3 when dyads with a Black caregiver exhibited the highest canonical correlation. These findings are consistent with Hypothesis 3, though the tests of Hypothesis 3 failed to reach conventional levels of statistical significance. Further, all within-race/ethnicity canonical correlations were larger than the overall canonical correlations collapsing across race/ethnicity.

**Dyads with a White Caregiver**

The first canonical correlation model was run for dyads with a White caregiver. Within this model, the first canonical correlation produced from the Time 1 analysis was .63, 39.9% shared variance, $\lambda = .581$, $\chi^2(9) = 20.92$, $p = .013$; the first canonical correlation produced from the Time 2 analysis was .64, 40.3% shared variance, $\lambda = \ldots$
.563, χ2(9) = 19.27, p = .023; and the first canonical correlation produced from the Time 3 analysis was .52, 27.1% shared variance, λ = .689, χ2(9) = 11.01, p = .275. All of these correlations are considered large-sized effects according to Cohen's (1988) standards, though only the first two correlations reached statistical significance. These correlations appear in Figure 4-1.

In the Time 1 canonical correlation, the standardized canonical coefficients for the caregiver variables showed that caregiver GDS loaded most highly (.84), whereas the other coefficients were below the conventional cutoff of .40. For the veteran variables, veteran GDS loaded most highly (.84) and had the only coefficient above .40. This pattern of shared variance suggests that at Time 1 in dyads with a White caregiver, the variables most highly contributing to the relationship between caregiver mental health and veteran functioning were caregiver and veteran depression.

In the Time 2 canonical correlation, the standardized canonical coefficients for the caregiver variables showed that caregiver GDS loaded most highly (1.12), followed by SCQ (.89) and SOC (.93). For the veteran variables, veteran GDS loaded most highly (.83), followed in magnitude by FAI (-.71). This pattern of shared variance suggests that at Time 2 in dyads with a White caregiver, the variables most highly contributing to the relationship between caregiver mental health and veteran functioning were all three caregiver mental health indices and veteran depression and quality of life.

Though the Time 3 canonical correlation did not reach statistical significance due to the small sample size in this analysis, a correlation with a magnitude of .52 is still considered large-sized (Cohen, 1988). Accordingly, examining the patterns of loadings still can be illuminating, though interpretations must be made with caution, given the
statically non-significant result. In the Time 3 canonical correlation, the standardized canonical coefficients for the caregiver variables showed that caregiver GDS loaded most highly (.44), followed in magnitude by SOC (-.42). For the veteran variables, veteran GDS loaded most highly (.73), followed by FAI (-.45). This pattern of shared variance suggests that at Time 3 in dyads with a White caregiver, the variables most highly contributing to the relationship between caregiver mental health and veteran functioning were caregiver depression and sense of coherence and veteran depression and quality of life. The standardized canonical coefficients for the first canonical correlation at Time 1, 2, and 3 in dyads with a White caregiver appear in Figure 4-1.

| Table 4-3. Standardized canonical coefficients over time in dyads with a White caregiver |
|-----------------------------------------------|---|---|---|
| Caregiver Variables | Time 1 | Time 2 | Time 3 |
| SOC | -0.18 | 0.93 | -0.42 |
| SCQ | 0.06 | 0.89 | 0.34 |
| GDS | **0.84** | **1.12** | **0.44** |
| Veteran Variables | Time 1 | Time 2 | Time 3 |
| FIM | -0.20 | 0.29 | -0.16 |
| FAI | -0.17 | -0.71 | -0.45 |
| GDS | **0.84** | **0.83** | **0.73** |

(Note. Coefficients in bold tended to cluster together consistently over time and will be the focus of discussion).

**Dyads with a Latino/Puerto-Rican Caregiver**

The second canonical correlation model was run for dyads with a Latino/Puerto-Rican caregiver. Within this model, the first canonical correlation produced from the Time 1 analysis was .42, 18.0% shared variance, \( \lambda = .744, \chi^2(9) = 13.17, p = .155 \); the first canonical correlation produced from the Time 2 analysis was .45, 20.0% shared variance, \( \lambda = .728, \chi^2(9) = 12.20, p = .202 \); and the first canonical correlation produced from the Time 3 analysis was .38, 14.7% shared variance, \( \lambda = .808, \chi^2(9) = 7.78, p = .557 \). All of these correlations are considered medium-sized effects according to
Cohen’s (1988) standards, though none reached statistical significance. Again because these correlations are medium-sized and account for quite a bit of shared variance (all at or above 14.7%), it may be informative to examine the patterns of loadings, albeit cautiously. These correlations are graphically displayed in Figure 4-1.

In the Time 1 canonical correlation, the standardized canonical coefficients for the caregiver variables showed that SOC loaded most highly (-1.19), followed by GDS (-.92). For the veteran variables, FAI loaded most highly (1.15), followed by GDS (.49). This pattern of shared variance suggests that at Time 1 in dyads with a Latino/Puerto-Rican caregiver, the variables most highly contributing to the relationship between caregiver mental health and veteran functioning were caregiver sense of coherence and depression and veteran quality of life and depression.

In the Time 2 canonical correlation, the standardized canonical coefficients for the caregiver variables showed that caregiver SOC loaded most highly (1.34), followed by GDS (.48). For the veteran variables, FAI had the highest loading (-1.23), and none of the other loadings surpassed .40. This pattern of shared variance suggests that at Time 2 in dyads with a Latino/Puerto-Rican caregiver, the variables most highly contributing to the relationship between caregiver mental health and veteran functioning were caregiver sense of coherence and depression and veteran quality of life.

In the Time 3 canonical correlation, the standardized canonical coefficients for the caregiver variables showed that caregiver SOC loaded most highly (1.28), followed in magnitude by GDS (.79). For the veteran variables, FAI loaded most highly (-1.29), followed in magnitude by GDS (-.55) and FIM (.45). This pattern of shared variance suggests that at Time 3 in dyads with a Latino/Puerto-Rican caregiver, the variables
most highly contributing to the relationship between caregiver mental health and veteran functioning were caregiver sense of coherence and depression and all indices of veteran functioning. The standardized canonical coefficients for the first canonical correlation at Time 1, 2, and 3 in dyads with a Latino caregiver appear in Figure 4-1.

Table 4-4. Standardized canonical coefficients over time in dyads with a Latino/Puerto-Rican caregiver

<table>
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<tr>
<th>Caregiver Variables</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
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<td>SOC</td>
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<td>1.34</td>
<td>1.28</td>
</tr>
<tr>
<td>SCQ</td>
<td>0.25</td>
<td>0.28</td>
<td>0.36</td>
</tr>
<tr>
<td>GDS</td>
<td>-0.92</td>
<td>0.48</td>
<td>0.79</td>
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<table>
<thead>
<tr>
<th>Veteran Variables</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
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<td>FAI</td>
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<tr>
<td>GDS</td>
<td>0.49</td>
<td>-0.09</td>
<td>-0.55</td>
</tr>
</tbody>
</table>

(Note. Coefficients in bold tended to cluster together consistently over time and will be the focus of discussion).

Dyads with a Black Caregiver

The third canonical correlation model was run for dyads with a Black caregiver. Within this model, the first canonical correlation produced from the Time 1 analysis was .49, 24.1% shared variance, $\lambda = .665$, $\chi^2(9) = 8.36$, $p = .499$; the first canonical correlation produced from the Time 2 analysis was .58, 33.2% shared variance, $\lambda = .577$, $\chi^2(9) = 9.08$, $p = .430$; and the first canonical correlation produced from the Time 3 analysis was .58, 33.1% shared variance, $\lambda = .549$, $\chi^2(9) = 8.69$, $p = .466$. The Time 1 correlation is considered a medium-sized effect, and the Time 2 and 3 correlations are considered large-sized effects (Cohen, 1988), though none reached statistical significance. The patterns of loadings within these correlations will be examined and interpreted cautiously. These correlations are graphically depicted in Figure 4-1.
In the Time 1 canonical correlation, the standardized canonical coefficients for the caregiver variables showed that GDS loaded most highly (1.76), followed by SOC (1.67). For the veteran variables, FIM loaded most highly (.73), followed by FAI (.57), and GDS (.53). This pattern of shared variance suggests that at Time 1 in dyads with a Black caregiver, the variables contributing the most to the relationship between caregiver mental health and veteran functioning were caregiver depression and sense of coherence and all the indices of veteran functioning.

In the Time 2 canonical correlation, the standardized canonical coefficients for the caregiver variables showed that caregiver SCQ loaded most highly (.97), followed by GDS (.41). For the veteran variables, GDS had the highest loading (-1.22), followed by FIM (.80). This pattern of shared variance suggests that at Time 2 in dyads with a Black caregiver, the variables most highly contributing to the relationship between caregiver mental health and veteran functioning were caregiver burden and depression and veteran activities of daily living.

In the Time 3 canonical correlation, the standardized canonical coefficients for the caregiver variables showed that SCQ loaded most highly (-1.10), with no other coefficients surpassing .40. For the veteran variables, GDS loaded most highly (-.77), followed in magnitude by FAI (.52). This pattern of shared variance suggests that at Time 3 in dyads with a Black caregiver, the variables most highly contributing to the relationship between caregiver mental health and veteran functioning were caregiver burden and veteran depression and quality of life. The standardized canonical coefficients for the first canonical correlation at Time 1, 2, and 3 in dyads with a Black caregiver appear in Table 6.
Table 4-5. Standardized canonical coefficients over time in dyads with a Black caregiver

<table>
<thead>
<tr>
<th>Caregiver Variables</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
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<td>SOC</td>
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<td>SCQ</td>
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<td>GDS</td>
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<table>
<thead>
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<th>Veteran Variables</th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
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<td>GDS</td>
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<td>-1.22</td>
<td>-0.77</td>
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</table>

(Note. No coefficients tended to cluster together consistently over time, so none were bolded or will be the focus of discussion).

See Table 4-6 for a correlation matrix of all variables from the current study collapsed across racial/ethnic groups.
Table 4-6. Correlation coefficients among all variables

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(Note. * = p < .05. ** = p < .01.)
CHAPTER 5
DISCUSSION

Overview of Findings

Out of the three racial/ethnic groups, Latino/Puerto-Rican veterans with stroke consistently showed the lowest functioning, and their caregivers showed the poorest mental health, though the mental-health effects did not reach statistical significance. Consistent patterns emerged over time in the relationships between caregiver mental health and functioning of individuals with stroke, though the patterns differed as a function of race/ethnicity. The following sections discuss the findings from this study as relating to each hypothesis.

Caregivers: Hypotheses 1a and 2a

Hypothesis 1a did not garner statistical support: Black caregivers did not have significantly better mental health than White caregivers, who did not have significantly better mental health than Latino/Puerto-Rican caregivers across measures of burden, depression, or coping. In fact, there were no statistically significant racial/ethnic differences among any of these measures at any point in time, even in exploratory analyses. However, when examining directionality of statistically non-significant mean differences, Black caregivers seemed to report lower depression (Geriatric Depression Scale; GDS) than the other two racial/ethnic groups did at each of the three time points. This statistically non-significant finding is consistent with a number of previous studies, which have found that African-American dementia caregivers exhibit less depression than White dementia caregivers (Connell & Gibson, 1997; Covinski et al., 2003; Farran, Miller, Kaufman, & Davis, 1997; Janevic & Connell, 2001). Also, in the current study, a statistically non-significant trend emerged, suggesting that Black caregivers may have
had better coping (Sense of Coherence; SOC) at Times 1 and 2 than did the other two racial/ethnic groups. Across both the GDS and SOC, Black caregivers’ mental health appeared to fare better than the mental health of members of other groups, though this finding must be interpreted with caution because it was not statistically significant. However, these trends are consistent with the published literature on the mental health of African-American caregivers.

On the other hand, statistically non-significant trends suggested that Latino/Puerto-Rican caregivers had the lowest coping (SOC) and the highest burden (Sense of Competence Questionnaire; SCQ) out of the three racial/ethnic groups at Times 2 and 3. These trends are consistent with previous research suggesting that Puerto-Rican individuals have often displayed extremely strong loyalty in providing support for sick or hurt family members (Delgado & Tennstedt, 1997; Sánchez-Ayendéz, 1998; Villarreal, Blozis, & Widamen, 2005; Zea, Quezada, & Belgrave, 1994; Zsembik & Bonilla, 2000) and perhaps as a result, face substantial role engulfment, depression, and personal-role strain (Dilworth-Anderson, Williams, & Gibson, 2002).

As with Hypothesis 1a, Hypothesis 2a did not garner statistical support: The mental health of Black stroke caregivers did not improve at a significantly more rapid rate than that of White caregivers, which did not improve at a significantly more rapid rate than that of Latino/Puerto-Rican caregivers. There were no statistically significant racial/ethnic differences in the rate of change in any mental-health measure over time, and even a visual inspection for statistically non-significant trends revealed no consistent patterns. Similarly, no statistically significant effect of time emerged, suggesting that caregiver mental health remained constant over time. There was likely
too much variability within racial/ethnic groups over time, even to identify racial/ethnic trends in the current study.

**Veterans with Stroke: Hypotheses 1b and 2b**

Hypothesis 1b found partial support: Latino/Puerto-Rican veterans with stroke exhibited the poorest functioning of the three racial/ethnic groups. At Times 1 and 2, Latino/Puerto-Rican veterans had lower quality of life (FAI) and activities of daily living (FIM) than Black veterans did. Latino/Puerto-Rican veterans’ scores on these measures were also consistently approximately lower than or equal to that of White veterans, though these differences did not reach statistical significance. In terms of directionality of statistically non-significant mean differences, Latino/Puerto-Rican veterans consistently reported the highest depression (GDS) out of the three racial/ethnic groups at each point in time. This pattern of significant stroke disparities for Latino individuals conforms to that shown in the literature (Ayala et al., 2001; McGruder, Malarcher, Antoine, Greenlund, & Croft, 2004; Scheinart et al., 1998).

However, the functioning of Black veterans with stroke did not conform to Hypothesis 1b or the published literature in that Black veterans exhibited the highest functioning out of the three racial/ethnic groups. Black veterans had the lowest depression over time, though again this trend did not reach statistical significance and should be interpreted with caution. This finding may be understood by looking to Knight and McCallum’s (1998) theories on depression in African Americans, including the “faking good hypothesis” and the “positive reappraisal hypothesis,” holding that African Americans may underreport their depression or focus on the positive aspects of stress. Also, Black veterans in the current study may have exhibited less depression because overall their activities of daily living and quality of life were better than that of
Latino/Puerto-Rican veterans generally and better than White veterans on the Time 2 FAI.

Interestingly, this set of findings for Black veterans with stroke runs contrary to much of the previous literature which has found that African Americans with stroke experienced more strokes and recovered more slowly from stroke than White individuals (Ayala et al., 2001; McGruder, Malarcher, Antoine, Greenlund, & Croft, 2004; Scheinart et al., 1998). One likely interpretation for this finding is that African Americans are more likely to be discharged to nursing homes than are individuals from other racial/ethnic groups (Onukwugha & Mullins, 2007). Because discharge to a nursing home was an exclusion criterion in the current study, the sample may have had an overrepresentation of healthier Black veterans, which also could have accounted for the statistically non-significant trend of lower depression levels for Black veterans and caregivers in the sample.

Hypothesis 2b was not supported in that the functioning of Black and Latino/Puerto-Rican veterans with stroke did not improve more slowly than that of White veterans. There were no statistically significant racial/ethnic differences in the rate of change in any veteran functioning measure over time, and even a visual inspection for statistically non-significant trends revealed no consistent patterns. Unlike with caregiver mental-health variables, a statistically significant main effect of time emerged for veteran-functioning variables, suggesting that veteran functioning changed over time. Inspection of the graphs suggests that both veteran FAI and FIM scores increased over time, indicating improvement in quality of life and in activities of daily living across all racial/ethnic groups.
Hypothesis 3

Hypothesis 3 was not supported statistically, and the racial/ethnic differences in the broad correlations between caregiver mental health and veteran functioning at Times 1, 2, and 3 did not reach statistical significance. However, examining the magnitude of differences in correlations provides some support for Hypothesis 3, though the analyses were underpowered. At Times 1 and 2, the sizes of these correlations were exactly as predicted, as dyads with a White caregiver exhibited the largest associations between caregiver mental health and veteran functioning, followed in magnitude by dyads with a Black caregiver and then dyads with a Latino/Puerto-Rican caregiver. At Time 3, the pattern in magnitude reversed for dyads with White and Black caregivers, when dyads with a Black caregiver exhibited the largest association, followed by dyads with a White caregiver and then dyads with a Latino/Puerto Rican caregiver. Again, it is important to emphasize that these differences, though fairly consistent over time, were not statistically significant and should be interpreted with caution.

Taken together, this pattern of results in the current study suggests that in dyads with a White or Black caregiver, caregiver mental health and veteran functioning were closely intertwined. This same magnitude of association did not emerge in dyads with a Latino/Puerto-Rican caregiver. One promising potential explanation for this finding is that in the current sample, dyads with a Latino/Puerto-Rican caregiver had a larger caregiving network than did dyads with a White or Black caregiver. Hinojosa, Zsembik, and Rittman (2009) have argued that as the number of informal caregivers increases in a family, burden on the primary caregiver may decrease, a viewpoint that may help illuminate the smaller correlations in the current study for dyads with a Latino/Puerto-
Rican caregiver. Unfortunately, the current data cannot empirically test this possible explanation because the racial/ethnic differences in correlation magnitude were not statistically significant, even before network size is employed as a covariate. As a result, tests of this possible explanation must the focus of future research.

The magnitudes of canonical correlations collapsed across caregiver race/ethnicity were consistently smaller and at times much smaller than the canonical correlations within caregiver race/ethnicity. This pattern suggests that differences among racial/ethnic groups served to mask important relationships between caregivers and veterans with stroke within racial/ethnic groups across time. An important implication of this finding is that critical knowledge regarding the connections between caregiver mental health and veteran functioning is lost when researchers and clinicians ignore race/ethnicity, instead of looking within and between racial/ethnic groups. A monolithic racial/ethnic model does not seem to hold, and race/ethnicity is likely a key variable in how caregiver mental health and veteran functioning reciprocally influence each other. A first step in stroke rehabilitation can involve culturally sensitive mental health interventions for stroke caregivers. These interventions could improve the way that caregivers within each racial/ethnic group provide informal care and ultimately contribute to more effective rehabilitation of veterans with stroke, especially in ethnic minority veterans facing stroke disparities. As a result, it may be useful to draw a number of concrete, culturally-specific implications for stroke rehabilitation from the current findings and previous research.

**Implications: Dyads with a White Caregiver**

In the current study, dyads with a White caregiver exhibited a very strong connection between caregiver mental health and veteran functioning, especially with
depression. A fairly consistent pattern emerged in canonical-correlation loadings for dyads with a White caregiver in that across all three time points, caregiver depression and veteran depression loaded most highly, suggesting that these two variables held the strongest connection as compared to other indices of caregiver mental health and veteran functioning. Depression in White caregivers may elicit depression in veterans with stroke or vice versa, slowing rehabilitation.

As compared to other racial/ethnic groups, mental-health interventions for White caregivers may produce some of the strongest positive effects on informal care, and as a result on stroke rehabilitation due to the large connections between White caregivers’ mental health and the functioning of individuals with stroke. Cognitive-behavioral therapy for White caregivers may be especially effective for reducing depression. Also, because White caregivers tend to have a small caregiving network, averaging only slightly more than one caregiver, encouraging White caregivers to enlarge their networks may reduce some of the impact of stroke on White caregivers’ mental health and generally improve informal care.

**Implications: Dyads with a Latino/Puerto-Rican Caregiver**

In the current study, dyads with a Latino/Puerto-Rican caregiver exhibited a looser connection between caregiver mental health and veteran functioning. This could be a result of the fact that in the current sample, dyads with a Latino/Puerto-Rican caregiver had larger caregiver networks than did dyads with a Black or White caregiver. Despite this looser connection, as with dyads with a White caregiver, a consistent pattern emerged in canonical-correlation loadings for dyads with a Latino/Puerto-Rican caregiver in that across all three time points, caregiver coping and depression and veteran quality of life loaded most highly. This consistent pattern suggests that the
component of stroke which most heavily affected the mental health of Latino/Puerto-Rican caregivers (and vice versa) was reduced functioning of the veteran with stroke in higher-order quality of life beyond the necessary skills for basic activities of daily living, such as domestic life, leisure/work, and outdoor activities.

As compared to other racial/ethnic groups, mental-health interventions for Latino/Puerto-Rican caregivers could focus more on role engulfment and personal-role strain. In the current sample, Latino/Puerto-Rican caregivers reported poorer mental health than other groups, though the effects fell short of statistical significance. Depression in Latino/Puerto-Rican caregivers combined with reduced meaning-making abilities may limit quality of care, impacting veteran quality of life and slowing rehabilitation. Mental-health interventions that specifically target the ways in which Latino/Puerto-Rican caregivers create meaning out of the caregiving process and interpret the limitations in veteran quality of life may help reduce caregiver depression and improve the quality of the informal care they provide.

**Implications: Dyads with a Black Caregiver**

In the current study, dyads with a Black caregiver exhibited a moderately strong connection between caregiver mental health and veteran functioning, though no consistent pattern emerged in canonical-correlation loadings over time. As compared to the other racial/ethnic groups, Black caregivers and veterans seemed to fair the best across most indices of caregiver mental health and stroke functioning. Given previously published research, these findings were likely accurate for caregiver mental health, though they did not reach statistical significance, probably because of the limited number of Black caregivers in the current study. However, these findings were likely inaccurate for veteran functioning because of the probable inadvertent over-sampling of
higher-functioning Black veterans with stroke in this study that resulted from differential discharge to nursing homes as a function of race/ethnicity.

This over-sampling issue points to the absolute necessity of considering external and systemic third variables when understanding disparities in stroke or when performing rehabilitation counseling with Black caregivers and veterans. In Black caregivers and veterans, the effects of social and economic forces (such as systemic racism, socio-economic status, caregiver health, and access to care) may be especially pronounced and create significant racial/ethnic disparities, for example, in the likelihood of being discharged to a nursing home. In the current study, these disparities and third variables may have obscured a valid interpretation of the connections between caregiver mental health and veteran functioning. This issue also points to the importance of rehabilitation counseling for Black caregivers incorporating a systems perspective and helping caregivers examine the impact of various social forces on their mental health and on the care they provide.

**General Implications**

Stroke rehabilitation interventions often target only veterans with stroke, rather than the caregiver/veteran dyad, approaching rehabilitation perhaps with only half of the potential power and effectiveness that they could. Findings from previous studies (e.g., Perrin et al., 2008; Perrin et al., 2009) and from the current study have identified very close links between the mental health of stroke caregivers and the functioning of veterans with stroke, suggesting that a first step in stroke rehabilitation could involve attending to the needs of the primary stroke caregiver. Early psychosocial interventions, especially for at-risk stroke caregivers, potentially could be less expensive and more
effective than dealing with complications resulting from inadequate, ineffective, or diminished informal caregiving.

The findings from the current study help illuminate the relationships between the mental health of stroke caregivers and the functioning of veterans with stroke both within and between racial/ethnic groups. These connections exist differentially for dyads with Black, Latino/Puerto-Rican, or White caregivers, and as a result, the findings from this study may be a first step in creating culturally sensitive mental-health interventions for caregivers of veterans with stroke. Because major disparities exist in the prevalence and course of stroke among African-American, Latino, and White veterans, it is of extreme importance to understand the patterns of relationships among caregiver mental health and the functioning of veterans with stroke differentially within each ethnic group.

The functioning of veterans with stroke is intimately linked to the mental health of stroke caregivers, so culturally sensitive interventions for caregivers could improve the way that caregivers within each ethnic group provide informal care and ultimately contribute to more effective rehabilitation of veterans with stroke, especially ethnic-minority veterans. Specifically, findings from the current study are consistent with the use of several forms of psychosocial interventions for stroke caregivers, and the treatment modality should depend on the specific needs of the caregiver/care recipient dyad.

Visser-Meily et al. (2005) reviewed a number of studies on interventions for stroke caregivers and found four primary categories of interventions: specialist services, psycho-education, counseling, and social support by peers. Visser-Meily et al. (2005) suggested that of the four predominant types of interventions, counseling programs had
the most positive outcomes, especially those involving active problem-solving strategies. For example, Grant, Elliott, Weaver, Bartolucci, and Newman Giger (2002) gave stroke caregivers a 3-hour social problem-solving training program two days before hospital discharge, followed by scheduled telephone contacts. The caregivers in the intervention group had several positive treatment outcomes relative to controls: improved problem-solving skills, greater caregiver preparedness, less depression, improved vitality, better social functioning, and higher mental health, though there were no differences in burden.

With Grant et al.’s (2002) findings and Visser-Meily et al.’s (2005) assertions in mind, one potential intervention could involve cognitive-behavioral counseling for caregivers, which may improve caregivers’ sense of coherence, reducing their levels of burden and depression and leading to improved informal care and better stroke recovery of individuals with stroke. Cognitive-behavioral counseling is well suited to help stroke caregivers who provide care for low-functioning veterans improve their sense of coherence by refining meaning-making strategies to ward off burden and depression. Good caregiver mental health in turn could lead to better informal caregiving and ultimately to more effective stroke rehabilitation, based on the causal feedback loop theory articulated by Perrin et al. (2008).

In addition to providing psychotherapeutic interventions, creating interventions that increase knowledge of stroke caregivers about their vulnerability to depression and to other reductions in their mental health could facilitate self care and appropriate treatment seeking. Many stroke caregivers have reported feeling inadequately informed because they lack basic information about stroke, strategies to care for individuals with
stroke, and ways to prevent complications and future strokes (O’Connell & Baker, 2004; Rodgers, Bond, & Curless, 2001; Smith, Kerr, Langhorne, & Lees, 2004; Wiles, Pain, Buckland, & McLellan, 1998). Stroke caregivers have indicated interest in knowing about the psychological sequelae and prognoses of stroke (Hanger, Walker, Paterson, McBride, & Sainsbury, 1998) and have reported the desire to acquire skills to assist in daily care, mobility, and toileting, as well as the desire to assist in taking blood pressure and conducting glucometer checks (Hartke & King, 2003; Wiles et al., 1998). These interests are even keener in some racial/ethnic groups than others. Puerto-Rican stroke caregivers living in Puerto Rico reported a greater need for health information about stroke compared with those living on the U.S. Mainland (Hinojosa & Rittman, 2007). An intervention that provides caregivers with health education on maintaining and improving their mental health may be helpful and especially desired by caregivers from specific racial/ethnic groups.

**Limitations and Future Directions**

A primary limitation to the current study is that the majority (87.1%) of stroke caregivers were women, and the majority (98.4%) of veterans with stroke were men. The patterns of connections between caregiver mental health and functioning of individuals with stroke found in the current study may not generalize to populations with more gender balance, because male and female gender roles may have different effects on mental health and on stroke functioning. It is notable that Tiegs et al. (2006) found no significant differences in the functioning of individuals with stroke based on the gender of the caregiver, but female caregivers in their study exhibited higher levels of depression, burden, and consequences to their personal life than did male caregivers. As a result, the patterns of connections in the current study should be applied with
caution to dyads with a male caregiver and/or a woman with stroke, and future studies should examine these connections in samples with more gender diversity.

A second limitation is the confound between race/ethnicity and country of origin in the current study. The sample contained Latino/Puerto-Rican caregivers and veterans with stroke who were almost exclusively from Puerto Rico, but the White and Black caregivers and veterans with stroke were exclusively from the U.S. mainland. This meant that race/ethnicity was confounded with living in Puerto Rico or in the U.S. mainland. In this study differences between Latino/Puerto-Ricans and other groups may be the result of race/ethnicity or the result of Puerto Rico vs. U.S. mainland, but the two potential sources cannot be teased apart. In addition, the findings in this study may not generalize to Puerto-Rican dyads from the U.S. mainland, where different levels of acculturation to American culture exist. So future studies need to examine whether the same findings hold in Puerto-Rican dyads in the U.S. mainland and whether the findings vary based on the acculturation level of individuals from those dyads.

A third limitation to the current study involves the lack of statistical significance in many of the reported effects. Because this has to do with the limited sample in the current study, the presentation of results and discussion was framed with a heavy emphasis on effect sizes and practical significance, given previous research findings, as opposed to an emphasis on statistical significance. For example, the power analysis conducted for the omnibus RMANOVAs suggested that this sample would only detect large-sized and some medium-sized effects, but no small-sized effects. Because of this lack of statistical significance for many of the effects discussed, the findings again must be interpreted with an appropriate degree of caution. Future studies should use larger
sample sizes to determine whether the effects found herein are reliable in other samples and reach statistical significance when analyses have more statistical power.

A fourth limitation involves the underlying theoretical framework for this study, which is that a feedback loop exists among caregiver mental health, quality of informal care, and stroke rehabilitation. Though this loop has received some tentative support in previous research (e.g., Perrin et al., 2009), the current study still used a correlational methodology, as opposed to an experimental one. Accordingly, future studies should implement experimental techniques to determine whether culturally sensitive caregiver mental-health interventions improve quality of care and, as a result, improve stroke rehabilitation in populations facing health disparities in the prevalence and course of stroke. This type of research is vital and warranted given the findings from the current study and from previous studies (e.g. Perrin et al., 2008, 2009).

**Conclusions**

Perhaps the most important implication of this study is that viewing stroke rehabilitation through a color-blind lens may mask important components of rehabilitation, because race/ethnicity and culture likely influence the social structures in which individuals with stroke receive care and function. Though caregiver mental-health interventions hold promise for improving quality of care and, as a result, improving stroke rehabilitation, including an appreciation of diversity in interventions may produce better outcomes. Critical knowledge is perhaps lost regarding the connections between caregiver mental health and the functioning of individuals with stroke when researchers and clinicians look only across caregiver race/ethnicity as opposed to also looking within race/ethnicity. To avoid this loss knowledge, future research on clinical interventions should incorporate a greater degree of cultural competence, which, if found to be
important in follow-up studies, could contribute to reducing the racial/ethnic disparities in the prevalence and course of stroke. Such assertions await further support from future research.
APPENDIX A
GERIATRIC DEPRESSION SCALE

Choose the best answer for how you felt over the past week (yes/no)

1. Are you basically satisfied with your life?
2. Have you dropped many of your activities and interests?
3. Do you feel that your life is empty?
4. Do you often get bored?
5. Are you hopeful about the future?
6. Are you bothered by thoughts you can’t get out of your head?
7. Are you in good spirits most of the time?
8. Are you afraid that something bad is going to happen to you?
9. Do you feel happy most of the time?
10. Do you often feel helpless?
11. Do you often get restless and fidgety?
12. Do you prefer to stay at home, rather than going out and doing new things?
13. Do you frequently worry about the future?
14. Do you feel you have more problems with memory than most?
15. Do you think it is wonderful to be alive now?
16. Do you often feel downhearted and blue?
17. Do you feel pretty worthless the way you are now?
18. Do you worry a lot about the past?
19. Do you find life very exciting?
20. Is it hard for you to get started on new projects?
21. Do you feel full of energy?
22. Do you feel that your situation is hopeless?
23. Do you think that most people are better off than you are?
24. Do you frequently get upset over little things?
25. Do you frequently feel like crying?
26. Do you have trouble concentrating?
27. Do you enjoy getting up in the morning?
28. Do you prefer to avoid social gatherings?
29. Is it easy for you to make decisions?
30. Is your mind as clear as it used to be?
APPENDIX B
SENSE OF COMPETENCE QUESTIONNAIRE

Response categories: 1, disagree very much; 2, disagree; 3, agree; 4, agree very much.

1. The responsibility for my … weighs heavily upon me over and above the responsibilities for my family, my job, etc.
2. It is clear to me how much care my … needs.
3. I’m capable to care for my … .
4. I feel that I don’t do as much for my … as I could or should.
5. I feel angry about my interactions with my … .
6. I feel that in the past I haven’t done as much for my … as I could have or should have.
7. I feel guilty about my interactions with my … .
8. I feel embarrassed over my … ’s behavior.
9. I feel nervous or depressed about my interactions with my … .
10. My … appreciates my constant care more than the care others give him/her.
11. My … benefits from everything I do for him/her.
12. I feel that I cannot leave my … alone, he/she needs me continuously.
13. I worry all the time about my … .
14. I feel that my … makes requests which I perceive to be over and above what he/she needs.
15. The involvement with my … leaves me enough time for myself.
16. I feel resentful about my interactions with my … .
17. I feel pleased about my interactions with my … .
18. I feel useful in my interactions with my … .
19. I feel strained in my interactions with my … .
20. I feel that my health has suffered because of my involvement with my … .
21. I feel that the present situation with my … allows me as much privacy as I’d like.
22. I feel that my social life has suffered because of my involvement with my … .
23. I wish that my … and I had a better relationship.
24. I feel that my … seems to expect me to take care of him/her as if I were the only one he/she could depend on.
25. I feel that my … behaves the way he/she does to have his/her own way.
26. I feel that my … behaves the way he/she does to annoy me.
27. I feel that my … behaves the way he/she does to manipulate me.
APPENDIX C
SENSE OF COHERENCE

Response keys for all questions except Items 4 and 7 ranged from Very often to Never. For Items 4 and 7, response keys ranged from Like it a lot to Don't like it all.

1. How often do you have the feeling that you don't really care about what goes on around you?
2. How often has it happened in the past that you were surprised by the behavior of people who you thought you knew well?
3. How often has it happened that people whom you counted on disappointed you?
4. How do you think you are going to feel about the things you will do in the future?
5. How often do you have the feeling that you are being treated unfairly?
6. How often do you have the feeling that you are in an unfamiliar situation and don't know what to do?
7. How do you feel about the things you do every day?
8. How often does it happen that you don’t quite understand your own feelings and ideas?
9. How often does it happen that you have feelings inside that you would rather not feel?
10. Many people – even those with a strong character – sometimes feel like losers in certain situations. How often have you felt this way in the past?
11. How often does it happen that you have the feeling that you don’t know exactly what’s about to happen?
12. How often do you have the feeling that there is little meaning in the things you do in your daily life?
13. How often do you have feelings that you’re not sure you can keep under control?
APPENDIX D
FUNCTIONAL INDEPENDENCE MEASURE

Response categories: 7-point Likert scale indicating the amount of assistance required to perform each item, ranging from “1 = total assistance in all areas” to “7 = total independence in all areas.”

Self-care
1. Eating
2. Grooming
3. Bathing
4. Dressing-upper body
5. Dressing-lower body
6. Toileting

Sphincter control
7. Bladder management
8. Bowel management

Transfers
9. Bed/chair/wheelchair
10. Toilet
11. Tub/shower

Locomotion
12. Walk/wheelchair
13. Stairs

Communication
14. Comprehension
15. Expression

Social cognition
16. Social interaction
17. Problem solving
18. Memory
APPENDIX E
FRENCHAY ACTIVITIES INDEX

Item 1, 2: 0 = Never, 1 = Under once weekly, 2 = 1-2 times a week, 3 = Most days
Item 3-10: 0 = Never, 1 = 1-2 times in 3 months, 2 = 3-12 times in 3 months, 3 = At least weekly
Item 11: 0 = Never, 1 = 1-2 times in 6 months, 2 = 3-12 times 3 months, 3 = At least weekly
Item 12, 13: 0 = Never, 1 = Light, 2 = Moderate, 3 = All necessary
Item 14: 0 = None, 1 = 1 in 6 months, 2 = Less than 1 a fortnight, 3 = Over 1 a fortnight
Item 15: 0 = None, 1 = Up to 10 hrs/week, 2 = 10-30 hrs/week, 3 = Over 30 hrs/week

1. Preparing main meals
2. Washing clothes
3. Light housework
4. Heavy housework
5. Local shopping
6. Social outings
7. Walking outside more than 15 minutes
8. Actively pursuing hobby
9. Driving a care/going on a bus
10. In the last six months how often have you undertaken:
11. Travel outings / car rides
12. Gardening
13. Household / car maintenance
14. Reading books
15. Gainful work
LIST OF REFERENCES


BIOGRAPHICAL SKETCH

Paul B. Perrin was a student at the University of Florida since August of 2001. In 2005, he completed a Bachelor of Arts in English and a Bachelor of Science in psychology. That same year, he started his doctoral studies in counseling psychology at the University of Florida. He earned a Master of Science in psychology in 2007 and then completed his doctoral qualifying exams in 2008. He defended his dissertation in 2010 and completed a clinical psychology internship at the Baltimore, Maryland Veterans Affairs Medical Center and the University of Maryland School of Medicine. He received his Doctorate of Philosophy in counseling psychology in 2011.