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The influence of functional social support on executive functioning in middle-aged African Americans

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Abstract

Social support has a positive influence on cognitive functioning and buffers cognitive decline in older adults. This study examined the relations between social support and executive functioning in middle-aged adults. A community-based sample of African Americans completed the Interpersonal Support Evaluation List, a measure of functions of social support, and two measures of executive functioning, the Stroop Color Word Test and the Wisconsin Card Sorting Test (WCST). Hierarchical regression analyses were used to explore the hypothesis that different facets of perceived social support influence performance on measures of executive functioning. After controlling for age, gender, and education, social support facets including belonging support, self-esteem support, appraisal support, and tangible support were significant predictors of Stroop performance. In addition, tangible support significantly predicted WCST performance. These findings add to previous literature on social support and cognition; however, findings for middle-aged adults are unique and suggest that social support has a positive influence on some executive functions in African Americans prior to old age.

Keywords

social support; executive functioning; African Americans; cognitive functioning; middle age

Overall cognitive ability declines with increasing age (Nieto, Albert, Morrow, & Saxton, 2008; Wecker, Kramer, Wisniewski, Kramer, & Delis, 2000). Thus, identifying factors that promote cognitive health in individuals as they age is a major public health goal (Hendrie et al., 2006). Social support has a positive influence on cognitive functioning and buffers cognitive decline in older adults (Seeman, Lusignolo, Albert, & Berkman, 2001). Research on social support and its relation to cognitive functioning has been conducted primarily in the elderly, specifically in the areas of overall cognitive ability and memory (Seeman et al., 2001; Gow, Pattie, Whiteman, Whalley, & Deary, 2007; Whitfield & Wiggins, 2003). Previous studies have suggested that social support is associated with increased general cognitive ability and reduced memory decline (Holtzman, Rebok, Saczynski, Kouzis, Doyle, & Eaton, 2004; Yeh & Liu, 2003; Ertel, Glymour, & Berkman, 2008; Hughes, Andel, Small, Borenstein, & Mortimer, 2008). However, little is understood about the influence of social support on executive functions.

Broadly, executive functions regulate one's thoughts and behaviors and are the processes that organize, monitor, sequence, and coordinate other cognitive processes (Friedman, Miyake, Young, Defries, Corley, & Hewitt, 2008; Salthouse, Atkinson, & Berish, 2003).

These processes include inhibition and set-shifting (Miyake, Friedman, Emerson, Witzki, & Howerter, 2000). The executive process of inhibition involves the ability to stop or override a mental process when it competes with another ongoing process (Salthouse et al., 2003) and allows an individual to suppress inappropriate automatic or impulsive responses (Fisk & Sharp, 2004). It is associated with attention and self-regulation of affect and actions (Barkley, 1997). Inhibition is related to the cognitive skills of judgment and social appropriateness, which are skills needed for effective and fulfilling interpersonal communication (Suchy, 2009). Elderly individuals with dysfunctional inhibition often display purposeless or inappropriate behaviors, such as physical and verbal aggression, wandering, and impulsivity. Behaviors such as these decrease overall quality of life, as they may lead to poor patient management by caregivers and hospital staff (Grigsby, Kaye, & Robbins, 1995). The executive process of shifting is the ability to flexibly switch or alternate attention between tasks or mental sets (Friedman et al., 2008; Fisk & Sharp, 2004). This process allows an individual to alter short-term and long-term goals as needed in response to changing situations (Suchy, 2009). Shifting is related to the cognitive skill of problem solving (Suchy, 2009). Individuals with impairments in this process find it difficult to solve problems in novel situations.

Individuals with executive functioning deficits display a variety of behaviors that can be harmful, including distractibility, social inappropriateness, lapses in judgment, lack of motivation, and difficulty regulating emotional responses (Suchy, 2009; Williams, Suchy, & Rau, 2009). In addition, they may show difficulty making decisions, following and changing plans, and remembering to do actions planned for the future (Strauss, Sherman, & Spreen, 2006). In the elderly, executive functioning deficits also lead to increase risk of falling, motor dysfunction, and impairments in doing activities of daily living (Nieto et al., 2008; Johnson, Lui, & Yaffe, 2007). Executive functioning is essential to health outcomes, as it allows for change and maintenance of health behavior, and stress regulation and management of chronic illness (Williams & Thayer, 2009). Overall, intact executive functioning allows individuals to cope with the demands of everyday life and improves quality of life (Williams et al., 2009; Suchy, 2009).

Factors that influence executive functioning may be best understood within the biopsychosocial framework. Within this framework, biological, psychological, and social factors work in tandem to affect human development (Engel, 1977). These factors are inextricably linked and provide a more comprehensive explanation for physical health and illness (Suls & Rothman, 2004). While biological factors such as genetics, cell function, or chemical imbalances influence the onset of illness, psychological factors (e.g., emotions, thoughts, and personality) and social factors (e.g., social support, poverty, culture, religion, and socioeconomic status) also affect health outcomes (Lafreniere & Cramer, 2005; Suls & Rothman, 2004; Cohen, 1988). There is considerable evidence that shows social support improves mental and physical health and reduces the risk of disease (Zunzunegui, Alvarado, Delser, & Otero, 2003; Taylor, 2007). Studies have shown that social support reduces the risk for dementia and mortality and protects against heart disease, hypertension, and depression (Bourne, Fox, Starr, Deary, & Whalley, 2007; Seeman et al., 2001). In addition to affecting disease outcomes, social support has been shown to impact physiological processes as well as buffer an individual's response to stress (Lafreniere & Cramer, 2005; Seeman & McEwen, 1996). It also predicts lower levels of hypothalamic-pituitary-adrenal (HPA) and sympathetic nervous system (SNS) activity in response to stress (Seeman & McEwen, 1996). Consistent with the biopsychosocial framework, social support, as a psychosocial variable, influences cognitive functioning.

Social support may impact cognitive functioning in a variety of ways. Two prominent hypotheses have emerged in the literature concerning social support and cognitive

functioning: the mental stimulation hypothesis and the stress-buffering hypothesis. According to the mental stimulation hypothesis, social support is presumed to provide mental stimulation that leads to better cognitive strategies or increased neural growth. This process may protect individuals against cognitive impairment and promote healthy cognitive aging (Gow et al., 2007; Seeman et al., 2001; Zunzunegui et al., 2003). The stress-buffering hypothesis posits that social support acts as a buffer against stressful life events by reducing adverse physiological reactions to various stressors and lowering physiological arousal (Seeman et al., 2001; Seeman & McEwin, 1996). Heightened physiological arousal, extensive and chronic HPA axis and SNS activation, are associated with poorer cognitive functioning and greater cognitive decline (Lupien et al., 1998; Seeman, Singer, Horwitz, & McEwen, 1997). Furthermore, engaging in socially and emotionally supportive environments lowers physiological reactivity and possibly protects against cognitive decline (Seeman et al., 2001).

To date, there is a paucity of studies that examine social support and its relationship to cognitive functioning in African Americans (Barnes, Mendes de Leon, Wilson, Bienias, & Evans, 2004). Furthermore, this is a population that has not been exclusively studied in prior research on social support and executive functioning. African Americans, in particular, are at a greater risk for cognitive impairment due to cardiovascular disease, diabetes, and stroke (Whitfield & Aiken-Morgan, 2008); therefore, it is imperative to find interventions that reduce this risk. In comparison to their white counterparts, African Americans have a unique support system that may differentially impact cognitive performance and serve as a protective factor (Whitfield & Aiken-Morgan, 2008). This ethnic group tends to have an extensive social support network that includes the extended family, community, fictive kin, and church members (Brown, 2008; Hatchett & Jackson, 1993; Taylor & Chatters, 1988). Specifically, church attendance is correlated with larger social networks and greater perceived support (Lee & Sharpe, 2007). African Americans who underutilize this unique network and have fewer social supports may be at increased risk for cognitive decline. Given the significant risk of cognitive decline for African Americans coupled with the unique availability of social support, it is important to determine the role of social support in cognitive outcomes within this population.

Another limitation to studies that address social support and cognitive functioning is that few examine social support and cognitive functioning in younger age groups, such as middle-aged individuals (Ybarra, Burnstein, Winkelman et al., 2008). Studying social support and cognitive functioning in a slightly younger sample may reveal that the positive effects of social support are apparent prior to the onset of late life cognitive decline. The current study was designed to ascertain the relationship between social support and executive functioning, namely inhibition and set-shifting, in a community sample of middle-aged African Americans. To this end, it was hypothesized that greater perceived social support across a number of facets would predict better inhibition and set-shifting abilities in middle-aged African Americans.

Method

Data source

The current study was conducted in conjunction with the Minority Organ Tissue Transplant Education Program's (MOTTEP) Stress and Psychoneuroimmunological Factors in Renal Health and Disease Study, which aimed to validate a model that identifies biological, psychosocial, and psychoneuroimmunological risk factors that contribute to impaired renal function and renal disease in African Americans. The study employed a cross-sectional and correlational design. It involved the assessment of biological, neuropsychological, psychosocial, and spiritual/religious variables.

Participants

A community-based sample of 139 self-identified African-American men and women with a mean age of 45.60 (SD=11.56) and a mean education of 13.81 (SD=2.39) participated in the study. Approximately 48% of the sample was male. Participants were recruited from the greater Washington, DC metropolitan area through flyers, health fairs, visitors to Howard University Hospital, and word-of-mouth. Participants were volunteers and inclusion criteria did not include any specific medical condition. They were recruited as normal, healthy volunteers. Exclusion criteria included current domestic, emotional, or drug abuse, and a current diagnosis of a psychiatric illness. Participants received \$50 for study completion.

Measures

Interpersonal Support Evaluation List (ISEL)—The Interpersonal Support Evaluation List is a self-report questionnaire that assesses overall perceived social support as well as the perceived availability of four specific dimensions: belonging, appraisal, tangible, and self-esteem (Cohen, Mermelstein, Karmack, & Hoberman, 1985). It consists of 40 items that are answered on a four-item Likert scale ranging from “definitely false” to “definitely true.” Twenty items are reverse coded and higher scores indicate the perception of more social support. Each of the subscales has 10 items. The belonging subscale measures the perceived availability of individuals with whom one can do things. The appraisal subscale measures the perceived availability of someone to talk to about one’s problems. The subscale of tangible support assesses the perceived availability of material assistance. The self-esteem subscale measures the perceived availability of having a positive comparison when comparing one’s self to another. The ISEL has sound psychometric properties. It has been shown to have high internal consistency within the general population (Brookings & Bolton, 1988; Cohen et al., 1985). For the complete scale, internal consistency coefficients range between .80 and .90. For the subscales, internal consistency coefficients range from .70-.82 for appraisal, .62-.73 for self-esteem, .73-.78 for belonging, and .73-.81 for tangible support. In community studies, test-retest reliability after a six-month interval shows the test-retest coefficient as .74 for the overall scale (Cohen et al., 1985).

Wisconsin Card Sorting Test—The Wisconsin Card Sorting Test (WCST) is a widely used test known to assess executive processes (Fristoe, Salthouse, & Woodward, 1997; Fisk & Sharp, 2004; Salthouse et al., 2003; Miyake et al., 2000). It assesses the ability to shift cognitive set through abstract reasoning in working memory (Grant & Berg, 1948; Somsen, 2007; Sanz, Molina, Calcedo, Martin-Loeches, & Rubia, 2001; Miyake et al., 2000; Barcelo, Munoz-Cespedes, Pozo, & Rubia, 2000). The Wisconsin Card Sorting Test-64: Computer Version 2-Research Edition of the WCST was administered (Heaton et al., 1993). For each trial, the participants were required to match computerized test cards to four stimulus cards that varied in number, color, and shape. On the basis of feedback (correct or incorrect), the participants had to infer the categorization rule. After 10 consecutive correct responses, the categorization rule is changed without warning, and the participant had to infer the new rule. The computerized version of the WCST scores 128 trials and computes the following scores: Correct (number of trials sorted correctly), Errors (number of trial sorted incorrectly), Perseverative Responses (number of repetitive responses), Non-perserverative Errors (number of non-repetitive errors), Perseverative Errors (number of repetitive errors), and Categories (10 consecutive responses according to number, color, or shape] Completed. The number of perseverative errors and categories completed were selected as performance measures for the analyses as they are widely used in the literature and considered to reflect cognitive inflexibility (Fristoe et al., 1997; Somsen, 2007; Fisk & Sharp, 2004; Sanz et al., 2001; Salthouse et al., 2003).

Stroop Color and Word Test—The Stroop Color and Word Test is a widely used test known to assess the executive process of inhibition (Cothran & Larson, 2008; Nigg, 2000; MacLeod, 1991). Participants were presented with three stimulus pages, one with color words printed in black ink, one with Xs printed in color, and another with color words printed in a contrasting color (Golden & Freshwater, 2002). Participants read the words on the first page and name the ink colors on the second page as quickly as possible. On the third page, participants were instructed to ignore the word and name the color of the ink as quickly as possible. The Stroop Color and Word Test yields three raw scores (Color, Word, and Color-Word), based on the number of items read or named correctly on each of the three stimulus sheets within 45 seconds. The Stroop interference score was calculated by subtracting the predicted color word (CW) (predicted CW = $C \times W/C + W$) score from the raw CW score (interference score = raw CW – predicted CW) (Golden & Freshwater, 2002). A positive interference score denotes that the word naming response can be appropriately inhibited in favor of naming the ink color. A negative interference score denotes that automatic response of word reading actively interferes with naming the color of the ink (Seo et al., 2008). Scores on the last task and corresponding interference score are thought to reflect the executive process of inhibition. The Stroop Color-Word and Interference scores were utilized in the analyses.

Procedure

Participants came to the Howard University Hospital Clinical Research Center (GCRC), located in Washington D.C. The Howard University's Institutional Review Board approved the study protocol. After signing a consent form and providing demographic and self-reported health information, participants underwent a medical screening and completed a variety of psychosocial, neuropsychological, spiritual, and physiological measures. Participation in the study was voluntary and lasted about four to five hours. Only measures included in the scope of this study will be analyzed and discussed.

Statistical Analyses

Prior to data analysis, all study variables were examined for normality. Of these, only WCST Perseverative Errors was positively skewed. A square root transformation was performed to adjust for skewness. Initial associations between the social support variables and executive functioning variables were assessed with bivariate correlations. Next, in order to account for multi-collinearity of the social support variables, separate hierarchical regression models were run to assess the associations between social supports and related executive function performance. Predictors in the regression models were total ISEL social support score, tangible subscale score, appraisal subscale score, self-esteem subscale score, and belonging subscale score. The covariates of age, gender, and education were selected and added to the models based on their known association with cognitive functioning and controlled for within the analyses.

Results

Table 1 displays the means and standard deviations for all study variables. Bivariate correlations between the social support variables and the executive functioning variables revealed that greater appraisal ($r = .23$; $p < .01$), tangible ($r = .28$; $p < .01$), self-esteem ($r = .20$; $p < .05$), belonging ($r = .25$; $p < .01$), and total support ($r = .27$; $p < .05$) were significantly correlated with greater interference scores on the Stroop. Greater appraisal ($r = .27$; $p < .01$), tangible ($r = .28$; $p < .01$), self-esteem ($r = .21$; $p < .05$), belonging ($r = .22$; $p < .01$), and total support ($r = .27$; $p < .05$) were significantly correlated with greater Color-Word scores on the Stroop. Greater appraisal ($r = -.27$; $p < .01$), tangible ($r = -.22$; $p < .01$), belonging ($r = -.17$; $p < .05$), and total support ($r = -.24$; $p < .01$) were related to fewer

perseverative errors on the WCST. Greater appraisal ($r = .26$; $p < .01$), tangible ($r = .20$; $p < .01$), and total support ($r = .20$; $p < .01$) were associated with more categories completed on the WCST.

Table 2 displays the hierarchical regression models for the social support variables and performance on the Stroop. The model that predicted Stroop interference scores from total support after controlling for covariates was significant ($F[4,112] = 5.30$, $p < .01$; Adj. $R^2 = .13$). Greater total support predicted higher Stroop interference scores ($\beta = .27$, $p < .01$). The model that predicted Stroop interference scores from appraisal support after controlling for covariates was significant ($F[4, 113] = 4.27$; $p < .01$; Adj. $R^2 = .10$). Greater appraisal support predicted higher Stroop interference scores ($\beta = .22$, $p < .05$). The model that predicted Stroop interference scores from tangible support after controlling for covariates was also significant ($F[4,122] = 5.46$, $p < .01$; Adj. $R^2 = .12$). Tangible support was also a significant predictor of higher Stroop interference scores ($\beta = .28$, $p < .01$). The model that predicted Stroop interference score from self-esteem support after controlling for covariates was significant ($F[4, 120] = 3.90$, $p < .01$; Adj. $R^2 = .09$). Self-esteem support significantly predicted Stroop interference score ($\beta = .19$, $p < .05$). Greater self-esteem support was associated with higher scores. Finally, the model that predicted Stroop interference score from belonging support after controlling for covariates was significant ($F[4,122] = 5.58$, $p < .01$; Adj. $R^2 = .13$). Greater belonging support predicted higher Stroop interference scores ($\beta = .28$, $p < .01$).

The model that predicted Stroop Color-Word scores from total support after controlling for covariates was significant ($F[4,112] = 11.26$, $p < .01$; Adj. $R^2 = .26$). Greater total support predicted higher Stroop Color-Word scores ($\beta = .24$, $p < .01$). The model that predicted Stroop Color-Word score from appraisal support after controlling for covariates was also significant ($F[4, 113] = 10.07$; $p < .01$; Adj. $R^2 = .24$). Appraisal support significantly predicted Stroop Color-Word scores ($\beta = .19$, $p < .05$). Greater appraisal support was associated with higher Stroop Color-Word scores. The model that predicted Stroop Color-Word scores from tangible support after controlling for covariates was significant ($F[4,122] = 12.96$, $p < .01$; Adj. $R^2 = .28$). Tangible support significantly predicted Stroop Color-Word scores ($\beta = .28$, $p < .01$). The model that predicted Stroop Color-Word scores from self-esteem support after controlling for covariates was significant ($F[4, 120] = 10.55$, $p < .01$; Adj. $R^2 = .24$). Greater self-esteem was a significant predictor of higher Stroop Color-Word scores ($\beta = .18$, $p < .05$). The model that predicted Stroop Color-Word score from belonging support after controlling for covariates was significant ($F[4,122] = 12.24$, $p < .01$; Adj. $R^2 = .27$). Greater belonging support was a significant predictor of higher Stroop Color-Word scores ($\beta = .25$, $p < .01$).

Table 3 displays the hierarchical regression models for social support variables and performance on the WCST. The model that predicted perseverative errors from tangible support after controlling for covariates was significant ($F[4,126] = 10.14$, $p < .01$; Adj. $R^2 = .22$). Greater tangible support was a significant predictor of more perseverative errors ($\beta = -.17$, $p < .05$). The model that predicted categories completed for tangible support after controlling for covariates was significant ($F[4,126] = 13.25$, $p < .01$; Adj. $R^2 = .27$). Greater tangible support was a significant predictor of more categories completed ($\beta = .17$, $p < .05$). No other functions of social support were predictors of WCST perseverative errors or categories completed.

Age predicted performance on the Stroop and WCST in all regression analyses, which demonstrated that greater age was associated with poorer performance on each of the measures. Education was related to executive functioning only for the self-esteem and belonging models and Stroop Color-Word score. Education significantly predicted

performance on the WCST in all regression analyses. More years of education were associated with greater performance. Gender did not predict performance on the Stroop or the WCST.

Discussion

The major findings of this study are as follows: greater perceived support, appraisal support, tangible support, self-esteem support, and belonging support predicted greater inhibition ability. However, only greater tangible support predicted greater shifting ability.

Appraisal support, tangible support, and self-esteem support all provide a form of emotional support. Seeman et al. (2001) defined emotional support as having relatives and friends that make one feel loved and cared for as well as having someone to talk to about one's problems. Their positive association with inhibition ability is consistent with the findings of Seeman et al. (2001), which showed that greater emotional support was significantly associated with greater cognitive performance. Additionally, the need to belong and to have close friendships is essential for overall well-being (Baumeister & Leary, 1995). Also in support of this finding, Gow et al. (2007) found that feeling alone was associated with lower cognitive ability and that feeling alone may be an indicator of lack of support.

The tangible support subscale was also predictive of greater inhibition ability. The tangible support subscale can be considered a measure of instrumental support. Instrumental support is the availability of having someone to procure financial assistance or aid in the activities of daily living. This significant finding is in contrast to other studies, which did not find a significant relationship between instrumental support and cognitive functioning (Seeman et al., 2001; Hughes et al., 2008). However, these studies sampled elderly populations and utilized tests of general cognitive ability as measures of cognitive functioning. A possible explanation for the significant finding of tangible support and inhibition in this study may be that instrumental support also carries emotional meaning to the individual who receives it (Semmer, Elfering, Jacobshagen, Perrot, Beehr, & Boos, 2008). Instrumental support conveys to the individual that they are cared for and loved, and it is this emotional component that makes instrumental support most successful in influencing physical health and well-being (Semmer et al., 2008). Furthermore, tangible support attenuates the response to stressful situations by directly resolving an instrumental problem (Cohen & Wills, 1985). By reducing one's stress response, cognitive functioning is enhanced (Seeman et al., 1997).

Specifically, the executive process of inhibition involves suppressing automatic responses and is related to judgment, social appropriateness, and impulsivity (Friedman et al., 2008; Suchy, 2009; Logan, Schachar, & Tannock, 1997). Emotional support is hypothesized to buffer cognitive decline by reducing physiological arousal to stressful situations (Seeman et al., 2001). Physiological arousal may influence inhibition by affecting an individual's ability to stop automatic and impulsive responses. Emotional support may have an impact on the inhibitory process due to its calming effect on physiological arousal. Thus, to the extent that different facets of social support have an emotional component, as discussed previously, emotional support may be a factor influencing inhibition ability.

The disparate findings between performance on the Stroop and WCST raised questions about how executive processes may be differentially impacted by social support. In this sample, all ISEL subscales were predictive of Stroop performance. However, appraisal support, belonging support, and self-esteem support were not associated with WCST performance. It is plausible that the emotional support provided by these facets does not influence shifting ability. On the other hand, tangible support was significantly associated with shifting ability. In this case, tangible support may carry a unique influence over and

beyond emotional support. The tangible support items on the ISEL assess the availability of someone to help solve one's immediate problems, such as being picked up when one is stranded, helping with daily chores, or giving one a ride to the hospital. Shifting ability is related to the cognitive skill of problem solving and allows an individual to adapt to changing situations (Suchy, 2009). Thus, the availability of tangible support affords one direct help for solving problems and may indirectly enhance one's overall problem-solving capacity.

Another reason for the disparate findings may be the focus of the WCST measure itself. In comparison to the Stroop, the WCST is a more complex and lengthy task. It requires greater sustained attention than the Stroop and may induce fatigue in the participant. Furthermore, even though the WCST is most widely used to measure the process of set shifting, other non-executive cognitive processes are also required for successful completion of the task (Strauss et al., 2006). In addition to the executive ability of set shifting, adequate motivation, visual processing, processing speed, and working memory are also utilized in the WCST (Strauss et al., 2006). It is difficult to tease out whether these non-executive processes played a more important role in influencing test performance in this sample. Thus, the role of social support on the process of set shifting may be confounded by these other non-executive abilities or the administrative limitations of the task.

The overall findings of this study support other research that suggests that social support has protective effects on cognitive functioning (Ybarra et al., 2008; Bassuk, Glass, & Berkman, 1999; Seeman et al., 2001). However, most research on social support and cognitive functioning has been limited to white elderly populations (Ybarra et al., 2008). In this study, the overall relationships between social support and executive functioning suggest that social support influences cognitive functioning within this middle-aged sample of African Americans. Consistent with the mental stimulation hypothesis, these findings suggest that social support has positive effects on cognitive functioning prior to old age due to the cognitive stimulation inherent to social interactions. Thus, implementing support across the life span may serve as a protective factor for executive functioning by preventing or slowing cognitive decline. As a result the middle-aged African American adults in this study with higher levels of social support may have a decreased rate of cognitive decline as compared to those who did not have these supports. Therefore, as much older adults, those with higher levels of the various facets of social support will tend to have better maintenance of executive functioning and greater quality of life. Longitudinal studies are needed to examine and confirm these mechanisms in African Americans across the life span.

The findings may also help to support the hypothesis that different facets of functional social support impact cognitive functioning by buffering the impact of stress. Functional support comprised of tangible, self-esteem, belonging, and appraisal support has been found to protect individuals from the detrimental effects of high levels of stress (Cohen et al., 1985). Positive and supportive interactions such as those that may be provided by these functional supports may lower the physiological response to stressful experiences. In turn, lower overall physiological response may improve cognitive functioning (Seeman et al., 1997). Follow-up analyses that examined the association between perceived stress, as measured by the Perceived Stress Scale (Cohen, Kamarck, & Merlmestein, 1983), and the four functions of social support, yielded significant negative correlations for all functions. These findings suggested that greater perceived social support was associated with lower levels of perceived stress and were consistent with the stress-buffering hypothesis.

The findings are especially salient for African Americans who are at an increased risk for cognitive decline due to disproportionate disease morbidity in comparison to other ethnic groups in addition to normal age-related deficits. Social support may serve as a significant

influence for this population in attenuating cognitive decline. African-American culture is collectivist in nature and the community plays a prominent role in the African-American family (Kim & Mckenry, 1998). Furthermore, religious involvement and ties to one's church community are especially salient in African-American culture (Lee & Sharpe, 2007; Kim & Mckenry, 1998). Utilization of these opportunities in the African-American support network may have played a significant role in strengthening the perception of perceived functional support in the study sample and ultimately influenced well-being. Explicit measurement of the unique cultural experiences that influence the perception of perceived functional support is a significant limitation of the ISEL and other available social support measures. The availability of a culturally sensitive functional social support measure may have helped to elucidate the precise social support experiences of African Americans that may have played a role in the significant associations found in this study.

The findings of this study have significant clinical implications. To the extent that the perception of functional social supports enhances executive functioning, developing clinical interventions that strengthen or improve the perception of social support may need to be a priority for clinicians to enhance the cognitive well-being of African Americans. Clinicians may also recommend that their African-American clients, both young and old, maintain or enhance their unique social supports to enhance mental stimulation and buffer the effects of stress.

Limitations

The small sample size may have affected the results obtained from this study. Furthermore, the urban sample utilized may not generalize to suburban and rural African-American communities. This study was also limited to two measures of executive functioning, reducing the ability to capture the domain of executive functioning in its entirety. Due to the small sample size, the inclusion of all WCST and Stroop domains would have significantly reduced the power of the analysis. In addition, despite significant associations that were found between social support and executive functioning, the correlational and cross-sectional nature of this study does not lend itself to causal assumptions or direction of influence. The findings of this study could reflect the tendency for individuals with greater cognitive ability to have more access to and utilize greater social support. However, well known aging studies suggest that the direction proposed in this study is theoretically sound (Seeman et al., 2001; Hughes et al., 2008; Zunzunegui et al., 2003; Yeh & Liu, 2003).

Future Research

Future research should examine the influence of functional social support on cognitive functioning in African American middle-aged adults within a longitudinal study. The influence of the various components of functional support on other cognitive domains, such as memory, attention, and reasoning, should also be examined. Finally, future studies should examine which types of social activities increase the perception of support.

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Table 1

Descriptive statistics for study variables (N = 139)

Variable	M	SD
Age	45.60	11.56
Education	13.81	2.39
Income	%	
Less than \$10,000	23.1	
\$10,001 - \$20,000	17.5	
\$20,001 - \$30,000	18.9	
\$30,001 - \$50,000	26.4	
\$50,001 - \$80,000	10.4	
Greater than \$80,000	3.5	
Marital status	%	
Single	66.9	
Married	14.7	
Divorced	14.0	
Widowed	1.5	
Separated	2.9	
Health status	%	
Self-reported hypertension	29.8	
Self-reported diabetes	11.3	
	M	SD
Appraisal Support	18.04	5.09
Tangible Support	21.86	6.38
Self-Esteem Support	20.92	4.63
Belonging Support	22.42	5.71
Total Support	83.88	19.31
STROOP Interference Score	-1.17	10.17
STROOP Color-Word Score	37.37	11.82
WCST Perseverative Errors	22.63	12.77
WCST Categories Completed	4.52	2.75

Note. STROOP = Stroop Color and Word Test; WCST = Wisconsin Card Sorting Test

Table 2

Regression analyses for social support variables and Stroop performance

	Interference Score					Color Word Score				
	B	SE B	β	Adj. R ²	F	B	SE B	β	Adj. R ²	F
Model 1				.05	7.64**				.06	8.37**
Appraisal	.52	.19	.25**			.63	.22	.26**		
Model 2				.10	4.27**				.24	10.07**
Appraisal	.47	.20	.22*			.47	.21	.19*		
Age	-.18	.08	-.21*			-.38	.08	-.39**		
Gender	2.09	1.92	.10			1.04	2.06	.04		
Education	.328	.434	.07			.76	.47	.15		
Model 1				.08	11.21**				.07	11.14**
Tangible	.48	.14	.29**			.56	.17	.29**		
Model 2				.12	5.46**				.28	12.96**
Tangible	.47	.15	.28**			.54	.16	.28**		
Age	-.18	.07	-.22*			.39	.08	-.41**		
Gender	1.56	1.78	.08			.17	1.89	.01		
Education	.31	.40	.07			.80	.42	.16		
Model 1				.03	4.91*				.03	5.13*
Self-Esteem	.43	.19	.20*			.51	.22	.20*		
Model 2				.09	3.94**				.24	10.55**
Self-Esteem	.42	.19	.19*			.46	.20	.18*		
Age	-.17	.08	-.20*			-.37	.08	-.38**		
Gender	2.40	1.83	.12			1.21	1.95	.05		
Education	.48	.40	.11			.99	.43	.20*		
Model 1				.06	9.27**				.05	7.18**

	Interference Score					Color Word Score				
	B	SE B	β	Adj. R ²	F	B	SE B	β	Adj. R ²	F
Belonging	.47	.16	.26**			.49	.18	.23**		
Model 2				.13	5.58**				.27	12.45**
Belonging	.50	.15	.28**			.52	.16	.25**		
Age	-.18	.07	-.22*			-.39	.08	-.40**		
Gender	2.30	1.77	.11			.95	1.91	.04		
Education	.50	.38	.11			1.00	.41	.20*		
Model 1				.07	9.59**				.06	8.69**
Total	.15	.05	.28**			.17	.06	.27**		
Model 2				.13	5.30**				.26	11.26**
Total	.15	.05	.27**			.15	.05	.24**		
Age	-.20	.08	-.23*			-.40	.08	-.40**		
Gender	2.11	1.90	.10			1.07	2.04	.04		
Education	.34	.42	.08			.77	.45	.15		

Note. STROOP = Stroop Color and Word Test; Adj. R² = Adjusted R²

**
p < .01;

*
p < .05

Table 3

Regression analyses for social support variables and WCST performance

	Perseverative Errors					Categories Completed				
	B	SE B	β	Adj. R ²	F	B	SE B	β	Adj. R ²	F
Model 1				.06	8.65**				.06	9.06**
Appraisal	-.06	.02	-.26**			.16	.05	.27**		
Model 2				.21	8.94**				.27	11.96**
Appraisal	-.03	.03	-.13			.09	.05	.14		
Age	.02	.01	.21*			-.08	.02	-.32**		
Gender	.04	.21	.02			.01	.50	.001		
Education	-.18	.05	-.33**			.41	.12	.31**		
Model 1				.05	7.17**				.04	6.59*
Tangible	-.06	.02	-.23**			.11	.04	.22*		
Model 2				.22	10.14**				.27	13.25**
Tangible	-.03	.02	-.17*			.08	.04	.17*		
Age	.02	.01	.25**			-.09	.02	-.35**		
Gender	.04	.21	.06			-.39	.48	-.06		
Education	-.18	.05	-.31**			.37	.11	.29**		
Model 1				.003	1.44				.001	1.07
Self-Esteem	-.03	.02	-.11			.06	.06	.09		
Model 2				.20	8.91**				.26	11.96**
Self-Esteem	-.01	.02	-.04			.02	.05	.04		
Age	.03	.01	.24**			-.09	.02	-.36**		
Gender	.10	.21	.04			-.15	.48	-.03		
Education	-.19	.05	-.35**			.41	.11	.31**		
Model 1				.03	4.27*				.003	1.44
Belonging	-.04	.02	-.18*			.06	.05	.11		

Perseverative Errors						Categories Completed						
	B	SE	B	β	Adj. R ²	F	B	SE	B	β	Adj. R ²	F
Model 2					.22	10.14**					.26	12.16**
Belonging	-.03	.02		-.15			.05	.04		.09		
Age	.03	.01		.25**			-.09	.02		-.35**		
Gender	.10	.21		.04			-.25	.48		-.04		
Education	-.19	.04		-.34**			.41	.11		.32**		
Model 1					.05	7.45**					.04	5.41*
Total	-.04	.006		-.24**			.03	.01		.21*		
Model 2					.22	9.35**					.27	12.33**
Total	-.03	.005		-.16			.02	.01		.13		
Age	.03	.009		.23**			-.08	.02		-.34**		
Gender	.10	.21		.02			.04	.50		.01		
Education	-.19	.05		-.33**			.41	.11		.32**		

Note. WCST = Wisconsin Card Sorting Test; Adj. R² = Adjusted R²

**
p < .01;

*
p < .05