The Association Between Social Resources and Cognitive Change in Older Adults: Evidence From the Charlotte County Healthy Aging Study

Tiffany F. Hughes,1 Ross Andel,1 Brent J. Small,1 Amy R. Borenstein,2 and James A. Mortimer2

1School of Aging Studies and 2Department of Epidemiology and Biostatistics, University of South Florida, Tampa.

Evidence that an active and socially integrated lifestyle may slow cognitive decline in old age (Bassuk, Glass, & Berkman, 1999) or reduce risk for dementia (Fratiglioni, Paillard-Borg, & Winblad, 2004) suggests that the social environment could confer protection against cognitive decline (Schooler & Malatu, 2001). However, few studies have simultaneously examined the effects of different aspects of social resources (e.g., size of social network, receipt of support, or satisfaction with social support) on the cognitive health of older adults or whether separate cognitive domains respond differently to social resources.

There is considerable variability in the manner in which social resources have been operationalized and in what cognitive outcome(s) have been measured. For example, size of social network has been the most frequently studied aspect of social resources in relation to cognitive performance (Bassuk et al., 1999; Holtzman, Rebok, Saczynski, Kouzis, Wilcox, & Eaton, 2004; Seeman, Lusignolo, Albert, & Berkman, 2001). However, other aspects of the social environment, such as emotional support, negative interactions, and satisfaction with support, have received less empirical attention despite suggestions that they may be important predictors of cognitive function (Bassuk et al., 1999; Holtzman et al., 2004; Seeman et al., 2001; Yeh & Liu, 2003).

Cognitive outcomes examined in previous studies have also been varied. The majority of studies have either used a measure of global cognitive function such as the Mini-Mental State Examination (Bassuk et al., 1999; Holtzman et al., 2004) or created a summary score of overall cognitive ability (Barnes, Mendes de Leon, Wilson, Bienias, & Evans, 2004; Seeman et al., 2001). However, different domains of cognitive functioning have different developmental trajectories across the life span and also respond differently to environmental factors (Kramer, Bherer, Colcombe, Dong, & Greenough, 2004). Therefore, examination of how social resources influence multiple cognitive domains requires further research.

The purpose of the current study was to examine the associations between different aspects of social resources and change in multiple domains of cognition. We examined whether changes in general cognitive ability, speed and attention, and episodic memory are differentially influenced by social network of family and friends; emotional, informational, and instrumental received support; satisfaction with support received; and negative social interactions. We also examined whether the strength of the associations between social resources and change in cognitive performance vary as a function of age.

METHODS

Participants
Participants were members of the Charlotte County Healthy Aging Study, a community-based, longitudinal study of aging in which participants were initially enrolled in 1997/1998. Interested readers can find a detailed description of the sampling procedure and response rates elsewhere (Borenstein, Mortimer, Wu, Jureidini-Webb, Fallin, & Small, 2006; Small, Graves, McEvoy, Crawford, Mullan, & Mortimer, 2000). After we excluded 38 individuals who scored less than 82 on the Modified Mini-Mental State Examination (Teng & Chui, 1987), the baseline sample comprised 417 individuals. At the follow-up approximately 5 years later (M = 4.94 years, range = 4.6–5.3 years), 43 participants (10.3%) had died, an additional 36 (8.7%) had withdrawn after the baseline phase, 39 (9.4%) refused to participate, and 60 (14.4%) were unable to be contacted. This resulted in 239 participants. Because of missing data on some predictors at baseline, the longitudinal sample consisted of 217 persons.
Measures

Cognitive measures.—The neuropsychological test battery included the Modified Mini-Mental State Examination (Teng & Chui, 1987) to measure general cognitive ability, the Stroop Test (Stroop, 1935) to measure attention, the Trailmaking Test (Parts A and B) to measure perceptual speed (Reitan & Wolfson, 1985), and the Hopkins Verbal Learning Tests (Brandt, 1991; Benedict, Schretlen, Goninger, & Brandt, 1998) comprising tests of delayed free recall, cued recall, and recognition to measure episodic memory. Based upon significant intercorrelations, we created two composite scores: speed and attention (Trailmaking, Parts A and B; and Stroop Test) and episodic memory (delayed, cued, and recognition).

Social resources.—The participants were asked 26 questions with regard to social resources at baseline. These items were derived from Lubben’s (1988) Social Network Scale and social support measures from the work of Krause and Borawski-Clark (1995). Principal components factor analysis with varimax rotation was used to reduce the number of variables in the models. The principal components factor analysis revealed seven factors: social network of family (number of contacts with family per month, frequency of contact per month with closest relative, and number of close relatives), social network of friends (number of close friends, number of friends in contact at least once per month, and frequency of contact with closest friend), emotional support (frequency in the past month of others providing support in difficult times, providing comfort, listening or talking about private feelings, and showing interest or concern), instrumental support (how often in the past month others provided transportation, help with housework, chores, or yard work, and help with shopping), informational support (frequency in the past month of others suggesting some action to take to solve a problem, making a difficult situation easier to understand, helping understand why something was not done well, and sharing what they did in a similar stressful situation), satisfaction with support (frequency of having someone to talk with about an important decision, and frequency of satisfaction with emotional support, instrumental support, and informational support), and negative social interactions (how often in the past month others placed demands, were critical, pried into affairs, and took advantage). The factors accounted for 63% of the variance.

Covariates.—Demographic variables included age (in years), gender (men = 0, women = 1), education (in years), marital status (not married = 0, married = 1), and residency in Charlotte County, Florida (in years). We included a between-subjects variable to account for follow-up attrition status (yes = 0, no = 1). Personality was assessed with the NEO Five-Factor Inventory (Costa & McCrae, 1992), which measures the domains of neuroticism, extraversion, openness, agreeableness, and conscientiousness.

Analyses

We used Proc MIXED in SAS Version 9 (Littell, Milliken, Stroup, & Wolfinger, 1996) to examine whether each social resource factor contributed unique variance in cognitive performance above and beyond the other factors. For each cognitive outcome, we simultaneously entered all of the baseline social resource factors and interactions between each social resource factor and continuous age while adjusting for baseline age, gender, education, marital status, residency status, and personality in the model. For the analysis of cognitive change, we also modeled the influence of years of follow-up time. In order to interpret significant interactions, we stratified age into young-old versus old-old based on a median split (age 73/74), recentered age, and examined whether the point estimates of each group fell within the 95% confidence interval (CI) of the opposite group.

RESULTS

Descriptive Analyses

At baseline, the study participants’ mean age was 72.4 years (SD = 6.2); they had an average of 14.0 years (SD = 2.7) of education; 51.8% were women; 77.5% were married; and they had lived an average of 12.6 years (SD = 8.5) in Charlotte County, Florida. The independent samples t-tests comparing the follow-up sample (n = 217) to those who were not followed (n = 200) revealed that those followed were younger and more likely to be married, had lower neuroticism scores, had higher scores on extraversion and conscientiousness, had lived fewer years in Charlotte County, and received less instrumental support at baseline. They also performed better on the measures of speed and attention and episodic memory at baseline compared to those who were not followed (p < .05 for all analyses).

Random Effects Models

As shown in Table 1, examination of the fixed effects of social resources on baseline levels of cognitive performance revealed that more negative social interactions and greater satisfaction with support were associated with better general cognitive ability. Better performance on speed and attention was also associated with greater satisfaction with support. Over the 5 years, less satisfaction with support was marginally associated with decline in episodic memory performance.

Tests of modification by age yielded significant findings for both baseline and change in cognitive performance (see Table 1). Stratifying the sample into young-old versus old-old based on a median split (age 73/74) revealed differences between the young-old (estimate = 0.20, 95% CI = 0.05, 0.34) and old-old (estimate = -0.35, 95% CI = -0.60, -0.11) for change in general cognitive ability as a function of social network of friends and between the young-old (estimate = 3.55, 95% CI = 1.40, 5.69) and old-old (estimate = -3.61, 95% CI = -7.92, 0.70) for change in speed and attention as a function of social network of friends. No other interactions satisfied the criteria for statistical significance.

DISCUSSION

In this study, we examined whether social resource measures were differentially important for cognitive change with aging. The pattern of associations found between the different social resource factors and cognitive change across multiple domains adds support for the notion that social resource factors may be important to the cognitive health of older adults. However, the
results also indicate that separate cognitive domains respond similarly to social resources, as we saw parallel patterns of associations across cognitive domains.

Of the social resource factors, baseline satisfaction with support and social network were most consistently related to cognitive performance. Consistent with Yeh and Liu (2003), who found stronger perceived positive support from friends to be related to better cognitive function, we found that greater satisfaction with support was associated with better general cognitive performance and speed and attention, as well as less decline in episodic memory performance, and that these relations were modified by age.

The relation between having a smaller social network and cognitive decline as a function of age is consistent with a number of previous studies (Barnes et al., 2004; Bassuk et al., 1999; Beland, Zunzunegui, Alvarado, Otero, & Del Ser, 2005; Holtzman et al., 2004). These findings are also in line with the conceptual model proposed by Berkman, Glass, Brissette, and Seeman (2000), whereby social networks provide the opportunity for social support and engagement and therefore have a broader influence on the social environment than other aspects of social resources.

Previous studies have reported that receipt of emotional social support is associated with cognitive performance (Bassuk et al., 1999; Seeman et al., 2001). At the main effect level, we did not find that receiving less emotional, instrumental, or informational support was related to cognitive performance. However, we did find that age modified the relation between baseline episodic memory performance and emotional support. Because our sample was a relatively healthy sample of older adults, we did not expect that receipt of less instrumental or informational support would be associated with cognitive decline over time, as this would likely have been an indication of poorer health status, including cognitive health, which would require greater support. Similar to Seeman et al. (2001), we also found that reporting more negative social interactions was associated with better general cognitive ability. This finding may be the result of negative social interactions providing a greater level of stimulation, which benefits cognitive functioning.

The ability to find associations between social resources and cognitive performance is likely related to the types of cognitive outcomes measured. One strength of the current study was the measurement of multiple aspects of cognitive function—including general cognitive ability, speed and attention (basic cognitive abilities), and episodic memory (complex cognition)—in order to explore the associations between various types of social resources and change in separate cognitive domains. We found that the cognitive domains responded similarly to social resources. In contrast to Gerstorf, Herlitz, and

<table>
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<th>Variable</th>
<th>Estimate</th>
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Note: All models were adjusted for age (centered), education, gender, marital status, residency, attrition status, and personality characteristics (neuroticism, extraversion, openness, agreeableness, conscientiousness). Negint = negative social interactions.
Smith (2006), we found that the main effect of gender was associated with change in episodic memory (estimate = 0.82, \( p = .0001 \)) after we controlled for education and attrition.

Although the results of the current study are informative, we should acknowledge several limitations. First, participants from the Charlotte County Healthy Aging Study are Caucasian, well educated, and in relatively good health, which may limit the generalizability of the results; in addition, there was a relatively high stability in cognitive function over time, which may have reduced our ability to detect associations. Second, there was relatively high stability in cognitive function over time, which may have reduced our ability to detect associations. Third, we did not correct for multiple comparisons. However, given the paucity of previous research examining multiple aspects of social resources, we view these results as a starting point for future research. Finally, we were unable to fully explore the directionality of the association (i.e., whether a lower level of social resources leads to poor cognitive function, or whether poor cognitive function leads to a lower level of social resources).

In conclusion, our results suggest that the social environment may be important for the cognitive health of older adults. These findings are especially important in that social resources are amenable to change. Future studies need to (a) examine the determinants of social resources in older adults (e.g., socioeconomic status, geographic proximity to family, or number of children) in order to identify persons at risk for cognitive decline, (b) examine the influence of health and level of social engagement in these associations, and (c) include three or more waves of data to assess the reciprocal relations between social resources and cognitive change with aging.

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Correspondence
Address correspondence to Tiffany F. Hughes, School of Aging Studies, University of South Florida, 4202 East Fowler Avenue, MHC 1300, Tampa, FL 33620. E-mail: thughes@health.usf.edu

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