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The Differential Relationship of Dimensions of Perceived Social Support with Cognitive Function among Older Adults

Sarah C. Pillemer¹ and Roe Holtzer^{1,2}

¹Ferkauf Graduate School of Psychology, Yeshiva University, Bronx, NY, 10461.

²Department of Neurology, Albert Einstein College of Medicine, Yeshiva University, Bronx, NY, 10461

Abstract

Objectives—Research has extensively examined the relationship of social support and cognition. Theories on social support suggest that it is a multidimensional construct including perceptions, actual assistance, and level of integration into a social network. Little is known, however, about the differential associations between distinct dimensions of perceived social support and cognition. The current study examined whether four empirically validated dimensions of perceived social support were differentially related to cognitive function in aging, and whether this association was moderated by gender.

Methods—The sample included 355 community-residing older adults (mean age=77ys; %female=55) enrolled in a longitudinal cohort study. Social support was assessed using the Medical Outcomes Study-Social Support Survey (MOS-SSS). Cognition was assessed using the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS).

Results—Principal component analysis yielded four factors capturing different dimensions of social support: emotional/informational support, positive social interaction, tangible support, and affectionate support. Linear regression analyses revealed that both perceived emotional/informational support (Beta= 1.41, $p = 0.03$; 95 % CI= .156 to 2.669) and positive social interaction (Beta=1.71, $p = 0.01$; 95 % CI= .428 to 2.988) were significantly associated with RBANS total index score. Further analyses revealed that gender moderated the relationship between emotional/informational support (Beta=1.266, $p = 0.04$), demonstrating that higher levels of perceived emotional support were associated with higher index scores in females but not in males.

Discussion—The associations between perceived emotional/informational support and positive social interaction suggest that social engagement may be an important target for intervention procedures for individuals at risk of cognitive decline and dementia.

Keywords

social support; aging; cognition; gender

Introduction

Social Support and Cognitive function in Older Adults

Gerontological research has highlighted the influence of different configurations of social networks and social support on health outcomes. Robust social networks are associated with better physical and mental health outcomes (Cohen & Syme, 1985; Rodriguez-Laso, Zunzunegui, & Otero, 2007; Umberson & Montez, 2010), whereas lack of social support has been linked to increased risk for mortality and morbidity (Thoits, 2011). Social support can be construed as the *perception* that an individual is cared for and has supports available should he/she need it, the *actual* assistance that is received; and/or the *level* of integration an individual has in a social network (Antonucci, 1990). Although family and friends typically deliver support, other associates (e.g., coworkers, neighbors) also serve as members in support networks (Seeman & Berkman, 1988).

The receipt of social support plays an important role in cognitive function in older adults. Studies have shown that the presence and degree of social support may reduce the rate of cognitive decline and dementia (Barnes, De Leon, Wilson, Bienias, & Evans, 2004; Barnes, Powell-Grinner, McFann, & Richard, 2004; Bassuk, Glass, & Berkman, 1999; Christensen et al., 1996; Ertel, Glymour, & Berkman, 2008; Fabrigoule, Letenneur, Dartigues, & Zarrouk, 1995; Zunzunegui, Alvarado, Del Ser, & Otero, 2003). Conversely, community-dwelling men and women with few social ties, reduced social integration, and social disconnection were at greater risk of cognitive decline (Bassuk, Glass, & Berkman, 1999; Zunzunegui, Gutierrez-Cuadra, Beland, Del Ser, & Wolfson, 2000). The protective effect of social support on cognitive decline may occur because engaging in social activities fosters communication and interpersonal interactions, which may aid in reducing cognitive decline (Berkman, 2000). Additionally, social support has been shown to protect individuals against the harmful consequences of stressful events, thus exerting positive effects on well-being and cognition (Cohen & Willis, 1985). Thus, in light of the associations between social support and cognition, the former may have a role in risk assessment and interventions for cognitive decline and dementia.

A few studies have explored the importance of specific facets of perceived social support in relation to cognitive decline either instead of, or in addition to, structural ones. In a cross-sectional study, Yeh and colleagues (2003) found a positive association between marriage and perceived support from friends and cognitive function. Three longitudinal studies examined the effect of emotional support on cognition, reporting that greater emotional support at baseline predicted better cognitive function at follow-up (Bassuk, Glass, & Berkman, 1999; Crooks, Lubben, Petitti, Little, & Chiu, 2008; & Seeman, Lusignolo, Albert, & Berkman, 2001). These studies, however, operationalized social support in different ways. For example, Crooks and colleagues (2008) used the abbreviated Lubben Social Network Scale, which consists of six questions measuring family and friendship ties. Bassuk and colleagues (1999) operationalized social support with a global social disengagement scale that included participation in various social groups and presence of significant others, family members, and friends. Seeman and colleagues (2001) operationalized social support using 6 items purported to measure level of emotional support

(e.g. “how often does your spouse make you feel loved and cared for”). Because the above-mentioned studies used different methods to operationalize social support (marital status, involvement in social groups, and different ways of operationalizing emotional support) it becomes difficult to determine which particular aspects of social support are associated with cognitive function. Therefore, in this article we attempted to shed light on this issue by examining the differential relationship of four distinct and empirically validated facets of perceived social support (Sherbourne & Stewart, 1991) with cognitive function.

Dimensions of Perceived Social Support

Social support is a multidimensional construct (Seeman & Berkman, 1988), which has been operationalized in different ways across studies. Much of the prior research on the relationship between social support and cognition has focused on structural support, which is the number of social ties or the presence of a significant other. Virtually unexplored, however, is the role of different dimensions of perceived social support and cognition in healthy older adults. This focus on perceived social support is justified because studies have uncovered the importance of positive perceptions about one's level of social support, demonstrating that such perceptions not only encourage health care utilization, (Cassel, 1976; Cobb, 1976) but also exert a protective effect on psychological outcomes by buffering stress (Cohen & Wills, 1985).

Exploring Perceived Social Support Using the Medical Outcomes Study- Social Support Survey (MOS-SSS)

The MOS-SSS affords a unique opportunity to examine the role of perceived social support and its underlying dimensions. Previous research has examined the factor structure of the MOS-SSS, which is a well-validated scale that assesses separate dimensions of perceived social support. Validation studies of the MOS-SSS have most commonly yielded between two to four factors (Alonso, Montes, Menendez, & Pereira, 2006; Charyton, Elliot, Lu, & Moore, 2009; Costa, Salamero, & Gil, 2007; Costa, Sa, & Calheiros, Gjesfjeld, Greeno, & Kim, 2012; Nahm, Resnick, & Gaines, 2004; 2012; Yu, Lee, & Woo, 2004, Yu et al., 2014). The primary validation study of the MOS-SSS (Sherbourne & Stewart, 1991) and articles that utilized this measure in older adults, however, provided robust support for four dimensions of perceived social support (Gjesfjeld, Greeno, & Kim, 2007; Sherbourne & Stewart, 1991; Yu, Lee, & Woo, 2004). These include: tangible support; emotional/informational support; affectionate support; and positive social interaction. Tangible support can be thought of as a concrete and direct way of providing support to someone and may include the provision of financial assistance, services, or material items (Cohen, Mermelstein, Kamarck, & Hoberman, 1985). Emotional/informational support encompasses nurturance and a sense of being looked after as well as the provision of advice. Affectionate support is the feeling of being loved and receiving affection. Lastly, positive social interaction encompasses the degree to which an individual has someone with whom he or she can have a good time with and enjoy things with.

The distinct dimensions of perceived social support are important to examine because their effects may differ according to context. For example, in one situation (i.e. bereavement) an older adult may require emotional support, whereas emotional support would not be

particularly useful if one needed a ride to a doctor's appointment. Additionally, in social interactions cognitive engagement is necessary to maintain a conversation flow. Therefore, identifying which of the aforementioned validated dimensions of perceived social support influence cognition may help elucidate causal factors that underlie the relationship between perceived social support and cognitive function in aging. Specifically, once confirmed longitudinally, such information can be used to develop risk assessment and intervention procedures for individuals at risk of cognitive decline and dementia.

Gender and Social Support

In addition to examining the effect of distinct dimensions of perceived social support on cognition, it is important to examine whether these relationships differ for certain subgroups of the older population. The most salient of these potential differences is gender. Research that has focused on gender and social support revealed that men and women experience social support differently. Several factors may contribute to this gender difference but in general, men are more inclined than women to report less intensive but more widespread social networks (Belle, 1987). Additionally, men are more likely to experience their closest relationships within their family whereas women cite both family members and friends as their confidants (Belle, 1987). As one ages, it is expected that shrinkage in network size may occur, and this decrease is potentially greater in men than in women (Antonucci & Akiyama, 1987). Furthermore, women's social networks may be more multidimensional than men's in that they are more variable and may serve more functions. Women also report receiving more emotional support from their friends and children than men do, which could contribute to women receiving and utilizing social support more than men (Eagly, 2013).

Moreover, for older individuals, the adult daughter or daughter-in-law is more likely to provide care when a spouse is not available to provide this care any longer (Pope, Kolomer, & Glass, 2012). Women are more likely than men to utilize their social support networks in times of need, however when men utilize their network they frequently rely on their spouse for support (Belle, 1987; Tamres, Janicki, & Helgeson, 2002). Thus, it appears that women are more inclined to be both providers and recipients of social support more than men are (Eagly, 2013). Therefore, it is important to examine the role of gender when assessing the influence of perceived social support on cognition as men and women are likely to experience and utilize social support differently.

Current study—Based on the preceding review, the current study was designed to address a major gap in the literature concerning the relationship between perceived social support and cognitive function in older adults. Specifically, we aimed to determine whether distinct and empirically validated domains of perceived social support were differentially related to cognitive function in a sample of community-residing non-demented older adults. Based on previous studies examining the relationship between social support and cognition, we hypothesize that emotional/informational support will be related to cognitive function in our sample. Consistent with the literature the MOS-SSS was used to define four domains of perceived social support (emotional/informational support, tangible support, affectionate support, and positive social interaction). The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) served as a measure of overall level of cognitive

function. Although considered a screen battery (see measures for details) the variability of the RBANS total scores among non-demented older adults is substantial as evidenced by published normative data (Duff et al., 2003; Duff et al., 2008; Randolph, 1998; Randolph, Tierney, Mohr, & Chase, 1998) and experimental studies including our cohort of older adults (Allali, Verghese, & Mahoney, 2014; Mahoney, Verghese, Holtzer, & Allali, 2014; Shuman-Paretsky, Belser-Ehrlich, & Holtzer, 2014). Furthermore, we examined whether gender influenced the association between dimensions of perceived social support and cognitive function. We hypothesized that the relationship between perceived social support and cognition would be stronger in females than in males based on previous findings (Antonucci & Akiyama, 1987; Eagly, 2013) reporting that women both utilize and have a more widespread social network than men.

Methods

Participants

The sample (N = 355) consisted of community-residing older adults enrolled in a longitudinal cohort study entitled “Central Control of Mobility in Aging.” As previously described, the primary aims of the study are to examine cognitive and brain predictors of mobility function, mobility decline, and disability in the aging population (Holtzer, Wang, & Verghese, 2013; Holtzer, Mahoney, & Verghese, 2014). Participants received a telephone interview prior to inclusion in the study, which consisted of verbal consent to participate in the study, a medical history questionnaire, a mobility questionnaire, and cognitive screens to rule out dementia (Buschke et al., 1999; Galvin et al., 2005). Additionally, the participants were required to be residents of Westchester County, New York, at least 65 years of age, and English-speaking

Exclusion criteria consisted of severe auditory or visual disturbances that would interfere with testing, inability to walk the length of a room or climb stairs without assistive devices or assistance from another person, any medical/neurological history that may interfere with performance on cognitive and motor tests, and a diagnosis of dementia, as diagnosed via consensus diagnostic case conference procedures once the participant is enrolled (Holtzer, Verghese, Wang, Hall, & Lipton, 2008). After completing the phone interview, and meeting eligibility, participants were invited for two 3-hour visits at the research clinic. The Albert Einstein College of Medicine Institutional Review Board approved the study and written informed consent was obtained from all subjects prior to participation. Participants completed two visits for the calendar year (about a week apart). On the first visit, participants complete a relatively brief battery of neuropsychological tests, structured mobility protocols, and a series of questionnaires. On the second visit, participants received a full neurological examination, walking and balance measures, computerized cognitive paradigms, and a series of questionnaires. Participants in the Central Control of Mobility in Aging study are followed longitudinally at yearly intervals.

Measures

MOS Social Support Survey (MOS-SSS)—The Medical Outcomes Study Social Support Survey (MOS-SS) is a multidimensional and brief scale that was developed and

validated for use in patients with chronic conditions (Sherbourne & Stewart, 1991). The MOS-SSS consists of a total of 19 items that are hypothesized to measure emotional support/informational support, tangible support, affectionate support, and positive social interaction. Although variability exists in data reduction studies of the MOS-SSS, where anywhere between 2 and 4 factors have been extracted, there is strong support for a 4-factor solution, especially among older adults (Gjesfjeld, Greeno, & Kim, 2007; Sherbourne & Stewart, 1991; Yu, Lee, & Woo, 2004). This questionnaire was developed to assess an individual's perceived level of the availability of various aspects of functional social support (Sherbourne & Stewart, 1991). The items posited to measure emotional support consist of four questions measuring expression of positive affect and empathetic understanding. Informational support consists of four questions measuring if the respondent has support when they need advice, information, guidance, or feedback. Tangible support consists of four questions measuring if the respondent has support concerning physical assistance or behavioral aid. Affectionate support consists of three questions measuring if the respondent receives expressions of love and affection. Lastly, positive social interaction contains three questions that measure if the respondent has availability of other persons to do fun things with them. For each question, the respondents were instructed to signify how often each item of support was available to them if they needed it. Response options ranged from 1-5 and consisted of none of the time (1), a little of the time (2), some of the time (3), most of the time (4), and all of the time (5). Therefore, the higher the score, the better the respondent perceived his or her level of social support. The reliability and validity of this scale have been established (Sherbourne & Stewart, 1991).

Repeatable Battery for the Assessment of Neuropsychological Status

(RBANS)—The RBANS is a relatively brief battery consisting of 10 neurocognitive tests measuring the domains of memory (immediate and delayed), attention, language, and visuospatial abilities. The RBANS has been used as a battery to detect and characterize deficits in a variety of disorders, including dementia, track the advancement of neurological disorders, and screen for neurocognitive status (Karantzoulis, Novitski, Gold, & Randolph, 2013; Randolph, 1998). The RBANS is a paper-and-pencil test, taking roughly 30 minutes to administer (Randolph, 1998; Randolph, Tierney, Mohr, & Chase, 1998). As noted earlier, based on normative data substantial variability exists in overall level of cognitive function, as measured by the total RBANS index score, (Randolph, 1998; Randolph, Tierney, Mohr, & Chase, 1998).

Covariates—Covariates in the current study included age, education, gender, and depression. The Geriatric Depression Scale (GDS) is a 30-item self-report measure used to assess depressive symptoms in older adults (Parmelee & Katz, 1990). Structured clinical interviews were used to determine the existence of chronic or acute medical conditions. A disease comorbidity summary score (ranging from 0-10) was computed by the presence or absence of diabetes, chronic heart failure, arthritis, hypertension, depression, stroke, Parkinson's disease, chronic obstructive lung disease, angina, and myocardial infarction, as previously described (Holtzer, Verghese, Wang, Hall, & Lipton, 2008).

Statistical Analysis—Consistent with the existing literature (Charyton, Elliot, Lu, & Moore, 2009; Gjesfjeld, Greeno, & Kim, 2007; Sherbourne & Stewart, 1991; Yu, Lee, & Woo, 2004) principal component analysis was used to extract a four-factor solution of the MOS-SSS. Principal component analysis is a dimension reduction tool used to extract linear components (factors) in a dataset using eigenvalues. Additionally, internal consistency measures for each of the factors were calculated. Linear regression analyses were used to examine the relationship between each factor of perceived social support and cognition, as measured by total RBANS scores. The linear regression analysis was done using three blocks. Block 1 examined the relationship of the four factors of perceived social support and cognition without adjusting for covariates. Block 2 adjusted for the covariates. In block 3 the interaction terms of gender and the four factor scores, (computed by multiplying each factor \times gender) were entered into the regression model to examine the moderating effect of gender on the association between social support and cognition. The factors, used as predictors in the linear regression analyses, were standardized factor scores with a mean of 0 and a standard deviation of 1. The data was inspected descriptively and graphically and model assumptions were formally tested. Statistical analyses were performed using IBM SPSS version 21 (IBM, Somers, NY). For all statistical analyses, alpha level of .05 was used to determine significance.

Results

For the current study, 355 participants completed the MOS-SSS questionnaire and baseline cognitive data. Baseline demographic characteristics are presented in Table 1. The study sample had a mean age of 76.58(\pm 6.94) years, a mean education level of 14.33(\pm 2.78) years, and a gender distribution of 55.2% female. The mean RBANS standardized total score (91.44, \pm 11.87) was in the average range of cognitive function. The low disease comorbidity summary (1.15, \pm 1.02) and GDS (4.75, \pm 3.99) scores were both indicative of relatively good health and low levels of depressive symptoms, respectively.

Principal component analyses were used to examine the underlying factor structure of the 19 questions of the MOS-SSS with orthogonal rotation (varimax). Kaiser-Meyer-Olkin measure of sampling adequacy (KMO= .941) verified the sampling adequacy for the analysis. Bartlett's test of sphericity (171, $p < .001$) specified that correlations between items in our sample were adequately large for principal component analysis. A four-factor solution accounted for 81.30% of the cumulative variance (see table 2).

Factor 1 included items that capture emotional and informational support. Factor 2 included items that measure tangible support. Factor 3 contained items that assessed positive social interaction. Factor 4 captured items that measure affectionate support. The first factor (emotional and informational support) accounted for 57.86% of the total variance after Varimax rotation. The second factor (tangible support) accounted for 11.55% of the total variance. The third factor (positive social interaction plus the additional item) accounted for 7.24% of the total variance. Lastly, the fourth factor (affectionate support) accounted for 4.58% of the total variance.

Chronbach's alpha for the total MOS-SSS was .958 indicating excellent internal consistency. Deletion of individual items did not result in increased Chronbach's alpha values. Furthermore, internal consistency for factors 1 ($\alpha = .953$), 2 ($\alpha = .938$), 3 ($\alpha = .941$), and 4 ($\alpha = .881$), was excellent. Corrected item total correlation analysis revealed that all items were above 0.4 and therefore indicated good discrimination between questions. Bivariate correlational analyses of the MOS-SSS total and factor scores with key demographic variables are summarized in Table 3.

Results of the linear regression analysis assessing relationships between perceived dimensions of social support and cognition are summarized in Table 4. Consistent with previous literature, overall level of perceived social support, as measured by the total MOS-SSS score, was positively associated with level of cognitive function ($\beta = 2.15$, Standardized $\beta = .16$, $p = .003$). Linear regression analysis revealed that higher factor scores on both emotional/informational support and positive social interaction were positively associated with higher total RBANS index scores without (block 1) and with (block 2) covariates in the model (see Table 4). In block 3 gender, factor scores and their interactions were included to determine whether the relationship between dimensions of perceived social support and levels of cognitive function, measured by the RBANS total index score, were moderated by gender. The analyses in block 3 also adjusted for the covariates. Findings revealed that the association between emotional/informational support was stronger in females compared to males ($\beta = 1.266$, Standardized $\beta = 0.11$, $P = 0.04$). Further stratified correlational analyses between emotional/informational support and RBANS total index score revealed a significant positive correlation ($r = 0.210$, $p = 0.003$) in females but not in males ($r = 0.034$, $p = 0.668$). The moderating effect of gender on the association between emotional/informational support and RBANS total index was not attributed to higher and more variable factor scores in females compared to males. Specifically, independent samples T-test with gender as the two-level independent variable and emotional/informational support of the dependent measure was not significant ($t(353) = -.718$, $p = .070$). Additionally, this association was not due to restricted range of scores in one group (Table 1) or grossly uneven distribution of gender in our sample (% female = 55). Gender did not moderate the relationship between factors 2, 3, and 4 and levels of cognitive function (Table 4).

Discussion

This study aimed to identify the relationship between distinct dimensions of perceived social support and cognitive function. Previous studies, have typically taken a unidimensional approach to this issue, focusing on a single aspect of social support. In contrast, we simultaneously assessed the differential relationships between four distinct dimensions of perceived social support (emotional/informational support, tangible support, positive social interaction, and affectionate support) and cognitive function in older adults. We found that of the four dimensions, greater emotional/informational support and greater positive social interaction predicted higher levels of cognitive function in fully adjusted models. Thus, the results highlight the importance of two distinct dimensions of perceived social support in predicting levels of cognitive function in community residing and relatively healthy older adults.

Another unique contribution of this research is the identification of positive social interaction, which has not been well studied, as a key predictor of cognition in later life. A potential mechanism for this effect can be derived from the “use it or lose it” theory of adaptation to aging. This theory posits that social support assists in promoting cognitive engagement, which may explain why positive social interaction was related to better cognitive outcomes in our study (Baltes & Baltes, 1990).

The findings related to emotional/informational support, are supported by prior research showing a link between emotional support and cognition (Seeman, Lusignolo, Albert, & Berkman, 2001). Higher levels of perceived emotional/informational support and positive social interaction might exert a positive effect on an individual's lifestyle behaviors (e.g. going to the doctor, exercising, medication adherence, smoking cessation) thus contributing to better cognitive function and health outcomes (Seeman & Crimmins, 2001).

Tangible support and affectionate support were not related to cognitive function in our sample. This finding maybe attributed to the low levels of cognitive engagement that are required in these two dimensions of perceived support. Furthermore, the role of tangible support (the provision of assistance, material goods, or services) can be served by formal as well as informal sources (a nurse, doctor, house keeper, etc.). A person providing tangible support may not need to exhibit the emotional connection and depth that a person providing emotional or informational support may display. Items loading on perceived affectionate support, although positive (e.g. someone who hugs you, someone who makes you feel wanted), may represent behaviors and relationships that can be provided by individuals with whom the respondent does not have a deep and meaningful connection. This is contrasted with the more meaningful and deeper connection that is assessed by perceived emotional/informational support (e.g., someone with whom the most private worries and fears can be shared, and someone who can give advice during crisis). Thus, although speculative, it appears that the limited depth and meaning of the relationships in perceived tangible and affectionate support may also account for their lack of association with cognitive function in this sample. Importantly, the lack of associations between perceived tangible and affectionate support and cognitive function cannot be attributed to restricted range of scores in these two factors.

We found that gender influenced the relationship between emotional/informational support and cognitive function. Specifically, this relationship was found in women but not in men. This finding cannot be attributed to restricted range of factor scores in one group or uneven distribution of gender in our sample, This result is consistent with previous literature finding that men and women perceive and utilize social support differently (Belle, 1987). As previously mentioned, women generally possess more intensive networks than men and experience close bonds both inside and outside of their families. Thus, women's social networks may be more multidimensional than men's, contain more individuals outside of the immediate family, and may serve more functions. Previous research has demonstrated that women may receive more emotional support from their friends and children than men (Eagly, 2013), and that those with more robust social networks exhibit better cognitive functioning (Barnes, Powell-Grinner, McFann, & Richard, 2004). Therefore, one reason for the moderating relationship may be that men in this age range typically receive extensive

support from their spouses, whereas women are more reliant on their broader social network (Belle, 1987; Eagly, 2013). Therefore, emotional and informational support from social network members, aside from their families, is likely to be substantially more important in cognitive outcomes for women than for men.

Another potential mechanism for this relationship is the interconnection between social support, wellbeing, and cognition. Emotional support has been linked to depression, where greater levels of emotional support result in fewer depressive symptoms (Seeman, Lusignolo, Albert, & Berkman, 2001). Additionally, women are twice as likely to develop major depressive disorder than men and more likely to experience a higher number of symptoms and greater depression severity (Seney & Sibille, 2014). Furthermore, depressive symptoms have been shown to influence cognitive function where lower levels of depression are associated with better cognitive functioning (Lichtenberg, Ross, Millis, & Manning, 1995). In our sample, the receipt of emotional/informational support may act as a protective factor against depressive symptoms in women therefore resulting in less cognitive decline. Taken together, the results of the current study suggest that the more robust social support networks that women are inclined to have and utilize compared to men may enhance their cognitive functions explaining the moderating effect of gender on the relationship between emotional/informational support and cognition reported herein. It remains to be evaluated whether these social support networks also have a protective effect against cognitive decline and risk of dementia in women but not in men.

Limitations

This study used cross-sectional data and therefore causality or direction of influence cannot be determined. There is a need for longitudinal research to examine whether higher scores on these factors of perceived social support also have a protective effect against cognitive decline and risk of dementia. Furthermore, it is possible that an individual's availability of perceived social support decreases with emergent cognitive difficulties, implying that this relationship could be bi-directional. It is conceivable that cognition may be affecting perceived social support. For example, as individuals decline in cognitive abilities, they may isolate themselves, thus impacting the amount of perceived social support received. Additionally, as the MOS-SSS is a self-report measure, there are some concerns that participants may exaggerate or under-report their perceived level of social support to either make their situation seem worse or minimize their problems, respectively. However, the MOS-SSS has previously established reliability and validity (Sherbourne & Stewart, 1991) and the reliability of our four-factor solution was excellent. We recognize that dimensions of perceived support are often correlated. Using the varimax rotation, however, allows us to quantify statistically distinct latent variables that represent non-overlapping variance in well-accepted dimensions of perceived support. This presents conceptual and analytic advantages in that one parsimonious regression model was used to determine simultaneously the differential relationships of distinct dimensions of perceived support with cognitive function. Of note, principal components analysis using an oblique rotation was also preformed yielding a similar 4-factor solution. Although assessed in four separate regression models, the relationships of the correlated factors with cognitive function and the moderating effect of gender on these associations were similar to those reported herein (data not shown).

Future studies should determine generalizability of the current findings to more diverse and cognitively impaired populations.

In conclusion, the current study established that distinct dimensions of social support were differentially related to cognitive function. Specifically, increased emotional/informational support and positive social interaction were both related to cognitive function in our sample of healthy older adults. Additionally, higher levels of perceived emotional/informational support was related to better cognitive function in women but not in men. The associations between perceived emotional/informational support and positive social interaction with cognitive function, if confirmed longitudinally, could potentially be used in assessment and intervention procedures for individuals at risk of cognitive decline and dementia.

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Table 1

Study of Sample Characteristics, Social Support, and Cognitive Functions at Baseline

Variable	Mean (SD)	Range
Total Sample (n)	355	
Age (years)	76.58 (± 6.94)	65.00-95.00
Women: number (%)	196 (55.2)	
Ethnicity: number (% Caucasian)	310 (87.3)	
Education (years)	14.33 (± 2.78)	5.00-20.00
Disease comorbidity index	1.15 (± 1.02)	0.00-5.00
Geriatric Depression Score	4.75 (± 3.99)	0.00-21.00
RBANS (standard total score)	91.44 (± 11.87)	65.00-137.00
MOS-SSS (total score)	4.06 (± 0.88)	1.00-5.00
MOS-SSS Factor Score 1	3.99 (± 1.04)	1.00-5.00
Females	4.03 (± 0.99)	1.00-5.00
Males	3.95 (± 1.10)	1.00-5.00
MOS-SSS Factor Score 2	3.99 (± 1.17)	1.00-5.00
Females	3.79 (± 1.22)	1.00-5.00
Males	4.23 (± 1.06)	1.00-5.00
MOS-SSS Factor Score 3	4.33 (± 1.01)	1.00-5.00
Females	4.02 (± 0.94)	1.00-5.00
Males	4.14 (± 1.09)	1.00-5.00
MOS-SSS Factor Score 4	4.08 (± 1.10)	1.00-5.00
Females	4.22 (± 0.92)	1.00-5.00
Males	4.46 (± 0.89)	1.00-5.00

Notes: MOS-SSS = Medical Outcomes Study- Social Support Survey; RBANS = Repeatable Battery for the Assessment of Neuropsychological Status; Factor 1 = Emotional/Informational Support; Factor 2= Tangible Support; Factor 3= Positive Social Interaction; Factor 4= Affectionate Support

Table 2

Rotated Principal Component Analysis Factor Loadings

MOS-SSS Items	Factor Loadings			
	1	2	3	4
Someone you can count on to listen to you when you need to talk	.707			
Someone to give you information to help you understand a situation	.793			
Someone to give you good advice about a crisis	.819			
Someone to confide in or talk to about yourself or your problems	.828			
Someone whose advice you really want	.834			
Someone to share your most private worries and fears with	.782			
Someone to turn to for suggestions about how to deal with a personal problem	.828			
Someone who understands your problems	.810			
Someone to help you if you were confined to bed		.849		
Someone to take you to the doctor if you needed it		.767		
Someone to prepare your meals if you were unable to do it yourself		.852		
Someone to help with daily chores if you were sick		.869		
Someone who shows you love and affection				.789
Someone to love and make you feel wanted				.806
Someone who hugs you				.737
Someone to have a good time with			.705	
Someone to get together with for relaxation			.818	
Someone to do something enjoyable with			.823	
Someone to do things with to help you get your mind off things			.718	
Eigenvalue	10.993	2.194	1.376	.871
% Variance	57.858	11.547	7.240	4.584
Cumulative Variance	57.858	69.404	76.644	81.299

Notes: Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization

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Table 3

Bivariate Correlational Analysis

Variable	Age	Education	GHS	GDS
	<i>r</i>	<i>r</i>	<i>r</i>	<i>r</i>
MOS-SSS Factors				
Emotional	-.071	.072	-.070	-.137*
Tangible	-.126*	-.076	.015	-.103
Positive Interaction	-.187**	-.56	-.008	-.248**
Affectionate	<0.001	-.010	-.068	-.143*

Notes:

* = significant at $p < 0.05$ ** = significant at $p < 0.01$; MOS-SSS= Medical Outcomes Study- Social Support Survey; Emotional = Emotional/Informational Support; Tangible= Tangible Support; Positive Interaction= Positive Social Interaction; Affectionate= Affectionate Support

Table 4

Linear Regression: associations of dimensions of perceived Social Support and Cognition

Variable	β	Standardized β	95% CI	<i>p</i>
<i>Block 1</i>				
Emotional	1.56	.13	.330 to 2.782	.01*
Tangible	.01	.001	-1.226 to 1.241	.99
Positive Interaction	1.97	.17	.750 to 3.191	.002*
Affectionate	-.04	-.003	-1.279 to 1.205	.95
<i>Block 2</i>				
Age	-.03	-.02	-.214 to .150	.73
Education	.39	.09	-.064 to .846	.09
Gender	.36	.02	-2.236 to 2.949	.79
GDS	-.18	-.06	-.511 to .150	.30
Disease Comorbidity Index	.90	.08	-.347 to 2.099	.16
Emotional	1.41	.12	.156 to 2.669	.03*
Tangible	.01	.001	-1.270 to 1.296	.97
Positive Interaction	1.71	.15	.428 to 2.988	.01*
Affectionate	-.05	-.004	-1.315 to 1.214	.94
<i>Block 3</i>				
Age	-.03	-.01	-.208 to .128	.79
Education	.40	.09	-.054 to .855	.08
Gender	.27	.01	-2.325 to 2.860	.84
GDS	-.22	-.07	-.550 to .117	.20
Disease Comorbidity Index	.81	.07	-.412 to 2.039	.19
Emotional	1.620	.14	.343 to 2.897	.01
GenderXEmotional	1.549	.13	.302 to 2.795	.02*
Tangible	-.235	-.02	-1.535 to 1.066	.72
GenderXTangible	.015	.00	-1.283 to 1.314	.98
Positive Interaction	1.883	.16	.595 to 3.171	<.01
GenderXPositiveInteraction	.100	.01	-1.133 to 1.334	.87
Affectionate	-.093	-.01	-1.369 to 1.183	.89
GenderXAffectionate	.503	.04	-.769 to 1.776	.44

Notes:

* = significant at $p < 0.05$; RBANS= Repeatable Battery for the Assessment of Neuropsychological Status; GDS= Geriatric Depression Scale; Emotional = Emotional/Informational Support; Tangible= Tangible Support; Positive Interaction= Positive Social Interaction; Affectionate= Affectionate Support. Interaction variable= Gender X Factor Score. *Block 1* shows the unadjusted linear regression analysis of the 4 factors of social support and their relationship to cognition. *Block 2* shows the adjusted linear regression analysis of the 4 factors of social support and cognition including covariates. *Block 3* shows the linear regression analysis of gender as a moderator.