

## Original Research Report

# Which Aspects of Social Support Are Associated With Which Cognitive Abilities for Which People?

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### Abstract

**Objectives.** To assess the relations between 11 aspects of social support and five cognitive abilities (vocabulary, reasoning, spatial visualization, memory, and speed of processing) and to determine whether these relations between social support and cognition are moderated by age or sex.

**Method.** A sample of 2,613 individuals between the ages of 18 and 99 years completed a battery of cognitive tests and a questionnaire assessing aspects of social support. A measure of general intelligence was computed using principal components analysis. Multiple regressions were used to evaluate whether each aspect of support and/or its interactions with age or sex predicted each cognitive ability and *g*.

**Results.** Several aspects of social support were significantly related to all five cognitive abilities and to *g*. When *g* was included as a predictor, there were few relations with specific cognitive abilities. Age and sex did not moderate any of the relations.

**Discussion.** These results suggest that contact with family and friends, emotional and informational support, anticipated support, and negative interactions are related to cognition, whereas satisfaction with and tangible support were not. In addition, these aspects of support were primarily related to *g*, with the exception of family contact. Social support–cognition relations are comparable across the life span and the sexes.

**Key Words:** Age differences—Cognitive abilities—Sex differences—Social support.

Social support has been positively associated with cognitive performance (Hughes, Andel, Small, Borenstein, & Mortimer, 2008; Seeman, Lusignolo, Albert, & Berkman, 2001; Seeman et al., 2011). However, the specificities of this relationship remain unclear.

First, social support can be conceptualized in different ways, and this can impact its relations with variables like health (Barrera, 1986; Uchino, 2009), and potentially also cognition. In addition, it is unclear whether social support is related to specific cognitive abilities (Krueger et al., 2009) or whether it has a similar relationship across abilities (Hughes et al. 2008; Seeman et al., 2011). Finally, although age and sex influence social support (Antonucci & Akiyama, 1987;

Fiori, Smith, & Antonucci, 2007; Fuhrer & Stansfeld, 2002; Shaw, Krause, Liang, & Bennett 2007; van Tilburg, 1998), few studies have evaluated whether they moderate social support–cognition relations. The main goals of the present study are to evaluate which aspects of social support are related to which cognitive abilities for which people.

### Which Aspects of Social Support?

The conceptualization of social support has long been a matter of debate (Barrera, 1986; O'Reilly, 1988). Barrera (1986) found that three types of social support measures, namely interacting with others, receiving support, and

being satisfied with the social support you receive, were unrelated, positively related, and negatively related to stress and distress, respectively. Based on these findings, [Barrera \(1986\)](#) argued that social support should be separated into multiple aspects. The present study was designed to evaluate whether these aspects have different relations with cognition.

Previous research indicates that such differences exist. For example, two studies found that one aspect of social support, frequency of social contact, did not predict cognition ([Amieva et al., 2010](#); [Holtzman et al., 2004](#)) whereas others did. This may be because frequency of contact provides little information about the quality of one's relationships ([Amieva et al., 2010](#); [Seeman et al., 2001](#)). In addition, whether contact is with family or friends could influence relations. For example, contact with family was associated with greater positive and negative affect for older adults, whereas contact with friends was associated with higher life satisfaction and positive affect but lower negative affect ([Huxhold, Miche, & Schuz, 2013](#)), and family relationships are often characterized by more positive and negative interactions than those with friends ([Akiyama, Antonucci, Takahashi, & Langfahl, 2003](#)).

Received and provided support are assessed as the emotional, tangible, or informational support received or given ([Shaw et al., 2007](#)). Received support may reduce stress ([Uchino, Carlisle, Birmingham, & Vaughn, 2011](#)), and provided support has been associated with better health and self-efficacy ([Piferi & Lawler, 2006](#)), potentially benefiting cognition. However, informational and tangible received support may be less comforting and more controlling ([Uchino, 2009](#); [Uchino et al., 2011](#)), and caregiving can damage health ([Vitaliano, Zhang, & Scanlan, 2003](#)).

Perceived support assesses one's satisfaction and anticipation of support. It is generally shown to have positive relations with cognition ([Hughes et al., 2008](#); [Krueger et al., 2009](#); [Yeh & Liu, 2003](#)). Negative interactions, another measure of perceived support, may be cognitively stimulating and reflect greater intimacy ([Hughes et al., 2008](#); [Seeman et al., 2001](#)) or induce stress ([Seeman et al., 2011](#)).

In summary, more research is needed to determine whether support aspects have different relations with cognition. The present study will evaluate the relations of 11 measures of support with cognition.

### Which Cognitive Abilities?

Identifying what aspects of cognition are related to social support is also crucial to understanding social support–cognition relations. Unfortunately, most previous studies have used measures like the Mini-Mental State Exam (MMSE; [Beland, Zunzunegui, Alvarado, Otero, & del Ser, 2005](#); [Holtzman et al., 2004](#); [Ybarra et al., 2008](#); [Yeh & Liu, 2003](#)) or global measures based on only a few tasks ([Barnes, Mendes de Leon, Wilson, Bienias, & Evans, 2004](#);

[Zunzunegui, Alvarado, Del Ser, & Otero, 2003](#)), resulting in crude measures of general intelligence.

Relations between measures of social support and abilities like memory ([Arbuckle, Gold, Andres, Schwartzman, & Chaikelson, 1992](#); [Ertel, Glymour, & Berkman, 2008](#)), speed and attention ([Hughes et al., 2008](#)), and executive function ([Seeman et al., 2011](#)) have been found and are sometimes interpreted as evidence of relations between certain cognitive abilities and support. For example, relations between perceived support and working memory, spatial relations, and perceptual speed could suggest that support is primarily linked with problem-solving abilities ([Krueger et al., 2009](#)). However, such interpretations fail to consider the interrelations between cognitive variables established in previous work ([Salthouse & Ferrer-Caja, 2003](#)) when assuming that a relation between support and a cognitive ability is specific to that ability and not shared among abilities.

It is commonly accepted that cognitive abilities can be organized in terms of a hierarchical structure ([Carroll, 1993](#); [Gottfredson, 1998](#)) where tasks are the lowest level, specific cognitive abilities like memory are the next level, and increasingly general factors are at higher levels. The highest level, referred to as *g* for general intelligence, represents the variance that each cognitive ability has in common.

There is some evidence that social support is related to *g* ([Hughes et al., 2008](#); [Seeman et al., 2011](#)). For example, [Hughes and colleagues \(2008\)](#) found that a memory and a speed and attention factor were positively related to perceived support. However, it is unclear whether this is the case for other aspects of social support and whether particular cognitive abilities are associated with social support above and beyond any relationship between social support and *g*.

The present study will seek to resolve these issues by evaluating the relations between each aspect of social support with *g* as well as with memory, reasoning, speed of processing, vocabulary, and spatial visualization before and after controlling for *g*.

### Which People?

There is a broad consensus that aspects of social support are differentially impacted by age and sex. However, little research has been done to evaluate whether age or sex moderate support–cognition relations.

Socioemotional selectivity theory argues that older adults' focus on short-term goals like emotional well-being ([Carstensen, 1992](#)) leads them to prune out relationships in favor of more intimate bonds. Reducing the number of total contacts to a few supportive relationships results in lower levels of contact with friends and sometimes family ([Fiori et al., 2007](#); [Krause, 1999](#); [Shaw et al., 2007](#)), lower levels of provided support, fewer negative interactions ([Schnittker, 2007](#); [van Tilburg, 1998](#)), and similar

or greater levels of perceived support (Fiori et al., 2007; Krause, 1999; Schnittker, 2007). Levels of received support may be lower due to the smaller number of relationships (Depner & Ingersoll-Dayton, 1988; Keyes, 2002) or higher because receiving support can help individuals meet short-term goals (Shaw et al., 2007).

Meanwhile, women tend to develop larger, more complex networks and receive more support from a variety of sources, whereas men report greater satisfaction with their marriages (Antonucci & Akiyama, 1987; Fuhrer & Stansfeld, 2002). These patterns likely reflect the fact that men tend to rely primarily on their wives or intimate partners to fulfill their needs, therefore enhancing their satisfaction and anticipation of support. Women, in turn, tend to maintain more complex social networks (Antonucci & Akiyama, 1987; McLaughlin, Vagenas, Pachana, Begum, & Dobson, 2010), resulting in more support given to and received from those networks.

In summary, it has been established that levels of social support are impacted by age and sex. Unfortunately, few studies have evaluated whether this is also true for support–cognition relations.

Social support–cognition relations should be stronger with age if the benefits of support accumulate across the life span. Several longitudinal studies using samples comprised of older adults have shown that higher levels of support predict slower rates of cognitive decline (Barnes et al., 2004; Beland et al., 2005; Holtzman et al., 2004; Hughes et al., 2008; Seeman et al., 2001; Zunzunegui et al., 2003), possibly because social support benefits health or adds to cognitive reserve (Amieva et al., 2010; Giles, Anstey, Walker, & Luszcz, 2012; Beland et al., 2005). It is also possible that relations vary with age because certain risk factors are more common in older adults. For example, decreased social contact is often characteristic of early dementia (Landes, Sperry, Strauss, & Geldmacher, 2001), and it has been suggested that the relations between social support and cognitive decline may be due to this (Stoykova, Matharan, Dartigues, & Amieva, 2001). Alternatively, social support–cognition relations could be increasingly obscured because of the health risk factors present with age, consistent with the findings of Seeman and colleagues (2011) of stronger relations for younger versus older adults.

In regards to sex, the different relationships and social roles men and women have may influence social support–cognition relations. For example, Beland and colleagues (2005) and Zunzunegui and colleagues (2003) found that feeling useful to friends was associated with slower cognitive decline only in women and argued that this was due to the differences in gendered social roles in rural Spain. Thomas (2011) found that a variable consisting of social contact and community involvement predicted later levels of cognitive and physical limitations only for women, potentially because men do not have enough social support to produce notable protective effects.

## The Current Study

The goal of the present study is to evaluate which aspects of social support are related to which cognitive abilities for which people using self-reports of social support and objective measures of cognition. It is expected that aspects of support will have different patterns of relations with cognition; for example, social contact may be unrelated and emotional received support positively related to cognition.

Based on findings that different types of cognitive abilities had similar patterns of relations with social support (Hughes et al., 2008; Seeman et al., 2011), it is hypothesized that social support–cognition relations will primarily be with *g*. The present study will first evaluate whether relations between aspects of support and specific cognitive abilities are found as in previous studies. It will then assess whether these aspects of support are also related to *g* and whether controlling for *g* eliminates the relations between social support and specific cognitive abilities.

Finally, if higher levels of social support slow cognitive decline or the influences of social support are linked to risk factors found primarily in older age, relations may be stronger in older adults than in younger adults. However, it is also possible that relations are weaker with age because of the increasing number of health concerns. Social support–cognition relations are expected to be stronger in women.

## Methods

### Participants

This study included 2,613 individuals who completed the Social Network Questionnaire (Shaw et al., 2007) and a battery of cognitive tasks as part of the Virginia Cognitive Aging Project (Salthouse, 2009). Participants were screened for dementia and major cognitive impairment by excluding participants who scored below 24 on the MMSE (Folstein, Folstein, & McHugh, 1975). The participants were recruited from Charlottesville, Virginia using newspaper advertisements, flyers, and referrals from previous participants. Characteristics of the participants in the total sample and in three age groups, 18–39, 40–59, and 60–99 years, are summarized in Table 1. The sample was predominantly women, although the proportions varied significantly between groups. Age was associated with more years of education and self-reported health limits.

### Social Network Questionnaire

The Social Network Questionnaire (Shaw et al., 2007) consists of 27 items and was designed to assess 11 aspects of social support. Each aspect was assessed with three items, except for received and provided emotional support,

satisfaction with support exchanges, and negative interactions, which were assessed with four items.

For all subscales, with the exception of satisfaction with support exchanges, participants reported a score between 1 and 4, where 1 meant never or not at all, and 4 meant very often, more than six times, or a great deal. For satisfaction with support exchanges, participants reported either a 0, for not satisfied, or a 1, for satisfied. This questionnaire has been shown to have good internal consistency (Krause, 1999). As demonstrated in Table 2, aspects of support tended to be interrelated.

**Table 1.** Demographic Characteristics of the Participants Divided Into Three Age Groups

	18–39	40–59	60–96	Age chi square
N	455	1,026	1,132	NA
Age	29.0 (5.7)	51.7 (5.3)	69.7 (7.6)	NA
Proportion female	0.66	0.72	0.63	17.53*
	18–39	40–59	60–96	Age <i>r</i>
Self-rated health	2.1 (0.8)	2.1 (0.9)	2.1 (0.9)	.05
Self-rated health limits	1.29	1.57	1.78	.25**
Years of education	15.4 (2.3)	15.7 (2.6)	16.4 (2.9)	.15**
Scaled Scores				
Vocabulary	12.1 (3.4)	11.5 (3.2)	13.0 (2.7)	.15**
Digit symbol	11.2 (3.1)	11.6 (3.0)	12.0 (2.8)	.13**
Word recall	11.7 (3.1)	11.8 (3.0)	12.4 (3.1)	.09**
Logical memory	11.6 (3.3)	11.8 (3.4)	12.3 (3.1)	.08**

Notes. The *r*s included in this figure were calculated using a continuous age variable, and chi square was calculated using the three age groups.

NA = not applicable.  
\**p* < .01. \*\**p* < .001.

### Cognitive Tasks

Sixteen cognitive tasks were administered. These tasks have previously been described, including details of reliabilities (Salthouse, 2012) and the results of factor analyses that support the hypothesized cognitive ability structure (Salthouse & Ferrer-Caja, 2003). These tasks were given in the same order to each participant. Vocabulary was measured using the Wechsler Adult Intelligence Scale (Wechsler, 1997a), a picture-naming task (Woodcock & Johnson, 1990), and a multiple-choice synonym and antonym task (Salthouse, 1993). Speed was measured using a letter and pattern comparison task (Salthouse & Babcock, 1991), and a digit symbol task (Wechsler, 1997a). Reasoning was measured using a letter sets task (Ekstrom, French, Harman, & Dermen, 1976), Shipley’s Abstraction (Zachary, 1986), and matrix reasoning (Raven, 1962). Space was measured using a form boards task (Ekstrom et al., 1976), a paper folding task (Ekstrom et al., 1976), and a spatial relations task (Bennett, Seashore, & Wesman, 1997). Finally, memory was measured using a logical memory task (Wechsler, 1997b), a free recall task (Wechsler, 1997b), and paired associates task (Salthouse, Fristoe, & Rhee, 1996).

### Analytic Plan

The analyses consisted of several steps. First, the composite scores were created for each cognitive ability and aspect of support by averaging the *z* scores for the measures representing that ability or aspect (cognitive abilities based on previous work identifying a hierarchical structure of cognitive abilities, Salthouse & Ferrer-Caja, 2003).

Simultaneous multiple regressions were used to evaluate which aspects of social support were related to which cognitive abilities. To evaluate the possibility that social

**Table 2.** Correlations Between Aspects of Social Support

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Social contact											
(1) Contact family	.33										
(2) Contact friends	.19**	.46									
Received support											
(3) Received emotional	.21**	.31**	.78								
(4) Received tangible	.15**	.16**	.42**	.64							
(5) Received information	.13**	.27**	.47**	.48**	.71						
Provided support											
(3) Provided emotional	.20**	.28**	.62**	.36**	.45**	.79					
(4) Provided tangible	.19**	.16**	.30**	.39**	.32**	.47**	.59				
(5) Provided information	.15**	.23**	.40**	.33**	.53**	.64**	.47**	.70			
Perceived support											
(6) Perceived satisfaction	.07*	.11**	.29**	.13**	.09**	.07**	.03	.00	.29		
(7) Perceived anticipated	.18**	.23**	.53**	.29**	.28**	.32**	.16**	.19**	.42**	.56	
(8) Perceived negative	.05	-.04	-.08**	.03**	.08**	.13**	.19**	.20**	-.24**	-.29**	.03

Notes. Factor loadings for each aspect on the general social support factor are listed on the diagonal.

\**p* < .01. \*\**p* < .001.

support may be related to global cognition instead of specific cognitive abilities individually, a *g* score for each participant using the first unrotated factor was computed using a principal components analysis. This factor accounted for about 43.5% of the variance in the 16 cognitive measures. Separate multiple regression analyses were run where each aspect of social support was individually included as a predictor of *g* or one of the cognitive abilities along with age, sex, and the interactions between age, sex, and social support. To determine whether there were any remaining relations between social support and specific cognitive abilities, additional analyses were run where each aspect of social support predicted each cognitive ability with *g* included as a predictor.

Multiple regressions were used to evaluate the relations of age, sex, and the interaction between age and sex with each aspect of social support. To determine whether age and sex moderated the relations between social support and cognition, the interactions of age and sex with each aspect of social support in the previous analyses were evaluated.

Analyses were conducted including education and self-reported health as covariates, based on our findings that older participants were more highly educated and reported more health limits that may obscure existing age trends. In addition, based on findings that social support aspects were moderately interrelated, a general social support factor was computed as the first unrotated factor using a principal components analysis. Factor loadings for each aspect of support are presented on the diagonal in [Table 2](#). This factor accounted for about 33.56% of the variance in the 11 support aspects and was included as a covariate of cognition along with each individual aspect of social support, age, sex, and their interactions. Finally, an analysis was conducted with all covariates included as predictors to evaluate which covariates were independently related to cognition.

## Results

### Social Support–Cognition Relations

Standardized coefficients predicting each cognitive ability and *g* from each aspect of social support after controlling for age and sex are presented in the top row of [Table 3](#). In each successive row, standardized coefficients are presented for which either *g*, education, health limits, or general social support is additionally controlled. In the final row, all covariates were controlled. These coefficients can be interpreted as effect sizes because their square corresponds to the proportion of variance in the outcome uniquely explained by that aspect of support.

Social contact with family significantly and negatively predicted vocabulary and *g*. Social contact with friends, received emotional and anticipated perceived support significantly and positively predicted all aspects of cognition and *g*. Provided emotional support, provided informational support, and received informational support all predicted

at least two cognitive abilities and *g*. Negative interactions significantly and negatively predicted all aspects of cognition and *g*. Finally, tangible received support, tangible provided support, and satisfaction with support did not predict any aspects of cognition or *g*. The significant coefficients explained between 0.3% to 2% of the variance in *g* and in each aspect of cognition.

When controlling for the influence of *g* by including it as a predictor, relations between aspects of support and specific cognitive abilities were weaker and generally nonsignificant. Only social contact with family, received informational support, and provided emotional and informational support had any remaining significant relations with specific cognitive abilities.

The inclusion of education as a covariate also reduced most of the relations between social support and cognition. However, relations were generally still present although weaker excepting of informational and emotional provided support where relations were almost entirely eliminated. Including self-reported health limits did not notably impact relations. The inclusion of a general social support factor weakened relations for social contact with friends and provided emotional and informational support and resulted in stronger negative relations for social contact with family, tangible received support, and tangible provided support.

When all covariates were added, patterns resembled those found when only *g* or education was included. Regardless of which aspect of social support was included, *g* was a significant predictor of all cognitive abilities. In addition, education significantly predicted vocabulary, reasoning, and space; age predicted vocabulary, space, memory, and speed; and sex predicted space, memory, and speed regardless of what aspect of social support was included as a predictor. The interaction of age and sex predicted reasoning and also predicted vocabulary for contact with friends and memory for contact with family. No other covariates were predictive. These results suggest that education and general intelligence are likely the most important factors in addition to age and sex for the relations between social support and cognition.

In summary, these results suggest that although aspects of social support vary in their relations with cognition, each aspect of support tends to have similar relations with different cognitive abilities.

### Age and Sex Differences

Standardized coefficients for age, sex, age<sup>2</sup>, age\*sex, and age<sup>2</sup>\*sex with each social support aspect are presented in [Table 4](#). There were significant linear relations of age for all aspects of social support, except for contact with family, and significant quadratic relations of age with social contact and provided support. All of the linear relations except for satisfaction and anticipation of perceived support were negative. The quadratic trends were in the direction of less negative age effects at older ages

**Table 3.** Standardized Regression Coefficients Predicting General and Specific Cognitive Abilities From Social Support With Age and Sex as Predictors and With the General Cognitive Factor, Education, and/or the Social Support Factor as an Additional Predictor the Cognitive Abilities

	<i>g</i>	Vocab	Reasoning	Space	Memory	Speed
<b>Social contact</b>						
Family	-.07*	-.11**	-.04	-.03	-.03	-.01
with <i>g</i>	—	-.06**	.02	.02	.01	.02
with education	-.03	-.07**	-.01	-.01	-.01	.01
with health limits	-.07*	-.11**	-.04	-.03	-.03	-.01
with SS	-.12**	-.16**	-.08*	-.06	-.06*	-.04
with all predictors	—	-.06**	-.02	.02	.01	.01
Friends	.11**	.09**	.08**	.09**	.06*	.06**
with <i>g</i>	—	.00	-.01	.01	-.01	.00
with education	.06*	.04	.04	.06*	.03	.04
with health limits	.10**	.08**	-.07*	.09**	.06*	.06*
with SS	.04	.03	.03	.06	.02	.04
with all predictors	—	-.02	-.00	.02	-.01	-.00
<b>Received support</b>						
Emotional	.13**	.13**	.10**	.07**	.11**	.06*
with <i>g</i>	—	.03	-.02	-.03	.03	-.01
with education	.09**	.09**	.05*	.04	.08*	.03
with health limits	.13**	.13**	.09**	.07*	.11**	.05*
with SS	.12*	.11*	.08	.07	.14**	.05
with all predictors	—	.01	-.03	-.02	.08*	-.01
Tangible	.02	.01	.02	.01	-.01	-.02
with <i>g</i>	—	.00	.01	.01	-.01	-.03
with education	.02	.00	.01	.01	-.01	-.03
with health limits	.03	.02	.03	.02	-.00	-.01
with SS	-.07	-.08*	-.04	-.05	-.09*	-.08*
with all predictors	—	-.01	.03	.01	-.03	-.03
Informational	.13**	.13**	.11**	.09**	.07**	.04
with <i>g</i>	—	.04*	-.01	-.01	-.01	-.03
with education	.06*	.07**	.05*	.05	.03	.02
with health limits	.13**	.13**	.11**	.09**	.07**	.05*
with SS	.10**	.10**	.10*	.08*	.02	.02
with all predictors	—	.04	.01	.01	-.04	-.04
Emotional	.10**	.13**	.05	.04	.10**	.05*
with <i>g</i>	—	.05**	-.03*	-.04*	.04*	-.00
with education	.05	.08**	.01	.00	.07*	.03
with health limits	.10**	.13**	.05	.04	.10**	.05*
with SS	.00	.07	-.06	-.05	.06	.03
with all predictors	—	.06*	-.05*	-.05	.05	.05
Tangible	-.02	-.02	-.03	-.01	-.01	-.01
with <i>g</i>	—	.01	-.01	.01	-.00	-.02
with education	-.02	-.01	-.03	-.01	-.01	-.01
with health limits	-.02	-.02	-.03	-.01	-.01	-.01
with SS	-.15**	-.15**	-.12**	-.09*	-.11**	-.08**
with all predictors	—	-.00	.01	.03	-.02	-.02
Informational	.08**	.12**	.05	.03	.06*	.04
with <i>g</i>	—	.06**	-.02	-.04*	.00	-.01
with education	.03	.07*	.00	-.01	.03	.02
with health limits	.08**	.12**	.05	.03	.06*	.04
with SS	.01	.07	-.02	-.03	-.01	.00
with all predictors	—	.05*	-.01	-.03	-.03	-.00
<b>Perceived support</b>						
Satisfied	-.01	-.01	-.00	-.00	-.00	.02
with <i>g</i>	—	-.01	.01	.00	.01	.00

Table 3. Continued

	<i>g</i>	Vocab	Reasoning	Space	Memory	Speed
with education	-.01	-.00	-.00	-.00	.00	.02
with health limits	-.02	-.02	-.01	-.01	-.01	.01
with SS	-.05	-.04	-.03	-.03	-.01	.01
with all predictors	—	-.01	.00	-.00	.01	.01
Anticipated	.14**	.12**	.15**	.09**	.10**	.08**
with <i>g</i>	—	-.01	.02	-.02	.01	.02
with education	.09**	.07**	.10**	.06*	.07*	.06*
with health limits	.13**	.11**	.14**	.09**	.09**	.07**
with SS	.11**	.06	.14**	.08*	.07*	.08*
with all predictors	—	-.05*	.04*	.00	-.01	.03
Negative	-.15**	-.12**	-.14**	-.15**	-.08**	-.07**
with <i>g</i>	—	.02	-.01	-.03	.02	.00
with education	-.10**	-.07**	-.10**	-.11**	-.05	-.05*
with health limits	-.14**	-.11**	-.13**	-.14**	-.07**	-.06**
with SS	-.14**	-.12**	-.14**	-.13**	-.08**	-.05*
with all predictors	—	.01	-.01	-.03	.01	.02

Notes. Each additional row represents the inclusion of that covariate only to the original analysis, with the exception of the final row. SS = social support.  
\* $p < .01$ . \*\* $p < .001$ .

**Table 4.** Standardized Regression Coefficients Predicting Each Measure of Social Support From Age, Sex, Age<sup>2</sup>, and Their Interactions

	Age	Sex	Age*Sex	Age <sup>2</sup>	Age <sup>2</sup> *Sex
Social contact					
With family	.01	.16**	-.09*	.09**	-.02
With friends	-.15**	.11**	.09*	.10**	-.01
Received support					
Emotional	-.09*	.24**	-.04	-.04	-.02
Tangible	-.12**	.07**	.01	.05	.01
Informational	-.15**	.13**	-.06	-.04	-.01
Provided support					
Emotional	-.17**	.27**	-.03	-.08**	-.02
Tangible	-.10*	.00	-.10*	-.08**	-.00
Informational	-.18**	.13**	-.08	-.09**	.01
Perceived support					
Satisfied	.13**	.00	-.08	.00	-.05
Anticipated	.12*	.04	-.12*	-.00	-.03
Negative	-.29**	.03	-.01	-.05	.01

Note. \* $p < .01$ . \*\* $p < .001$ .

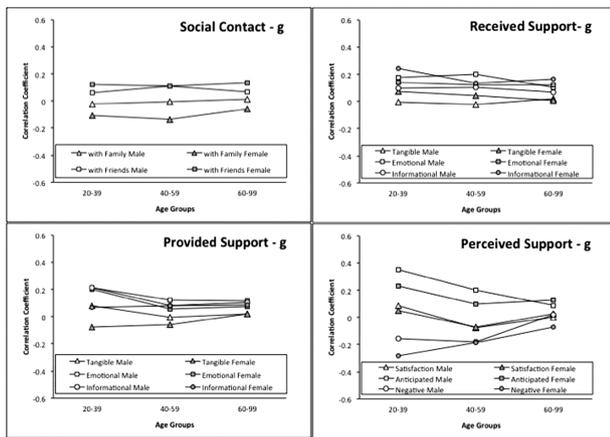
for the contact measures and more negative age effects at older ages for provided support. Women had significantly higher ratings in all aspects of social support except for tangible provided support, satisfaction with support, anticipated support, and negative interactions. Finally, the interaction of age and sex significantly predicted contact with family, contact with friends, provided support, and anticipation of support. The interactions with contact reflected more negative age relations for women than for men in contact with family, but the opposite was the case for contact with friends. The age relations were more negative in women than in men for tangible provided

support and were more positive in men than in women for anticipated perceived support.

### Moderation of Age and Sex

To evaluate the role of individual differences, interactions between each aspect of support with age, sex, and age & sex were included as predictors of *g* and each cognitive ability. The only significant interactions were age with negative interactions and with received emotional support in predicting memory before controlling for *g*. Figure 1 presents the relations between each aspect of social support and *g* for men and women in three age groups and shows that the magnitude of these relations were generally comparable across conditions. With the exception of an interaction of negative interactions with age and with sex for space and between contact with family and age for speed, none of the interactions for specific aspects of social support were significant for specific aspects of cognition after controlling for the influence of *g*. All relations explained less than 1% of variance.

The majority of interactions after controlling for each covariate were nonsignificant, and all explained less than 1% of the variance. Age and anticipated support predicted *g* with health limits controlled. Age, sex, and informational support predicted space with general social support controlled. Sex and contact with friends predicted memory with general social support controlled. Emotional received support and age predicted memory with education, health limits, or general social support controlled. Emotional provided support and age predicted memory with education controlled. Anticipated support interacted with age predicting memory with education or health limits controlled. Age and the interaction of age and sex interacted with family



**Figure 1.** Correlation coefficients between each measure of social support and *g* for three age groups and for both genders. Sample sizes ranged from 127 and 637 with *SEs* between 0.04 to 0.09.

contact in predicting speed when general social support was controlled. When all covariates were included, age interacted with contact with family in predicting speed and with negative interactions in predicting space.

In summary, specific aspects of social support had different patterns of relations with cognition, although these relations were generally with *g* and not specific abilities. Although age and sex did influence aspects of social support, they did not notably moderate support–cognition relations.

### Discussion

The aim of present study was to evaluate the relationships between multiple aspects of social support and cognitive abilities taking into consideration age and sex. The results of the present study suggest that specific aspects of social support have different patterns of relations with cognition and that their relations are primarily with *g*. Finally, although age and sex were associated with social support, neither age nor sex influenced support–cognition relations.

The first goal of interest was to evaluate which aspects of social support were related to cognition. Social contact with family was negatively related to vocabulary, and relations were weakened by the inclusion of education, potentially because of the increased number of negative interactions reported in familial relations (Akiyama et al., 2003) or a third variable. Similarly, the positive relations between *g* and contact with friends were basically eliminated by the inclusion of education. Potentially, those with less education may need to cohabit with family, whereas those with more are able to spend more time with friends. In addition, the increased negative patterns for contact with family and the almost complete elimination of positive relations for contact with friends after controlling for the general social support factor suggest that the positive qualities of contact are a result of other types of support that co-occur with contact (Amieva et al., 2010; Seeman et al., 2001).

Emotional and informational received support positively predicted cognition. Received support may ameliorate stress, which can benefit cognition (Dickinson, Potter, Hybels, McQuoid, & Steffens, 2011). In addition, informational support could promote positive health behaviors (Holtzman et al., 2004), although self-reported health limits did not notably reduce patterns. Tangible support was unrelated to cognitive abilities, and controlling for general support resulted in negative relations with certain cognitive abilities. These results are consistent with reports that tangible support can be less nurturing and more controlling than emotional support (Uchino, 2009; Uchino et al., 2011). In addition, individuals requiring tangible support may suffer from health conditions that negatively impact cognition, although again the inclusion of health limits did not notably impact relations.

Emotional and informational provided support were positively related to cognition, but tangible support was not. Piferi and Lawler (2006) demonstrated that provided support is associated with better health and self-efficacy, which could benefit cognition. However, self-reported health limits did not notably reduce relations whereas education did, suggesting that well-educated individuals may be more able to provide support and perform well cognitively. The inclusion of general social support as a predictor also reduced relations, suggesting that the benefits of provided support are due to other support aspects. Our findings that those benefits found are limited to emotional and informational support and that controlling for general social support resulted in negative relations between tangible support and cognition are consistent with reports that extreme caregiving can have negative health consequences (Vitaliano et al., 2003).

Negative interactions and anticipation of support negatively and positively predicted cognitive performance. Krueger and colleagues (2009) suggested that the relationship between perceived support and cognition may be a result of improved problem solving so that those who are better able to problem solve to resolve relationship concerns may perceive those relationships more positively. This explanation fits with findings that older adults with poorer processing speed abilities suffered from more hurt feelings after being rejected (Cheng & Gruhn, 2015) and participants made more progress achieving social goals like emotional closeness on days where their perceived relationship quality was better than usual (Mejia & Hooker, 2014). In addition, improved coping or problem-solving skills may be more salient to reducing negative interactions and the necessity of depending on others in times of need than satisfaction, resulting in no relations for satisfaction with cognition.

The second goal of interest was to understand which cognitive abilities were related to social support. Aspects of social support tended to have comparable patterns of relations across abilities, with the exception of social contact with family. Of particular importance, relations between

social support and specific cognitive abilities were almost entirely eliminated by including *g* as a predictor. These results are consistent with studies where social support had similar patterns of relations across multiple aspects of cognition (Krueger et al., 2009; Seeman et al., 2011) and suggest that future explanations for the relations between support and cognition need to account for both different patterns between aspects of social support and shared relations across cognitive abilities. However, it is important to note that the results of the present study are merely descriptive; although *g* as a statistical phenomenon is well established, its biological underpinnings remain to be determined and we are thus limited in our ability to posit specific mechanisms connecting social support and *g*.

The third goal was to evaluate whether age and sex influenced aspects of support or support–cognition relations. Consistent with previous research (Birditt, Jackey, & Antonucci, 2009; Keyes, 2002; Krause, 1999; Schnittker, 2007; Shaw et al., 2007), levels of contact with friends, received support, and provided support were lower, contact with family was stable, and perceived support was higher with age. These findings are consistent with socioemotional selectivity theory (Carstensen, 1992), which posits that older adults increasingly prune their social networks in favor of fewer but more intimate relationships that promote emotional regulation, resulting in less contact with tangential relationships like friends but similar amounts with family (Shaw et al., 2007), less received and provided support due to the decreased social ties maintained (Keyes, 2002), and higher levels of perceived support because their retained relationships are generally more positive and rewarding.

Levels of social contact, received support, and provided support were generally higher in women, and age and sex interacted for both aspects of social contact. In young adults, men and women have similar levels of contact with friends. However, for older adults, men have much less contact with friends when compared with older women even though both groups had lower levels of contact compared with young adults. This pattern is reversed in contact with family; whereas young women have much higher levels of contact with family than young men, older men and women have much more similar levels of contact with family. These patterns found for social contact, received and provided support likely reflect the fact that women tend to have more complex social networks and receive support from more sources (Antonucci & Akiyama, 1987; Depner & Ingersoll-Dayton, 1988; Fuhrer & Stansfeld, 2002). Presumably, if women find having relationships with nonfamily members more rewarding than men, then they will maintain their contact with those individuals more than men. Older men are more likely to give tangible support, although the pattern is opposite in younger adults. Finally, men tend to anticipate more support with age, whereas women have relatively stable expectations across the life span.

Although age and sex influenced social support levels, they generally did not moderate social support–cognition relations. The relations between each aspect of social support and *g*, the level of cognition with which support appears to be primarily connected, seem comparable across age groups and both sexes (shown in Figure 1). This is in contrast to the results of previous studies where age or sex moderated relations (Beland et al., 2005; Seeman et al., 2011; Thomas, 2011; Zunzunegui et al., 2003) and where social support was related to cognitive decline (Barnes et al., 2004; Ertel et al., 2008; Giles et al., 2012; Holtzman et al., 2004; Zunzunegui et al., 2003). The inclusion of covariates revealed a few interactions generally with specific abilities, but these were weak. Where age interactions occurred, relations were weaker with age, potentially due to the increased number of risk factors (Seeman et al., 2011). Overall, the results of the present study suggest that social support has similar relations with general intelligence across the life span.

The present study has its limitations. The participants performed normally on the MMSE and reported being in good health, and therefore the results presented here cannot be extended to clinical populations. Similarly, because participants were primarily Caucasian and the older adults tended to be well educated, different patterns may be found for other racial or socioeconomic groups. Not all aspects of support were included in the present study; other variables like social network size may have different patterns. The analyses were based on cross-sectional data, and although some explanations for these results posit a directional relationship between social support and cognition, neither directionality nor causality can be determined based on the present analysis.

In conclusion, our findings demonstrate that specific aspects of social support are positively related to *g* across different types of people. These results could inform future studies evaluating social support as an intervention for cognition, as our study demonstrates which aspects of social support could have benefit cognition for people of any age or sex.

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## Conflict of Interest

There are no conflicts of interests.

## References

- Akiyama, H., Antonucci, T., Takahashi, K., & Langfahl, E. S. (2003). Negative interactions in close relationships across the life span.

- Journal of Gerontology: Psychological Sciences*, 58B, 70–79. doi:10.1093/geronb/58.2.P70
- Amieva, H., Stoykova, R., Matharan, F., Helmer, C., Antonucci, T. C., & Dartigues, J. F. (2010). What aspects of social network are protective for dementia? Not the quantity but the quality of social interactions is protective up to 15 years later. *Psychosomatic Medicine*, 72, 905–911. doi:10.1097/PSY.0b013e3181f5e121
- Antonucci, T. C., & Akiyama, H. (1987). An examination of sex differences in social support among older men and women. *Sex Roles*, 17, 737–749. doi:10.1007/bf00287685
- Arbuckle, T. Y., Gold, D. P., Andres, D., Schwartzman, A., & Chaikelson, J. (1992). The role of psychosocial context, age, and intelligence in memory performance of older men. *Psychology and Aging*, 7, 25–36. doi:10.1037/0882-7974.7.1.25
- Barnes, L. L., Mendes de Leon, C. F., Wilson, R. S., Bienias, J. J., & Evans, D. A. (2004). Social resources and cognitive decline in a population of older African Americans and whites. *Neurology*, 63, 2322–2326. doi:10.1037/e504022006-001
- Barrera, M. (1986). Distinctions between social support concepts, measures, and models. *American Journal of Community Psychology*, 14, 413–445. doi:10.1007/bf00922627
- Beland, F., Zunzunegui, M. V., Alvarado, B., Otero, A., & del Ser, T. (2005). Trajectories of cognitive decline and social relations. *Journal of Gerontology: Psychological Sciences*, 60, 320–330. doi:10.1093/geronb/60.6.p320
- Bennett, G. K., Seashore, H. G., & Wesman, A. G. (1997). *Differential aptitude test*. San Antonio, TX: The Psychological Corporation.
- Birditt, K. S., Jackey, L. M. H., & Antonucci, T. C. (2009). Longitudinal patterns of negative relationship quality across adulthood. *Journal of Gerontology: Psychological Sciences*, 64, 55–64. doi:10.1093/geronb/gbn031
- Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies*. New York, NY: Cambridge University Press. doi:10.1017/CBO9780511571312
- Carstensen, L. L. (1992). Social and emotional patterns in adulthood: Support for socioemotional selectivity theory. *Psychology and Aging*, 7, 331–338. doi:10.1037/0882-7974.7.3.331
- Cheng, Y., & Gruhn, D. (2015). Age differences in reactions to social rejection: The role of cognitive resources and appraisals. *Journal of Gerontology: Psychological Sciences and Social Sciences*, 70, 830–839. doi:10.1093/geronb/gbu054
- Depner, C. E. & Ingersoll-Dayton, B. (1988). Supportive relationships in later life. *Psychology and Aging*, 3, 348–357. doi:10.1037/0882-7974.3.4.348
- Dickinson, W. J., Potter, G. G., Hybels, C. F., McQuoid, D. R., & Steffens, D. C. (2011). Change in stress and social support as predictors of cognitive decline in older adults with and without depression. *International Journal of Geriatric Psychiatry*, 26, 1267–1274. doi:10.1002/gps.2676
- Ekstrom, R. B., French, J. W., Harman, H. H., & Dermen, D. (1976). *Manual for kit of factor-referenced cognitive tests*. Princeton, NJ: Educational Testing Service.
- Ertel, K. A., Glymour, M. M., & Berkman, L. F. (2008). Effects of social integration on preserving memory function in a nationally representative US elderly population. *American Journal of Public Health*, 98, 1215–1220. doi:10.2105/AJPH.2007.113654
- Fiori, K. L., Smith, J., & Antonucci, T. C. (2007). Network types among older adults: A multidimensional approach. *Journal of Gerontology: Psychological Sciences*, 62, 322–330. doi:10.1093/geronb/62.6.p322
- Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). “Mini-mental state”. A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, 12, 189–198. doi:10.1002/(SICI)1099-1166(199805)13:5<285::AID-GPS753>3.0.CO;2-V
- Fuhrer, R. & Stansfeld, S. A. (2002). How gender impacts patterns of social relations and their impact on health: A comparison of one or multiple sources of support from “close persons”. *Social Science & Medicine*, 54, 811–825. doi:10.1016/s0277-9536(01)00111-3
- Giles, L. C., Anstey, K. J., Walker, R. B., & Luszcz, M. A. (2012). Social networks and memory over 15 years of followup in a cohort of older Australians: Results from the Australian Longitudinal Study of Ageing. *Journal of Aging Research*, 2012, 856048. doi:10.1155/2012/856048
- Gottfredson, L. S. (1998). The general intelligence factor. *Scientific American Presents*, 9, 24–29.
- Holtzman, R. E., Rebok, G. W., Saczynski, J. S., Kouzis, A. C., Doyle, K. W., & Eaton, W. W. (2004). Social network characteristics and cognition in middle-aged and older adults. *The Journals of Gerontology: Psychological Sciences*, 6, 278–284. doi:10.1093/geronb/59.6.p278
- Huxhold, O., Miche, M., Schuz, B. (2013). Benefits of having friends in older ages: Differential effects of informal social activities on well-being in middle-aged and older adults. *Journals of Psychological and Social Sciences*, 69, 366–375. doi:10.1093/geronb/gbt029
- Hughes, T. F., Andel, R., Small, B. J., Borenstein, A. R., & Mortimer, J. A. (2008). The association between social resources and cognitive change in older adults: Evidence from the Charlotte county healthy aging study. *The Journals of Gerontology: Psychological Sciences*, 62, 241–244. doi:10.1093/geronb/63.4.p241
- Keyes, C. L. M. (2002). The exchange of emotional support with age and its relations with emotional well-being by age. *The Journals of Gerontology: Psychological Sciences*, 57, 518–525. doi:10.1093/geronb/57.6.p518
- Krause, N. (1999). Assessing change in social support during late life. *Research on Aging*, 21, 539–569. doi:10.1177/0164027599214002
- Krueger, K. R., Wilson, R. S., Kamenetsky, J. M., Barnes, L. L., Bienias, J. L., & Bennett, D. A. (2009). Social engagement and cognitive function in old age. *Experimental Aging Research*, 35, 45–60. doi:10.1080/03610730802545028
- Landes, A. M., Sperry, S. D., Strauss, M. E., & Geldmacher, D. S. (2001). Apathy in Alzheimer’s disease. *Journal of American Geriatrics Society*, 49, 1700–1707. doi:10.1046/j.1532-5415.2001.49282.x
- McLaughlin, D., Vagenas, D., Pachana, N. A., Begum, N., & Dobson, A. (2010). Gender differences in social network size and satisfaction in adults in their 70s. *Journal of Health Psychology*, 15, 671–679. doi:10.1177/1359105310368177
- Mejia, S. T., & Hooker, K. (2014). Relationship processes within the social convoy: Structure, function, and social goals. *Journal of Gerontology, Series B: Psychological Sciences and Social Sciences*, 69, 376–396. doi:10.1093/geronb/gbt011
- Piferi, R. L., & Lawler, K. A. (2006). Social support and ambulatory blood pressure: An examination of both receiving and

- giving. *International Journal of Psychophysiology*, 62, 328–336. doi:10.1016/j.ijpsycho.2006.06.002
- O'Reilly, P. (1988). Methodological issues in social support and social network research. *Social Science & Medicine*, 26, 863–873. doi:10.1016/0277-9536(88)90179-7
- Raven, J. (1962). *Advanced Progressive matrices, set II*. London: H. K. Lewis.
- Salthouse, T. A. (1993). Speed and knowledge as determinants of adult age differences in verbal tasks. *The Journals of Gerontology: Psychological Sciences*, 48, 29–36. doi:10.1093/geronj/48.1.p29
- Salthouse, T. A. (2009). When does age-related cognitive decline begin? *Neurobiology of Aging*, 30, 507–514. doi:10.1016/j.neurobiolaging.2008.09.023
- Salthouse, T. A. (2012). Psychometric properties of within-person across-session variability in accuracy of cognitive performance. *Assessment*, 19, 494–501. doi:10.1177/1073191112438744
- Salthouse, T. A., & Babcock, R. L. (1991). Decomposing adult age differences in working memory. *Developmental Psychology*, 27, 763–776. doi:10.1037/0012-1649.27.5.763
- Salthouse, T. A., & Ferrer-Caja, E. (2003). What needs to be explained to account for age-related effects on multiple cognitive variables? *Psychology and Aging*, 18, 91–110. doi:10.1037/0882-7974.18.1.91
- Salthouse, T. A., Fristoe, N., & Rhee, S. H. (1996). How localized are age-related effects on multiple cognitive variables? *Psychology and Aging*, 11, 91–110. doi:10.1037/0894-4105.11.2.272
- Schnitker, J. (2007). Look (closely) at all the lonely people: Age and the social psychology of social support. *Journal of Aging and Health*, 19, 659–682. doi:10.1177/0898264307301178
- Seeman, T. E., Lusignolo, T. M., Albert, M., & Berkman, L. (2001). Social relationships, social support, and patterns of cognitive aging in healthy, high-functioning older adults: MacArthur studies of successful aging. *Health Psychology*, 20, 243–255. doi:10.1037/0278-6133.20.4.243
- Seeman, T. E., Miller-Martinez, D. M., Merkin, S. S., Lachman, M. E., Tun, P. A., & Karlamangla, A. S. (2011). Histories of social engagement and adult cognition: Midlife in the U.S. Study. *The Journals of Gerontology, Series B: Psychology Sciences and Social Sciences*, 66, 141–152. doi:10.1093/geronb/gbq091
- Shaw, B., Krause, N., Liang, J., & Bennett, J. (2007). Tracking changes in social relations throughout late life. *The Journals of Gerontology: Social Sciences*, 62B, 90–99. doi:10.1093/geronb/62.2.s90
- Stoykova, R., Matharan, F., Dartigues, J.-F., & Amieva, H. (2001). Impact of social network on cognitive performances and age-related cognitive decline across a 20-year follow-up. *International Psychogeriatrics*, 23, 1405–1412. doi:10.1017/s1041610211001165
- Thomas, P. A. (2011). Gender, social engagement, and limitations in late life. *Social Science & Medicine* (1982), 73, 1428–1435. doi:10.1016/j.socscimed.2011.07.035
- Uchino, B. N. (2009). Understanding the links between social support and physical health: A life-span perspective with emphasis on the separability of perceived and received support. *Perspectives on Psychological Science*, 4, 236–255. doi:10.1111/j.1745-6924.2009.01122.x
- Uchino, B. N., Carlisle, M., Birmingham, W., & Vaughn, A. A. (2011). Social support and the reactivity hypothesis: Conceptual issues in examining the efficacy of received support during acute psychological stress. *Biological Psychology*, 86, 137–142. doi:10.1016/j.biopsycho.2010.04.003
- van Tilburg, T. (1998). Losing and gaining in old age: Changes in personal network size and social support in a four-year longitudinal study. *Journal of Gerontology: Social Sciences*, 53, 313–323. doi:10.1093/geronb/53b.6.s313
- Vitaliano, P. P., Zhang, J., & Scanlan, J. M. (2003). Is caregiving hazardous to one's physical health? A meta-analysis. *Psychological Bulletin*, 129, 946–972. doi:10.1037/0033-2909.129.6.946
- Wechsler, D. (1997a). *Wechsler Adult Intelligence scale (3rd ed)*. San Antonio, TX: The Psychological Corporation.
- Wechsler, D. (1997b). *Wechsler Memory Scale (3rd ed.)*. San Antonio, TX: The Psychological Corporation.
- Woodcock, R. W., & Johnson, M. B. (1990). *Woodcock-Johnson Psycho-Educational Battery-Revised*. Chicago, IL: Riverside.
- Ybarra, O., Burnstein, E., Winkielman, P., Keller, M. C., Manis, M., Chan, E., & Rodriguez, J. (2008). Mental exercising through simple socializing: Social interaction promotes general cognitive functioning. *Personality & Social Psychology Bulletin*, 34, 248–259. doi:10.1177/0146167207310454
- Yeh, S. C., & Liu, Y. Y. (2003). Influence of social support on cognitive function in the elderly. *BMC Health Services Research*, 3, 9. doi:10.1186/1472-6963-3-9
- Zachary, R. A. (1986). *Shipley Institute of Living Scale-Revised*. Los Angeles, CA: Western Psychological Services. doi:10.1007/978-0-387-79948-3\_1070
- Zunzunegui, M.-V., Alvarado, B. E., Del Ser, T., & Otero, A. (2003). Social networks, social integration, and social engagement determine cognitive decline in community-dwelling Spanish older adults. *The Journals of Gerontology: Social Sciences*, 58, 93–100. doi:10.1093/geronb/58.2.s93