



Social support, verbal interaction, and cognitive function among middle-aged and older adults in the Wisconsin Registry for Alzheimer's Prevention (WRAP)



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INTRODUCTION

Background

Evidence suggests that higher levels of social activity are associated with better cognitive function and reduced Alzheimer's disease (AD). Such activity represents a confluence of social support and verbal interaction, which likely influence cognition through mechanistically distinct pathways. Most studies to date have assumed a strong relationship between verbal interaction and level of perceived social support, and often explain the reduced risk for decline through models of stress and coping. However, few studies have attempted to address other positive or negative effects of social activity, such as the role that interaction may play in providing neuronal stimulation.

Objective

We examined *independent* relationships between both dimensions of social activity and test performance in six distinct cognitive domains (speed and flexibility, verbal learning and memory, immediate memory, working memory, visual learning and memory, and story recall) among late middle-aged adults enrolled in the Wisconsin Registry for Alzheimer's Prevention (WRAP).

METHODS

Study Design

Longitudinal population-based Wisconsin Registry for Alzheimer's Prevention study (WRAP). The sample is enriched for a family history of late-onset AD.

Measurements

• **Outcome:** Standardized factor scores representing six cognitive domains

• **Main predictors:** Standardized index scores for 1) Perceived availability of social support, and 2) Quantity of time engaged in face-to-face verbal interaction with other people each week

• **Covariates:** Age, gender, ethnicity, education, APOE ε4 status, parental history of AD, BMI, physical activity, smoking status, partner status, and quality of verbal interactions

Table 1. Sample characteristics at earliest visit (N=1,052)

Variable	Mean (SD) or %	Range
Age, years	60.2 (6.7)	40 - 78
Gender, female	69%	
Race, non-white	5%	
Family history of AD	72%	
Education		
High school/GED	9%	
Some college	28%	
College degree	20%	
Postcollege	43%	
APOE ε4 carrier	39%	
Partner, yes	77%	
Social support, index (0-36)	28.9 (6.8)	0-36
Interaction quantity, hrs/wk*	19.7 (15.6)	0.25 - 81.3

*Verbal interaction data winsorized at 99th percentile (original range: 0.25 - 130.9 hrs/wk)

Statistical Analysis

• Mixed-effects regression models assessed individual effects of each sociobehavioral predictor variable, adjusting for participant demographics, APOE ε4 status, and parental history of AD.
• In secondary analyses, measures of lifestyle (e.g., physical activity, smoking, and partner status) as well as a control for verbal interaction quality were included in all models.

RESULTS

Primary findings

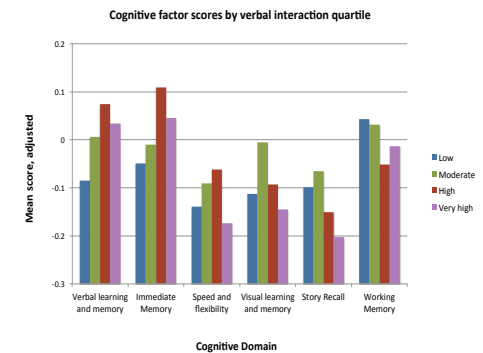
Table 2. Coefficients for regression of six cognitive factor scores on perceived social support

	Model 1 (Demographics)	Model 2 (+ Lifestyle)	Model 3 (+ Partner)	Model 4 (+ Int'n Quality)
	β (p)	β (p)	β (p)	β (p)
Speed and flexibility	0.09 (<0.001) →	0.08 (0.002) →	0.07 (0.01) →	0.05 (0.03)
Verbal learning and memory	0.05 (0.06)	0.04 (0.14)	0.02 (0.50)	0.03 (0.35)
Immediate memory	0.07 (0.01) →	0.06 (0.04) →	0.03 (0.29)	0.04 (0.21)
Working memory	0.05 (0.06)	0.04 (0.13)	0.03 (0.33)	0.02 (0.46)
Visual learning and memory	0.04 (0.12)	0.03 (0.24)	0.01 (0.72)	0.01 (0.62)
Story recall	0.04 (0.15)	0.03 (0.63)	0.03 (0.31)	0.03 (0.23)

Significant relationships between perceived social support and cognitive test performance were only seen within the domain of speed and flexibility once key social covariates were added to models (Table 2).

In early analyses, a significant association was seen between a squared verbal interaction term and cognitive test performance ($\beta = -0.05$, $p = 0.04$) implying a non-linear relationship. Indicator variables were created to represent quartiles of verbal interaction quantity: low (<9 hrs/wk), moderate (9-15 hrs/wk), high (15-25 hrs/wk) and very high (>25 hrs/wk).

- "High" levels of verbal interaction were associated with better performance on tests of verbal learning and memory in fullest models ($\beta = 0.16$, $p = 0.02$)
- Pattern of association repeated across multiple cognitive domains (Figure 1)



CONCLUSIONS

- Perceived social support is positively associated with processing speed but not memory in models accounting for health and lifestyle factors.
- Quantity of verbal interaction is positively associated with verbal learning and memory and this relationship is independent of perceived social support and valence of interactions.
- Relationship between verbal interaction quantity and test performance is non-linear, with a possible threshold effect (>15 hrs/wk) and decline in performance at highest levels of interaction (>25 hrs/wk).