



Does loneliness mediate the relation between social support and cognitive functioning in later life?



Lea Ellwardt^{a,*}, Marja Aartsen^b, Dorly Deeg^b, Nardi Steverink^{a,c}

^a University of Groningen, Department of Sociology and Interuniversity Center for Social Science Theory and Methodology (ICS), Grote Rozenstraat 31, 9712 TG Groningen, The Netherlands

^b VU University Amsterdam, Department of Sociology, De Boelelaan 1081, 1081 HV Amsterdam, The Netherlands

^c Section Health Psychology, Department of Health Sciences, University Medical Center Groningen, University of Groningen, The Netherlands

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ABSTRACT

Research in gerontology has demonstrated mixed effects of social support on cognitive decline and dementia: Social support has been shown to be protective in some studies, but not in others. Moreover, little is known about the underlying mechanisms between social support and cognitive functioning. We investigate one of the possible mechanisms, and argue that subjective appraisals rather than received amounts of social support affect cognitive functioning. Loneliness is seen as an unpleasant experience that occurs when a person's network of relationships is felt to be deficient in some important way. As such, loneliness describes the extent to which someone's needs are not being met and thus provides a subjective assessment of support quality. We expect that receiving instrumental and emotional support reduces loneliness, which in turn preserves cognitive functioning. Data are from the Longitudinal Aging Study Amsterdam (LASA) and include 2255 Dutch participants aged 55–85 over a period of six years. Respondents were measured every three years. Cognitive functioning was assessed with the Mini-Mental State Examination (MMSE), the Coding Task, and the Raven's Coloured Progressive Matrices. The analytical approach comprised latent growth mediation models. Frequent emotional support related to reduced feelings of loneliness and better cognitive functioning. Increases in emotional support also directly enhanced cognitive performance. The protective effect of emotional support was strongest amongst adults aged 65 years and older. Increase in instrumental support did not buffer cognitive decline, instead there were indications for faster decline. After ruling out the possibility of reversed causation, we conclude that emotional support relationships are a more powerful protector of cognitive decline than instrumental support relationships.

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Introduction

Population aging and increased life-expectancy have been challenging modern societies with age-related diseases such as dementia and Alzheimer's disease. In 2005, approximately 24 million people suffered from dementia worldwide, and this number is expected to exceed 80 million by 2040 (Ferri et al., 2005). The vast burden of dementia thus calls for identifying determinants of cognitive disabilities, so that policy and preventive programs can be further developed.

Along with biological, physiological and psychological markers, integration into supportive social networks is believed to be an important determinant of health and cognitive aging (Barnes,

Mendes de Leon, Wilson, Bienias, & Evans, 2004; Bassuk, Glass, & Berkman, 1999; Berkman, Glass, Brissette, & Seeman, 2000; Ertel, Glymour, & Berkman, 2008; Wang, Karp, Winblad, & Fratiglioni, 2002). Individuals who are lonely have double the risk of developing Alzheimer's disease, and generally experience more rapid cognitive decline than individuals who are connected socially (Amieva et al., 2010; Wilson et al., 2007).

However, a considerable research body in gerontology has demonstrated mixed effects of social support on cognitive functioning. Empirical findings suggest that the quality rather than the quantity is protective of cognitive decline (Krueger et al., 2009), and that emotional support seems to have more beneficial effects than instrumental support (Amieva et al., 2010; Glymour, Weuve, Fay, Glass, & Berkman, 2008; Holtzman et al., 2004; Seeman, Lusignolo, Albert, & Berkman, 2001).

The underlying mechanisms between social support and cognitive functioning have hardly been unraveled both in

* Corresponding author.

E-mail addresses: Lellwardt@rug.nl, leallwardt@gmail.com (L. Ellwardt), m.j.aartsen@vu.nl (M. Aartsen), djh.deeg@vumc.nl (D. Deeg), b.j.m.steverink@umcg.nl (N. Steverink).

theoretical and empirical terms. Because severe loneliness has consistently been found to be associated with impaired cognitive functioning (Cacioppo & Hawkley, 2009; Holmen, Ericsson, & Winblad, 2000; Wilson et al., 2007), it may be a stronger predictor than received amounts of social support. We expect that the mechanism is an indirect one, specifically that outcomes of cognitive functioning are explained by *perceived* rather than *received* quality of social support. A useful indicator of perceived support quality is loneliness (Bernardon, Babb, Hakim-Larson, & Gragg, 2011), broadly defined as the perception of the extent to which social needs are met by others. The objective of this study is to test whether a potential relation between received social support and cognitive functioning is mediated by loneliness.

We employ an advanced analytical approach and use data from the Longitudinal Aging Study Amsterdam (LASA), including 2255 subjects aged 55–85 over a period of six years. Using latent growth mediation models we are able to investigate cross-sectional associations of social support with initial levels of loneliness and cognition. Furthermore, we test longitudinal associations with changes in social support and changes in loneliness and cognition. We also address the possibility of reversed causality, because previous research indicated that change in support networks may follow from cognitive decline (Aartsen, Van Tilburg, Smits, & Knipscheer, 2004).

Theory and evidence

Social support

Research on the relation between cognitive functioning and support typically distinguishes between emotional and instrumental support (Berkman et al., 2000), with the first type referring to the amount of caring and understanding from others (e.g., talking about feelings), and the second type to receiving help, aid or assistance with tangible needs and daily activities (e.g., cooking meals, filling in forms, repairing things). Both types of support may be embedded in the same social relationship.

Scholars in gerontology widely agree that integration into support networks prevents from cognitive decline, postpones the onset of dementia, and buffers the progression of Alzheimer's disease (Bennett, Schneider, Tang, Arnold, & Wilson, 2006; Hultsch, Hertzog, Small, & Dixon, 1999; James, Wilson, Barnes, & Bennett, 2011; Wang et al., 2002; Zunzunegui, Alvarado, Del Ser, & Otero, 2003). Involvement in supportive relationships is argued to preserve cognitive capacities, such as episodic memory, working memory and perceptual speed. Preservation is facilitated directly through enhanced brain stimulation, and indirectly through lowered stress reactivity and vulnerability in older adults (Dickinson, Potter, Hybels, McQuoid, & Steffens, 2011; Fratiglioni, Paillard-Borg, & Winblad, 2004; Wilson, Begeny, Boyle, Schneider, & Bennett, 2011), and improved coping with critical life-events and healthy behaviors (Duncan & McAuley, 1993). These findings suggest that social support is one of the determinants of cognitive functioning, and that individuals with more social support experience slower rates of cognitive decline.

However, empirical evidence demonstrates a large variability in effects. Quite consistent positive associations with multiple indicators of cognitive functioning have been found for emotional support, both in cross-sectional and longitudinal studies (Glymour et al., 2008; Krueger et al., 2009; Seeman et al., 2001). In contrast, a mix of positive and negative associations has been shown for instrumental support (Dickinson et al., 2011; Seeman et al., 2001). In a study by Newsom, Rook, Nishishiba, Sorkin, and Mahan (2005), participants frequently receiving emotional support evaluated social exchanges more positively, whereas participants with frequent

instrumental support reported greater distress. Note that these effects were shown independent of physical functioning, chronic diseases, and co-morbidity. Altogether evidence on the protective effects of support relationships against cognitive decline mainly rests on research using emotional support.

The above discussion emphasizes that when we want to explain cognitive functioning in older adults we should not rely on quantitative indicators (e.g. number of support relationships) but on type and quality of the support received (Uchino, 2009).

Loneliness

In their recent review, Uchino, Bowen, Carlisle, & Birmingham (2012) conclude that health does not directly improve through receipt of social support but indirectly through positive perceptions of support. Poor evaluations of support are assumed to have detrimental consequences for mental health and cognitive functioning. A crucial marker of unfavorably evaluated support and deficits in social relationships is loneliness (Heinrich & Gullone, 2006; O'Donovan & Hughes, 2007; Pinquart & Sörensen, 2001), defined as a "distressing feeling that accompanies the perception that one's social needs are not being met by the quantity or especially the quality of one's social relationships" (Hawkley & Cacioppo, 2010: 218). It implies that some people may lead relatively rich social lives but feel lonely nevertheless.

Yet, researchers often agree that amongst other factors receiving much support counteracts loneliness (Bernardon et al., 2011; Cacioppo, Hawkley, & Thisted, 2010; Newcomb & Bentler, 1986; Van Tilburg, 1990). Several intervention studies have shown that stimulating friendships (Pitkala, Routasalo, Kautiainen, Sintonen, & Tilvis, 2011; Stevens & Van Tilburg, 2000) and increasing support in social networks (Winningham & Pike, 2007) are successful means to reduce loneliness and eventually improve older people's cognitive functioning (Masi, Chen, Hawkley, & Cacioppo, 2011).

Once loneliness occurs it has serious consequences for emotion, behavior, morbidity and cognition. It has been associated with cognitive impairment, accelerated cognitive decline and elevated risks of Alzheimer's disease (Cacioppo & Hawkley, 2009; Holmen et al., 2000; Tilvis, Pitkala, Jolkkonen, & Strandberg, 2000; Wilson et al., 2007), even after controlling for amount of social support (Gow, Pattie, Whiteman, Whalley, & Deary, 2007) and ruling out the possibility of reverse causation.

Several mechanisms have been made responsible for these negative consequences. Biological theories state that mental disorders emerge from a chemical imbalance in the brain, caused by too much or too little activity of certain neurotransmitters and hormones. For instance, the monoamine hypothesis views depression as a result of underactivity of monoamine transmitters (Hirschfeld, 2000). Another example is the glucocorticoid cascade hypothesis, which claims that chronic stress affects aging brains more severely than younger brains. With advancing age, responses to stressful situations are characterized by cascaded release of stress hormones (glucocorticoids), which frequently cause loss in hippocampal neurons (Sapolsky, Krey, & McEwen, 1986). These proposed mechanisms, however, do not account for psychosocial pathways.

There is substantiated evidence that loneliness is often accompanied by social withdrawal and lessened regional brain activation (Baumeister, Twenge, & Nuss, 2002; Cacioppo, Norris, Decety, Monteleone, & Nusbaum, 2009), increased blood pressure and risk of cardiovascular diseases, elevated cortisol and stress levels (Hawkley, Burleson, Berntson, & Cacioppo, 2003), impaired sleep quality (which causes memory problems), heightened feelings of depression and anxiety, and increased vulnerability (Hawkley & Cacioppo, 2010). Lonely individuals are also less able to optimize positive emotional states and self-regulate their behavior. Social

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