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Research Article

Actor and Partner Effect of Loneliness on Episodic Memory and Verbal Fluency: A Dyadic Multilevel Analysis of Romantic Couples Across 28 Countries

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Abstract

Objectives: There is evidence that loneliness is detrimental to cognitive health. Most studies, however, do not consider the association between loneliness and cognition in the context of close relationships, such as a spouse or romantic partner. This study examines loneliness, experienced by both the individual and their romantic partner, and cognitive performance.
Methods: Data were from 24,689 opposite-sex couples (49,378 participants) from 28 countries in the Survey of Health, Aging and Retirement in Europe. Each couple participant reported loneliness and completed memory and verbal fluency tasks. A multilevel sex-stratified analysis was used to account for the nested data structure and evaluate actor and partner effects of loneliness on cognitive performance for male and female partners.
Results: Consistent with the literature, there were small actor effects of loneliness on memory and verbal fluency for both males and females: A person's own loneliness was associated negatively with their cognitive performance on both tasks. There were also small partner effects: A person with a partner who was lonely tended to have worse cognitive performance above and beyond their own loneliness. Actor and partners effects were similar for male and female partners, replicated in most countries, and generally held controlling for age, education, household size, and disease burden. For memory, loneliness effects were slightly stronger among older participants.
Discussion: Both the experience of loneliness and loneliness of a partner have a negative association with cognitive health.

Keywords: Actor loneliness, Cognitive function, Dyads, Partner loneliness, Romantic relationship

Loneliness is a concern for all age groups, including older adults (National Academies of Sciences, Engineering, and Medicine, 2020). Feeling lonely—which differs from being alone—is associated with increased risk for numerous health problems in middle and older adulthood (Hawkley & Cacioppo, 2010; National Academies of Sciences, Engineering, and Medicine, 2020), including cardiovascular problems (e.g., Valtorta et al., 2018), immune dysfunction (Shiovitz-Ezra & Parag, 2019), impaired sleep (Segrin & Burke, 2015), depression (Cacioppo et al., 2010), and even premature death (Holt-Lunstad et al.,

2015). More recently, researchers have identified loneliness as one of the top risk factors for late-life dementia (Weiss et al., 2020; see also Lara, Martín-María et al., 2019; Sundström et al., 2020; Sutin et al., 2020) and other cognitive impairments (Luchetti et al., 2020), independent of the effects of objective isolation (e.g., being unmarried or having few social contacts), health status, and other behavioral and generic risk factors for dementia (Luchetti et al., 2020; Sutin et al., 2020). Loneliness has also been associated with worse performance on tasks across multiple cognitive domains, including memory, verbal fluency, and backward digit span and a faster decline in general cognitive function over three years (Lara, Caballero et al., 2019).

Studies that examined loneliness and cognition have only considered loneliness as an individual experience. Loneliness, however, is a phenomenon that occurs in relational contexts: It can spread from one individual to another (Cacioppo et al., 2009), particularly among close relationships, such as a spouse or romantic partner (Ayalon et al., 2013; Stokes, 2017). Loneliness within spouses tends to be correlated, and such feelings are associated with marital strain and lower perceived support (Ayalon et al., 2013; Ermer et al., 2020; Hsieh & Hawkley, 2018; Stokes, 2017). Hsieh and Hawkley (2018) found that individuals in "aversive" marriages not only feel lonely themselves, but also contribute to their partners' experience of loneliness. Individuals who tend to feel lonely may act negatively toward their spouse, complain, or criticize their partner, behavior that may "induce" loneliness in the other person (Cacioppo et al., 2009; Hsieh & Hawkley, 2018). Individuals within a couple may also face similar circumstances that increase loneliness (i.e., the shared environment hypothesis) or tend to pair with a partner who shares similar levels of loneliness (i.e., the homophily hypothesis; see Cacioppo et al., 2009 and Ermer et al., 2020).

Independent of the mechanisms through which loneliness may spread within married or romantic partners, the experience of loneliness may have dyadic implications for health, and cognition in particular, among middle-aged and older couples. That is, in addition to one's own level of loneliness, the loneliness of one's partner may also have a negative association with cognitive health. There is some support for this hypothesis for health behaviors (e.g., sleep; Segrin & Burke, 2015) and cardiometabolic markers (e.g., HbA1c; Stokes & Barooah, 2021). Thus far, however, no study has examined the association between partner loneliness and cognitive health outcomes. Partner loneliness might be relevant for cognitive health for several reasons. First, a lonely partner may lead to more stressful interactions between spouses (Cacioppo et al., 2009; Hsieh & Hawkley, 2018), with consequences for both partners' cognitive performance (Wilson et al., 2015). Second, a lonely partner may reduce the couple's engagement in social activities and other cognitive stimulating activities, within and outside the household—activities that typically help maintain cognitive function with age (Krueger et al., 2009). Third, couples tend to share health behaviors that undermine health (Wilson et al., 2020) and that are also associated with loneliness (e.g., smoking, physical inactivity, etc.; Christiansen et al., 2016). Loneliness in one partner may affect cognition in the other partner through the shared, deleterious behaviors that result from feeling lonely.

The current study examines the cross-sectional association between loneliness and cognitive function using dyadic data from partnered couples in the Survey of Health, Aging and Retirement in Europe (SHARE). The aim of the study is to examine whether loneliness experienced both by the individual and their romantic partner is associated with cognitive performance. As illustrated in Figure 1, given the previous literature on loneliness and cognition, we hypothesize that the loneliness of Partner A will be associated with their own worse cognitive performance (*actor effect*). We further hypothesize that the loneliness of their partner, Partner B, will be associated negatively with their (Partner A's) cognitive performance (*partner effect*). We use a sex-stratified approach to examine possible differences in actor and partner loneliness associations among males and females, and explore whether these associations with cognition varied by age. We focus on memory and verbal fluency, as performance on these tasks is considered a clinically relevant marker for risk of subsequent cognitive impairment (Josefsson et al., 2019; Sutin et al., 2019).

Method

Participants

This study used data from SHARE, a cross-national multidisciplinary study of adults aged 50 and older and their spouses or romantic partners, regardless of age (Börsch-Supan, 2020, 2021). Data were drawn from 28 countries: France, Hungary, Portugal, and Switzerland from Wave 4 (DOI: 10.6103/SHARE.w4.710), Austria, Belgium, Czech Republic, Denmark, Estonia, Germany, Israel, Luxemburg, the Netherlands, Sweden, and Spain from Wave 5 (DOI: 10.6103/SHARE.w5.710), Croatia, Greece, Italy, and Slovenia from Wave 6 (DOI: 10.6103/SHARE.w6.710), and Bulgaria, Cyprus, Finland, Latvia, Lithuania, Malta, Poland, Romania, and Slovakia from Wave 8 (DOI: 10.6103/SHARE.w8.100). We selected these waves to maximize the number of couples and countries included in the analysis (see Author Note 1). All participants in the analytic sample reported being married or in a committed relationship and lived with their partner at the time of the interview (see Author Note 2). Across the waves, there were 49,378

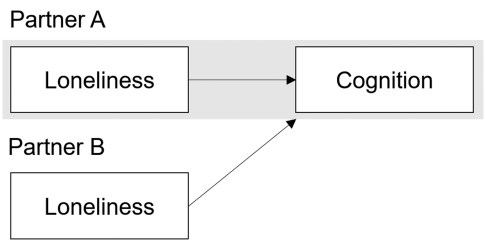

Figure 1. Model of the hypothesized actor and partner effects.

participants (24,689 opposite-sex couples) who had complete data on loneliness, cognitive function (memory and verbal fluency), age, education, and household size (i.e., the number of persons in the household). We excluded couples who had one or both partners with missing data on loneliness and/or cognition, age and/or education, and who reported discordant marital status at the time of the interview (see Supplementary Figure S1, for a diagram of sample selection across waves; see Author Note 3). Because of the small number of same-sex couples in SHARE (n = 37), these couples were not included in the analysis.

SHARE is reviewed and approved by the Ethics Council of the Max Planck Society, Munich, Germany. Information on study design, sampling, and data availability can be found at: http://www.share-project.org.

Measures

Loneliness

Participants completed the three-item version of the UCLA Loneliness Scale (Hughes et al., 2004; Mehrbrodt et al., 2019). Specifically, each member of the couple reported how much of the time they felt a lack of companionship, left out, and isolated from others on a three-point scale (1 = often, 2 = some of the time, 3 = hardly ever or never). Responses were reverse-scored, and the mean is taken across the items, with higher scores reflecting greater loneliness (alpha reliabilities were 0.71 for males and 0.75 for females).

Cognitive function

Participants completed standard measures of episodic memory and verbal fluency (Mehrbrodt et al., 2019). For the memory task, participants were read a list of 10 common words and asked to immediately recall the words. After a short delay in which other survey questions were answered, respondents were asked again to recall the 10 words. The score was the total number of words recalled across the immediate and delayed recall (range = 0–20); more words remembered indicated better memory function. For the verbal fluency task, participants were asked to name as many animals as possible in 60 s. The score was the total number of correct animals counted by the interviewer; more animals named indicated better processing speed and verbal abilities.

Covariates

Age in years, education, and household size (coded as 1 = living with other relatives or children and 0 = living only with the partner) were selected as plausible confounders of the hypothesized associations (Hawkley et al., 2022). Education in SHARE is harmonized across countries using the 1997 International Standard Classification of Education with categories ranging from 0 (preprimary level of education) to 6 (second stage of tertiary education). SHARE does not collect information on race/ethnicity. The additional analysis controlled for disease burden: Both partners reported whether they were ever diagnosed with the following diseases: heart attack, hypertension, stroke, lung disease, cancer (nonskin), arthritis, and diabetes (score = 0–7). Sensitivity analysis further excluded participants who self-reported a diagnosis of Alzheimer's disease, dementia, or senility (yes/no). These additional covariates were included because experiencing a disease, either oneself or the disease of a spouse/partner, is related to both loneliness (Ferreira-Alves et al., 2014; Luchetti et al., 2021) and poor cognitive function (Comijs et al., 2009; Vitaliano et al., 2017).

Analytic Strategy

We first examined sex differences in loneliness and performance on memory and verbal fluency tasks using dependent-sample t tests. Zero-order correlations were performed to test the associations between loneliness, cognitive performance, age, education, and health of each partner, and household size.

A two-level mixed model approach, with partners nested within countries, was used to estimate actor and partner effects (Kenny et al., 2006) and to account for the nonindependence within couples and countries. We conducted a sex-stratified analysis to assess the association between loneliness and cognitive performance for male and female partners. We first predicted cognitive outcomes for males: Males' loneliness (actor loneliness) and females' loneliness (partner loneliness) were entered as predictors of males' performance on memory and verbal fluency, respectively (actor performance). We then used the same approach for females: Females' and males' loneliness were entered to predict females' performance on each task. We first estimated models with fixed effects of actor and partner loneliness on cognitive performance and then models with fixed and random effects. The models were then compared based on the Akaike Information Criterion (AIC). Using the best fitting model, we included the covariates: age of the actor, education of both partners, and household size. We did not include the age of the partner because of the high correlation between the age of partners (r = 0.89). A sensitivity analysis excluded cases where one or both partners reported a diagnosis of Alzheimer's disease, dementia, or senility (n = 438). Additional analyses controlled for the disease burden of each partner. Exploratory analyses tested whether the actor and partner effects varied by age. For the models with random effects, we allowed for different variances among the countries by using a variance components structure for the residuals. Effect sizes were calculated using the residual variances of the null and the full models. All analyses were performed using SPSS (version 25). All models applied the restricted maximum likelihood estimation.

Results

Descriptive Statistics and Correlations

Descriptive statistics and zero-order correlations for male and female partners are reported in Table 1 (Supplementary Table S1 for statistics by country). There

were a few noticeable differences between males and females (Cohen's $d > 0.10$): On average, females were lonelier (Cohen's $d = 0.11$) and had better performance on memory ($d = 0.22$) than males. Males tended to be older ($d = 0.71$) and more educated ($d = 0.11$) compared to females. As expected, there were moderate correlations between males' and females' loneliness ($r = 0.35$) and between their cognitive performance ($r = 0.45$ for memory and $r = 0.54$ for verbal fluency).

Mixed Model Analysis

The AIC of the models with fixed effects predicting memory performance was 129,686 for males and 130,693 for females. The AIC for the models with fixed effects predicting verbal fluency was 165,793 for males and 164,990 for females. Adding the random effects of loneliness, AIC was 129,674 for males' and 130,678 for females' memory, and 165,757 for males' and 164,965 for females' verbal fluency. We therefore selected the models that included both random and fixed effects. Table 2 (unadjusted) reports the actor and partner effects of loneliness on cognitive function. As expected, loneliness had a significant actor effect on memory and verbal fluency for both males and females: One's own loneliness was associated negatively with one's own cognitive performance. We also found evidence of significant partner effects that indicated that partner loneliness was related negatively to one's own memory and verbal abilities for both males and females. In other words, a person with a partner who was lonely tended to have poorer performance on both tasks above and beyond one's own loneliness. For memory, the size of the partner effects was about 40% of the size of the actor effects and for verbal fluency the partner effects were about half of the size of the actor effects. Across all models, the effects were small in size: f^2 was 0.02 for the models with loneliness, indicating that actor and partner loneliness explained 2% of the variance in cognitive performance relative to the unexplained variance of the null models without predictors. Actor and partner effects held accounting for age, education of both partners, and household size (see Table 2, Adjusted). There was only one exception: Males' loneliness was no longer associated with females' memory when accounting for these covariates. The observed effects remained significant when further controlling for the disease burden of both partners (Supplementary Table S2) and excluding cases where one or both partners reported dementia or senility (Supplementary Table S3; see Author Note 4). Note that actor and partner effects of loneliness did not differ for males and females. Nonstratified analyses indicated nonsignificant interactions between actor loneliness and partner loneliness with sex, which indicated that

Table 1. Descriptive Statistics and Correlations Among Study Variables

	Males	Females		Correlations						
	M (*SD*)	*M* (*SD*)	*t* Test	1	2	3	4	5	6	7
1. Loneliness	1.21 (0.37)	1.26 (0.42)	−16.59**	**0.354****	−0.124**	−0.145**	0.077**	−0.053**	0.106**	0.004
2. Memory	8.84 (3.45)	9.65 (3.59)	−0.34.39**	−0.150**	**0.452****	0.448**	−0.371**	0.331**	−0.169**	0.072**
3. Verbal fluency	19.79 (7.62)	20.07 (7.73)	−5.90**	−0.164**	0.491**	**0.538****	−0.263**	0.313**	−0.097**	0.009
4. Age (years)	66.32 (9.19)	63.22 (9.28)	111.56**	0.055**	−0.347**	−0.241**	**0.888****	−0.159**	0.262**	−0.336**
5. Education level	2.95 (1.45)	2.81 (1.43)	17.06**	−0.100**	0.398**	0.412**	−0.212**	**0.592****	−0.088**	−0.013*
6. Disease burden[a]	1.02 (1.04)	0.95 (1.03)	8.57**	0.125**	−0.194**	−0.131**	0.317**	−0.154**	**0.241****	−0.102**
7. Household size (>2)	28.4% (7,007)		—	0.004	0.059**	0.003	−0.373**	0.007	−0.125**	—

Notes: $N = 24{,}689$ couples (49,378 individuals). Data were from SHARE Wave 4 (France = 1,135 couples, Hungary = 893, Portugal = 504, and Switzerland = 909), Wave 5 (Austria = 1,036 couples, Belgium = 1,410, Czech Republic =1,463, Denmark = 1,139, Estonia = 1,402, Germany = 1,677, Israel = 621, Luxemburg = 356, the Netherlands = 1,108, Sweden = 1,137, and Spain = 2,010), Wave 6 (Croatia = 854 couples, Greece = 1,532, Italy = 1,613, and Slovenia = 1,143), and Wave 8 (Bulgaria = 262 couples, Cyprus = 155, Finland = 299, Latvia = 204, Lithuania = 363, Malta = 283, Poland = 397, Romania = 425, and Slovakia = 359). Correlations (Pearson's *r*s) for males and females are reported above and below the diagonal. For each variable, correlations between partners are in bold along the diagonal. Descriptive statistics and correlations for each country separately are reported in Supplementary Table S1. *SD* = standard deviation.

[a]*N* size is slightly reduced due to missing values ($n = 24{,}634$ males and females).

*$p < .05$; **$p \leq .01$.

Table 2 Actor and Partner Effects of Loneliness on Memory and Verbal Fluency

Cognitive task	Memory						Verbal fluency					
	Males			Females			Males			Females		
	B	*SE*	β	*B*	*SE*	β	*B*	*SE*	β	*B*	*SE*	β
Unadjusted												
Intercept	10.465**	0.174		11.276**	0.205		22.794**	0.681		23.049**	0.763	
Loneliness												
Actor loneliness	−0.998**	0.080	−0.11	−0.986**	0.062	−12	−1.866**	0.227	−0.09	−1.798**	0.176	−0.10
Partner loneliness	−0.394**	0.072	−0.05	−0.386**	0.094	−0.04	−0.864**	0.177	−0.05	−0.884**	0.189	−0.04
Estimate variance												
Residual	11.118**	0.100		11.576**	0.104		47.835**	0.431		46.326**	0.418	
Intercept	0.589**	0.199		0.905**	0.283		11.750**	3.466		15.151**	4.364	
Actor slope	0.058	0.039		0.014	0.024		0.846*	0.398		0.431*	0.221	
Partner slope	0.047	0.035		0.115*	0.059		0.430	0.226		0.449	0.278	
Adjusted												
Intercept	15.718**	0.221		15.337**	0.234		29.738**	0.707		28.005**	0.760	
Loneliness												
Actor loneliness	−0.712**	0.068	−0.08	−0.699**	0.054	−0.08	−1.413**	0.211	−0.07	−1.271**	0.162	−0.07
Partner loneliness	−0.188**	0.061	−0.02	−0.151	0.077	−0.02	−0.494**	0.153	−0.03	−0.497**	0.166	−0.02
Covariates												
Actor age	−0.119**	0.002	−0.32	−0.110**	0.002	−0.28	−0.176**	0.005	−0.21	−0.166**	0.005	0.20
Actor education	0.495**	0.017	0.21	0.630**	0.018	0.25	0.796**	0.037	0.15	1.339**	0.037	0.25
Partner education	0.212**	0.017	0.09	0.176**	0.017	0.07	0.502**	0.038	0.09	0.220**	0.035	0.04
Household size	−0.198**	0.046	−0.06	−0.176**	0.048	−0.05	−0.192	0.100	−0.02	−0.225*	0.098	−0.03
Estimate variance												
Residual	8.983**	0.081		9.262**	0.083		42.152**	0.380		39.187**	0.353	
Intercept	0.325**	0.112		0.522**	0.166		8.968**	2.664		11.797**	3.411	
Actor slope	0.033	0.026		0.007	0.019		0.721*	0.338		0.369*	0.176	
Partner slope	0.027	0.024		0.063	0.038		0.267	0.160		0.317	0.209	

Notes: N = 24,689 couples (49,378 individuals). Unadjusted reports the models without covariates; Adjusted reports the models with basic covariates. Because we did not test cross-level interactions, individual-level variables were not centered. SPSS produces only unstandardized coefficients in multilevel modeling. Therefore, we calculated standardized coefficients using the formula: β standardized = (*B* unstandardized × standard deviation explanatory variable)/standard deviation outcome variable; βs are reported for actor and partner effects of loneliness and covariates. *SE* = standard error.
* $p \leq .05$; ** $p \leq .01$.

the associations with cognitive performance were similar across males and females (Supplementary Table S4). The associations were also generally consistent across SHARE countries, with evidence of a significant partner effect observed in 18 out of the 28 individual countries and in the same direction in another seven countries that generally had smaller samples (see Supplementary Table S1).

Fianlly, we tested whether the associations were moderated by age (see Author Note 5). Actor and partner effects on memory were slightly stronger for male partners at older ages: Experiencing loneliness and having a lonely partner were associated with worse memory, particularly in older males (actor loneliness × actor age, B = −0.015, standard error [*SE*] = 0.005 [β = −0.016], p = .004; partner loneliness × actor age, B = −0.011, *SE* = 0.005 [β = −0.012], p = .022). For females, age moderated the actor effect but not the partner effect for memory: Loneliness was associated with worse memory, particularly for older females (actor loneliness × actor age, B = −0.011, *SE* = 0.005 [β = −0.012], p = .016). No significant moderation emerged for the partner effect (partner loneliness × actor age, B = −0.004, *SE* = 0.005 [β = −0.004], p = .399). Age did not moderate the association between loneliness and verbal fluency.

Discussion

This study examines the cross-sectional association between loneliness and cognitive function using dyadic data from partnered couples across 28 countries participating in the SHARE. There was evidence of small, significant actor and partner effects of loneliness on cognitive performance for both males and females. Consistent with the literature on loneliness and cognition (Lara, Caballero et al., 2019), feeling lonely was associated negatively with one's own performance on tasks of both memory and verbal fluency.

To this literature, we add that participants with a partner who was lonely tended to have poorer performance on the cognitive tasks, above and beyond their own loneliness. Even if small, actor and partner effects generally replicated across countries, were roughly similar for male and female partners, and held when controlling for age, education, household size, and disease burden.

These results align with the accumulating evidence that feelings of loneliness are detrimental for cognitive health and increase the risk of developing late-life dementia and other cognitive impairments (Lara, Martín-María et al., 2019; Luchetti et al., 2020; Sutin et al., 2020). Previous studies have reported that loneliness is associated with poor cognitive performance in healthy adults (Kyröläinen & Kuperman, 2021; Lara, Caballero et al., 2019), although the associations vary somewhat based on the cognitive domain and the psychological and sociodemographic variables included in the models (as noted by Boss et al., 2015). Our work supports a concurrent association between loneliness and worse word recall and verbal fluency, two tasks that are useful to identify individuals at risk for subsequent cognitive impairment (Josefsson et al., 2019; Sutin et al., 2019).

This work further expands the extant literature on loneliness and cognition by considering the context in which loneliness occurs, specifically the relational context with a spouse or romantic partner. For many older adults, the relationship with their spouse or partner is the most important social connection and source of support. Within this relationship, the characteristics, behaviors, and experiences of each partner may have important implications for health (Choi et al., 2016; Stokes & Barooah, 2021), and in particular, for cognitive functioning. In line with this expectation, we found that feelings of loneliness, reported both by a participant and their partner, were associated with poor memory recall and verbal fluency. That is, there was a partner as well as an actor effect of loneliness on cognition. Partner effects were about two fifth in size of the actor effects for memory and about half of the actor effects for verbal functioning, which indicates a dyadic pattern in between an "actor-only pattern" (i.e., no partner effect) and a "couple pattern" (i.e., equal actor and partner effect; Kenny & Ledermann, 2010). Of note, the effects were small in size: Actor and partner loneliness explained 2% of the variance in cognitive performance. This is, however, not surprising and consistent with the literature (Boss et al., 2015; Lara, Caballero et al., 2019). Cognitive health is, indeed, a complex and multidetermined phenomenon, with influences ranging from genetics to environmental factors (Tucker-Drob et al., 2013). Therefore, psychosocial and behavioral factors (including loneliness and other relational factors) are expected to explain only a small proportion of variance. Even if small, these effects are not negligible (Götz et al., 2022), especially when considering the documented effects of close relationships on health (Kiecolt-Glaser & Wilson, 2017; Wilson et al., 2020) and long-term consequences of loneliness on late-life cognition (Sundström et al., 2020; Sutin et al., 2020).

There are several potential mechanisms for the detrimental association between loneliness and cognitive function in the context of married or romantic couples. For example, loneliness can spread from one partner to the other (Ayalon et al., 2013; Stokes, 2017). Having a lonely partner may increase one's own level of loneliness and thereby affect cognitive function. It is important to note, however, that partner loneliness was associated with cognitive performance above and beyond actor loneliness. There may thus be other mechanisms through which having a lonely partner may be associated with cognitive function. For instance, a lonely partner might criticize or withdraw affection and support from their spouse (Hsieh & Hawkley, 2018), which leads to stress and conflict within the couple, which in turn may be detrimental to cognitive health (Wilson et al., 2015). A partner's loneliness may also be an indicator of emotional disconnection in the dyad, which leads to negative emotions and psychological traits (i.e., neuroticism) that contribute to poor cognitive functioning (Foong et al., 2018; McHugh Power et al., 2020). Furthermore, older couples tend to have similar behaviors that affect health and cognition (Wilson et al., 2020). The experience of loneliness by one partner might lead both members of the couple to disengage from social activities and interactions with others, with related consequences for cognitive function in daily life and over the long term (Wilson et al., 2015; Zhaoyang et al., 2021). Recent dyadic studies also found partner loneliness to be associated with health behaviors (Segrin & Burke, 2015) and physiological markers (Stokes & Barooah, 2021) that are associated with poor cognition. The present study found a partner effect of loneliness on cognitive function that, even if small, might have practical implications (Primbs et al., 2021). For example, when planning interventions directed to maintain cognitive functioning in older adulthood, researchers should consider the relational context in which a person lives.

It should be noted that, because of the correlational nature of our study, we cannot draw conclusions on causal pathways, nor the directionality of the associations. Longitudinal studies are needed to examine the coevolution of loneliness within romantic partners and its possible consequences on health and cognition (Ermer et al., 2020). Furthermore, even though loneliness is a risk factor for cognitive decline and impairment decades later (Luchetti et al., 2020; Sundström et al., 2020), there are likely to be reciprocal associations between loneliness and cognitive functioning (Zhong et al., 2017). For example, Zhong et al. (2017) found loneliness was associated with poor cognitive function at later assessments, while better cognitive function at the initial assessment was associated with decreases in loneliness over time. In the context of couples, a partner with better cognitive function may be more engaged and socially active, which may lower their own loneliness and

also their partner's loneliness. This, in turn, could help support both partners' cognitive health. In contrast, when cognitive impairment is present in one of the partners, loneliness might increase, particularly for the spouse who transitions into the role of caregiver (Leggett et al., 2020; Luchetti et al., 2021).

Additional limitations and possibilities for future research are worth noting. First, our measure of sex was simply male and female. It is important to consider other variables related to cultural roles and relationship quality, in addition to sex, to examine whether aspects of the gendered experience and/or characteristics of the relationship operate in the partner effects. Second, although we found a little moderating effect of age, there are other sociodemographic factors that were not available in SHARE (e.g., race/ethnicity) that merit attention in future studies. Third, couples with missing data were excluded from the analytic sample. Because of missingness, the results may underestimate the true associations, as noted in longitudinal studies on cognition (Salthouse, 2014). However, results were the same when imputing missing values for loneliness and cognition (see Supplementary Table S5). Fourth, this study aimed to test whether there was an association between partner loneliness with cognitive performance, in addition to the association with actor loneliness. The next step is to identify the mechanisms underlying these associations. That is, identifying possible mediators of loneliness and cognition, both at the individual level and within couples (e.g., affect or depression; McHugh Power et al., 2020). Finally, the social context and interactions outside the couple might be relevant to reduce loneliness and protect cognition. In a recent ecological assessment study, Zhaoyang et al. (2021) found that having more daily social interactions (particularly pleasant interactions) was related to better cognitive performance on the same day and the following day. This type of micro-level analysis should be applied in future studies to understand contextual factors associated with loneliness, relationship dynamics, and their consequences on cognitive function and health.

In conclusion, the results from this study illustrate the potential value of considering the relational context in which loneliness occurs when examining the association between loneliness and cognitive health. Loneliness is not the same as being alone and can be experienced even by married or partnered adults. Experiencing loneliness may not only have a negative association with one's own cognition but also with the cognitive functioning of one's partner.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

Author Notes

1. SHARE is an ongoing study. As its start (Wave 1, 2004/2006), new participants and new countries joined the study, with a total of 28 European countries and Israel participating in the last wave (Wave 8, 2019/2020). In the current analyses, we included participants in a romantic relationship across four waves: Wave 4 (i.e., first wave in which SHARE administered a three-item measure of loneliness), Wave 5, Wave 6, and Wave 8. Wave 3 and Wave 7 were not considered because a life story interview was administered at these waves.

2. Partners in SHARE are coupled through the variable "coupled." This variable is provided only for individuals in a relationship and when both partners live in the same household. It is a system variable generated by SHARE based on the cover-screen information provided by one person within the household on behalf of all other members. During the interview, each participant further responds to questions on their current marital or relationship status and whether changes occurred since the last interview. Because of the possible delay in time between the cover-screen and interview, there can be discordance between couple-ids and marital status, and marital status within a couple, in some cases. Participants who had a couple-id and a discordant marital status (i.e., either one or both partners reported to be separated, widowed, or divorced at the time of the interview, n = 1,354) were excluded from the analysis.

3. Loneliness was measured as part of the drop-off questionnaire in Wave 4. This led to a higher number of couples with missing data on loneliness in Wave 4, when compared with the other waves in which loneliness was assessed as part of the interview (see Supplementary Figure S1). Note that results were virtually the same when controlling for administration modality (loneliness as part of the interview vs. drop-off questionnaire) and when missing values for loneliness and cognition were imputed using multiple imputations (see Supplementary Table S5).

4. Because we aimed to identify an association between actor and partner loneliness with cognitive performance, we avoided overcorrection and inclusion of covariates that are potential mediators (e.g., depression) or colliders of the association. We conducted, however, additional analyses controlling for depressive symptoms. When controlling for actor depression, the effect of actor and partner loneliness on verbal fluency was reduced in size but remained significant (actor loneliness, B = −0.75, SE = 0.20, p = .001 and partner loneliness, B = −0.35, SE = .16, p = .033 for males, and actor loneliness, B = −0.73, SE = 0.17, p < .001 and partner loneliness, B = −0.41, SE = .16, p = .018 for females). Actor but not partner loneliness was associated with memory controlling for depression in both males and females (actor loneliness, B = −0.33, SE = 0.07, p < .001 for males and B = −0.37, SE = .06, p = p < .001 for females). These analyses were exploratory and future work is needed to formally test mediation pathways between loneliness and cognition.

5. In additional exploratory analyses, we examined whether actor and partner effects of loneliness were further moderated by partners' disease burden and household size. For females, disease burden moderated some of the actor and partner effects. Specifically, partner loneliness was more detrimental for memory among females with better health (i.e., lower number of diseases; partner loneliness × actor disease burden, $B = 0.121$, $SE = 0.048$, $p = .011$). Similarly, both actor and partner loneliness were more detrimental for verbal fluency among females with fewer diseases (actor loneliness × actor disease burden, $B = 0.238$, $SE = 0.085$, $p = .005$; partner loneliness × actor disease burden, $B = 0.217$, $SE = 0.099$, $p = .029$). There were no significant interactions between actor and partner loneliness and partner disease burden. Finally, household size did not moderate actor and partner effects of loneliness on either memory or verbal fluency.

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Conflicts of Interest

None declared.

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