

UCSF

UC San Francisco Previously Published Works

Title

In sickness and in health: Loneliness, depression, and the role of marital quality among spouses of persons with dementia.

Permalink

<https://escholarship.org/uc/item/3cj797m0>

Journal

Journal of the American Geriatrics Society, 71(11)

Authors

Hsu, Kristie

Center, Irena

Harrison, Krista

et al.

Publication Date

2023-11-01

DOI

10.1111/jgs.18520

Peer reviewed



Published in final edited form as:

J Am Geriatr Soc. 2023 November ; 71(11): 3538–3545. doi:10.1111/jgs.18520.

In Sickness and in Health: Loneliness, Depression, and the Role of Marital Quality among Spouses of Persons with Dementia

Kristie Y. Hsu, MD¹, Irena Cenzer, PhD², Krista L. Harrison, PhD^{2,3}, Christine S. Ritchie, MD, MSPH^{4,5}, Linda Waite, PhD⁶, Ashwin Kotwal, MD, MS^{2,7}

¹Division of Internal Medicine, University of California, San Francisco, CA

²Division of Geriatrics, University of California, San Francisco, CA

³Global Brain Health Institute, University of California, San Francisco, CA

⁴Massachusetts General Hospital Division of Palliative Care and Geriatric Medicine and Harvard Medical School, Boston, MA

⁵The Mongan Institute Center for Aging and Serious Illness, Massachusetts General Hospital, Boston, MA

⁶Department of Sociology, University of Chicago, Chicago, IL

⁷Geriatrics, Palliative, and Extended Care Service Line, San Francisco Veterans Affairs, San Francisco, CA

Abstract

BACKGROUND: Older adults married to persons living with dementia (PLwD) may be at risk for loneliness and depression. We assessed the prevalence of loneliness and depressive symptoms among spouses of PLwD or cognitive impairment not dementia (CIND), and the role of marital quality in mediating these outcomes.

METHODS: We used a U.S. population-based sample of 4,071 couples enrolled in the Health and Retirement Study (2014 and 2016). We included older adults married to PLwD (N=227), married to persons with CIND (N=885), or married to persons with no cognitive impairment (NCI) (N=2,959). We determined the prevalence of loneliness (UCLA 3-item scale), depressive symptoms (CESD-8 scale), and both, using multivariable logistic regression adjusting for sociodemographic and health-related characteristics. We then tested for interaction terms between marital quality (4-item scale) and degree of spousal cognitive impairment for each outcome of loneliness and depressive symptoms.

RESULTS: The sample was 55% women and on average 67-years-old (Range: 50-97). After adjustment, spouses of persons with cognitive impairment were more likely to be lonely (NCI:

Corresponding author: Kristie Y. Hsu, Address: 505 Parnassus Avenue, Room M-1480, Box 0119, San Francisco, CA 94143, Kristie.Hsu@ucsf.edu.

Author contributions: Conception and design: KYH, IC, AK; Acquisition of the data: KYH, IC, AK; Analysis and interpretation: KYH, IC, AK, KLH, CSR, LW; Drafting and revising manuscript: KYH, IC, AK, KLH, CSR, LW; Approval of final manuscript: KYH, IC, AK, KLH, CSR, LW.

Conflicts of Interest: Dr. Kotwal reports research consulting fees from Papa Health outside the submitted work. All other authors report no potential conflicts of interest.

20%, CIND: 23%, PLwD: 29%; $p=0.04$), depressed (NCI: 8%, CIND: 15%, PLwD: 14%; $p<0.01$), and both (NCI: 4%, CIND: 9%, PLwD: 7%; $p<0.01$). The association between cognition and loneliness, but not depression, differed by marital quality (interaction p -value=0.03). Among couples with high marital quality, spousal cognitive impairment was associated with higher likelihood of loneliness ($p<0.05$). In contrast, no association existed between spousal cognition and loneliness among couples with lower marital quality ($p=0.37$).

CONCLUSIONS: One in six spouses of persons with CIND or more advanced disease (PLwD) experienced depressive symptoms, and loneliness among spouses of PLwD was experienced at a twofold rate. By identifying and managing both, and facilitating interventions that promote high-quality social connection, clinical teams might improve the lives of older couples facing dementia.

Keywords

Dementia; Spouse; Loneliness; Depression

INTRODUCTION

Older adults married to persons living with dementia (PLwD) or to persons with cognitive impairment not dementia (CIND) might be at especially high risk for both loneliness¹ and depression^{2,3} due to dementia's impact on a couple's shared social life and core marital relationship. Loneliness and depression are related but distinct entities,⁴ with loneliness defined as the emotional distress due to the difference between one's desired and perceived social connections, and depression as a mood disorder with specific depressive symptoms that may or may not have a clear trigger. Both are often under-recognized among older adults, despite each having known ties to worsened quality of life, morbidity, mortality, and healthcare costs.⁴⁻¹⁰

Prior research details the large impact of dementia on the psychosocial health of spouses and caregivers, including themes of loneliness or loss, and sadness.^{11,12} Moreover, extensive qualitative and sociology research demonstrates how the quality of the marital relationship, not just presence of the relationship, can influence psychosocial well-being among spouses of PLwD.¹³⁻¹⁵ To our knowledge, however, no population-based estimates exist regarding the prevalence of both loneliness and depressive symptoms among spouses of PLwD and of those with milder cognitive impairment (CIND), and the role of marital quality in experiencing loneliness and/or depression. A better understanding of the magnitude of these psychosocial needs and the role of marital quality might inform tailored interventions to improve quality of life among older adult couples facing dementia or milder cognitive impairment.^{4,6,8,16} Our objective was therefore to use a unique U.S. population-based cohort of couples to: (1) determine the prevalence of loneliness, depressive symptoms, and both, among older adults married to persons living with dementia (PLwD) or cognitive impairment not dementia (CIND), and (2) the role of marital quality in moderating loneliness or depression.

METHODS

Study Sample

We used data from the Health and Retirement Study (HRS), which includes a U.S. population-based cohort of married or cohabiting partnered older Americans. Since 2006, the HRS has collected psychosocial and lifestyle data using the self-administered questionnaire (SAQ), which is administered to alternating halves of the sample every two years. Our sample therefore included 4,071 older adult (age ≥ 50) couples from the same household (N=3,776 married, N=295 partnered), who responded to the SAQ in either 2014 or 2016.¹⁷ We included three categories of couples: older adults with no cognitive impairment (NCI) or CIND who were (1) married to PLwD (N=227) or (2) married to persons with CIND (N=885), and (3) older adults with NCI married to persons with NCI (N=2,959). We excluded couples (N=145) with missing responses. The HRS is approved by the Institutional Review Board (IRB) at the University of Michigan and use of the data is approved by the IRB at the University of California, San Francisco.

Measures

Cognitive impairment included cognitive impairment not dementia (CIND) or dementia, using the previously validated Langa-Weir methodology.¹⁸ A 27-point summary score was derived from three items: (1) immediate and delayed 10-noun free recall, (2) serial sevens, and (3) counting backwards test. Respondents were grouped as NCI (12-27 points), CIND (7-11 points), or dementia (0-6 points) based on diagnostic information from the HRS Aging, Demographics, and Memory Study cohort.¹⁹ Loneliness was defined using the 3-item UCLA scale (6 points on 3-9 scale).⁷ Participants with missing responses to 2 or 3 items were excluded from the analysis. Participants with only one missing item (N=71) were left in the analysis, and the missing item was imputed as a mean of the reported items. Depression was defined using the CES-D scale (4 points on 0-8 scale).²⁰

Marital quality was defined using a previously published 4-item positive marital quality scale,^{13,21,22} including: (1) How much does your spouse/partner really understand the way you feel about things?, (2) How much can you rely on your spouse/partner if you have a serious problem?, (3) How much can you open up to your spouse/partner if you need to talk about your worries?, and (4) How close is your relationship with your partner or spouse? (Cronbach's $\alpha=0.83$). Responding "a lot" or "some" to the first three questions (response options: 1. a lot, 2. some, 3. a little, or 4. not at all) and "very" or "quite close" to the fourth question (response options: 1. very, 2. quite, 3. not very, or 4. not at all close) was categorized as "high" marital quality, while responding "a little," "not very," or "not at all" was categorized as "low" marital quality.

Sociodemographic factors included age, gender, race/ethnicity (White, Black, Hispanic/Latinx, or "Another Race"), and education. Social isolation was identified based on a previously validated social connectedness score, with 2 points on 0-6 scale representing social isolation (Kotwal et al. Appendix Figure S1).²³ Health-related factors for the partner living with cognitive impairment included functional status (i.e., difficulty performing

1 activity of daily living) and multimorbidity (i.e., 2 self-reported chronic conditions, including diabetes, heart disease, lung disease, cancer, hypertension, stroke, or arthritis).

Statistical Analysis

We used chi-squared tests to compare the unadjusted prevalence of loneliness, depressive symptoms, and both, by the degree of spousal cognitive impairment. We then used multivariable logistic regression to determine if these differences remained after adjusting for sociodemographic characteristics (age, gender, race/ethnicity, and education), social isolation of the partner without dementia, and the functional status and multimorbidity of the partner living with dementia or CIND. We ran marginal effects in post-estimation tests following logistic regression to derive the adjusted prevalence of loneliness, depressive symptoms, and both, respectively, in three separate models. We then tested for interaction terms between marital quality and spousal cognitive impairment in separate adjusted models predicting loneliness and depressive symptoms. We conducted two separate sensitivity analyses: (1) excluding couples in which the first partner had CIND (i.e., excluding if both in the couple had cognitive impairment) (N=201), and (2) excluding cohabiting partnered couples (N=295), which both yielded similar results to those presented below. Statistical analyses were conducted using Stata 17.1 and used national survey weights accounting for the likelihood of survey participation.

RESULTS

The sample was 55% women, 71% White, 12% Black, 13% Hispanic, and on average 67-years-old (SD: 9.6, Range: 50-97). Table 1 demonstrates that compared to older adults married to persons with NCI, older adults married to persons living with CIND or dementia had significant differences by age, gender, race/ethnicity, education, marriage duration, marital quality, and partner functional status and multimorbidity, but not by social isolation. The correlation coefficient between loneliness and depressive symptoms was 0.26.

In unadjusted analyses, older adults married to persons with cognitive impairment were more likely to be lonely and, separately, to have high depressive symptoms, or both (Table 1). Similarly, after covariate adjustment, older adults married to PLwD were more likely to be lonely (NCI: 20%, CIND: 23%, PLwD: 29%; $p=0.04$), have high depressive symptoms (NCI: 8%, CIND: 15%, PLwD: 14%; $p<0.01$), or both (NCI: 4%, CIND: 9%, PLwD: 7%; $p<0.01$) (Figure 1).

The association between cognitive impairment and loneliness differed by marital quality (interaction p -value=0.03) (Figure 2). Among spouses with high marital quality, spousal cognitive impairment was associated with a higher likelihood of loneliness (NCI: 13%, CIND: 15%, PLwD: 25%; $p<0.05$). However, among those with low marital quality, no association existed between spousal cognitive impairment and loneliness, although rates of loneliness were much higher overall (NCI: 44%, CIND: 40%, PLwD: 37%; $p=0.37$). The association between spousal cognitive impairment and depressive symptoms did not differ by marital quality.

DISCUSSION

This study provides the first U.S. population-based prevalence estimates of both loneliness and depressive symptoms among spouses of persons living with dementia and of persons with CIND. Nearly 1 in 3 older adults married to PLwD experienced loneliness. Notably, elevated depressive symptoms were present in 1 in 6 older adults married to persons with even mild cognitive impairment (CIND), along with more advanced disease (PLwD). Although loneliness and depression co-occurred, it was more common for individuals to experience each separately, particularly loneliness. Findings point to a significant and likely underappreciated clinical opportunity to identify spouses' loneliness and depression, and to connect them with tailored psychosocial interventions.

Results are consistent with prior literature demonstrating higher rates of depression among spouses of PLwD,^{2,3} and build on it by identifying similarly high rates of depressive symptoms among spouses of persons with milder impairment (CIND). We also add that loneliness was more common than depression and occurred despite relatively low rates of objective social isolation (5%) in this population. Together, findings suggest a high-yield opportunity for clinical teams to screen for and intervene on depression and loneliness among spouses, potentially before partners' first IADL impairment. Notably, loneliness is not captured by typical clinical screening tools for depression (e.g., GDS, PHQ-9) and would require separate screening (e.g., using UCLA 3-item scale). If depression is recognized among spouses, clinical teams can offer individualized pharmacologic and psychosocial interventions.⁸ For loneliness, structured clinical frameworks also exist which can guide next steps and connect individuals to social interventions.^{6,24} We hypothesize that addressing loneliness as an upstream approach might prevent depression, since a recent longitudinal study⁴ identified loneliness as a powerful predictor of downstream depression, with the risk of depression from loneliness persisting for over a decade after loneliness was first reported. This mechanism can be evaluated in future longitudinal studies of spouses of PLwD and interventions.

Study findings add to extensive prior evidence of how dementia can disrupt the lives of the family members, particularly spouses. At a systems level, we might therefore consider how to improve access to comprehensive, multi-disciplinary dementia care designed to support a couple or family unit, and not just the focal individual.²⁵⁻²⁷ In addition, clinicians might improve external support services for PLwD (e.g., home health services, referral to Adult Day Center) in order to increase opportunities for their spouses to strengthen high-quality connections with close family and friends.²⁸

Importantly, marital quality was a key factor in shaping differential experiences of loneliness, but not depression, among individuals married to PLwD. While spouses with low-quality relationships appear to have higher rates of loneliness at baseline, those with higher relationship quality appear to experience a much steeper increase in loneliness when their spouse develops dementia. Thus, we hypothesize that those in good marriages have more to lose when their spouse develops cognitive limitations.^{14,15} Our epidemiologic results complement prior qualitative studies^{11,12} that identified close partners' sense of grief and anger at the loss of intimacy, both physically and intellectually or emotionally, in the

face of dementia. We did not find a similar trend between marital quality and depression as related to spousal dementia. This may be because the smaller number of individuals with depressive symptoms (relative to loneliness) leaves us underpowered to detect these patterns, and depressive symptoms may not be mediated as powerfully by relationship quality. Additional mix-methods data to explore potential mechanisms may be helpful.

We suggest that relationship quality should be considered in clinical and psychosocial interventions addressing loneliness among spouses of PLwD in at least two ways. First, clinicians should acknowledge the profound loneliness and loss of companionship that may accompany dementia's disruption of strong marriages. Addressing loneliness in these situations may involve therapeutic presence and listening to validate and guide, rather than "fix" loneliness or grief, as spouses process the significant life alterations caused by their loved one's serious illness. To address anticipatory grief²⁹ and help to normalize intimate relational changes, referrals to behavioral health specialists, psychologists, or dementia-trained social workers may be considered. Second, results remind clinicians that even when individuals are married, people with poor relationship quality can experience high levels of loneliness.

This study faced limitations. First, we used cross-sectional data that did not contain the duration of cognitive impairment, limiting causal inference, although this is less relevant to our prevalence estimates. Second, this data was collected before the COVID-19 pandemic reached the U.S., which may have increased loneliness due to decreased access to in-person support systems. Thus, our estimates of loneliness may be conservative.³⁰ Third, data was limited for LGBTQ+ couples (N=35 couples) and underpowered for subgroup analysis. Future studies might evaluate loneliness and depression among spouses of PLwD using longitudinal data, particularly since the COVID-19 pandemic, to identify points in the disease trajectory when their psychosocial well-being might be most vulnerable.

In conclusion, we found a substantial burden of loneliness and depressive symptoms among older adults married to persons living with dementia and to persons with milder cognitive impairment. Clinicians caring for the growing number of individuals married to persons living with cognitive impairment might improve couples' lives by identifying and addressing both loneliness and depression, and tailoring interventions that strengthen high-quality social connection.

ACKNOWLEDGMENTS

Funding Information: Dr. Kotwal was supported by National Institute on Aging (NIA) grants (K23AG065438; P30AG044281). Dr. Harrison was supported by NIA grants (K01AG059831; P01AG066605; P30AG044281).

REFERENCES

1. Leggett AN, Choi H, Chopik WJ, Liu H, Gonzalez R. Early Cognitive Decline and its Impact on Spouse's Loneliness. *Res Hum Dev.* 2020;17(1):78–93. doi:10.1080/15427609.2020.1750293 [PubMed: 33041699]
2. Chen C, Thunell J, Zissimopoulos J. Changes in physical and mental health of Black, Hispanic, and White caregivers and non-caregivers associated with onset of spousal dementia. *Alzheimers Dement (N Y).* 2020;6(1):e12082. doi:10.1002/trc2.12082 [PubMed: 33163612]

3. Hawkey L, Zheng B, Hedberg EC, Huisingh-Scheetz M, Waite L. Cognitive limitations in older adults receiving care reduces well-being among spouse caregivers. *Psychol Aging*. Feb 2020;35(1):28–40. doi:10.1037/pag0000406 [PubMed: 31985247]
4. Lee SL, Pearce E, Ajnakina O, et al. The association between loneliness and depressive symptoms among adults aged 50 years and older: a 12-year population-based cohort study. *Lancet Psychiatry*. 01 2021;8(1):48–57. doi:10.1016/S2215-0366(20)30383-7 [PubMed: 33181096]
5. Perissinotto C, Holt-Lunstad J, Periyakoil VS, Covinsky K. A Practical Approach to Assessing and Mitigating Loneliness and Isolation in Older Adults. *J Am Geriatr Soc*. 04 2019;67(4):657–662. doi:10.1111/jgs.15746 [PubMed: 30762228]
6. National Academies of Sciences E, and Medicine. *Social Isolation and Loneliness in Older Adults: Opportunities for the Health Care System*. Washington, DC: The National Academies Press; 2020.
7. Steptoe A, Shankar A, Demakakos P, Wardle J. Social isolation, loneliness, and all-cause mortality in older men and women. *Proc Natl Acad Sci U S A*. Apr 09 2013;110(15):5797–801. doi:10.1073/pnas.1219686110 [PubMed: 23530191]
8. Rodda J, Walker Z, Carter J. Depression in older adults. *BMJ*. Sep 28 2011;343:d5219. doi:10.1136/bmj.d5219 [PubMed: 21957206]
9. Office of the Surgeon General. *Our Epidemic of Loneliness and Isolation: The U.S. Surgeon General's Advisory on the Healing Effects of Social Connection and Community*. Washington D.C. 2023.
10. Yu B, Zhang X, Wang C, Sun M, Jin L, Liu X. Trends in depression among Adults in the United States, NHANES 2005-2016. *J Affect Disord*. Feb 15 2020;263:609–620. doi:10.1016/j.jad.2019.11.036 [PubMed: 31744739]
11. Evans D, Lee E. Impact of dementia on marriage: a qualitative systematic review. *Dementia (London)*. May 2014;13(3):330–49. doi:10.1177/1471301212473882 [PubMed: 24339060]
12. Albert SC, Eduardo Martinelli J, Costa Pessoa MS. Dementia and its impacts on the intimate, sexual couple relationship: A systematic review of qualitative research studies. *Dementia (London)*. May 2022;21(4):1449–1466. doi:10.1177/14713012211073205 [PubMed: 35142230]
13. Liu H, Zhang Z, Zhang Y. A national longitudinal study of marital quality and cognitive decline among older men and women. *Soc Sci Med*. Aug 2021;282:114151. doi:10.1016/j.socscimed.2021.114151 [PubMed: 34174580]
14. Huo M, Kim K, Han SH. The Impact of Marital Quality as Older Couples Adjust to Dementia Onset. *J Gerontol B Psychol Sci Soc Sci*. Jun 01 2022;77(6):1026–1036. doi:10.1093/geronb/gbab235 [PubMed: 34940834]
15. Hawkey LC, Hughes ME, Waite LJ, Masi CM, Thisted RA, Cacioppo JT. From social structural factors to perceptions of relationship quality and loneliness: the Chicago health, aging, and social relations study. *J Gerontol B Psychol Sci Soc Sci*. Nov 2008;63(6):S375–84. doi:10.1093/geronb/63.6.s375 [PubMed: 19092047]
16. Gallagher EA, Stokes JE. Cognitive Functioning, Gender, and Marital Quality Among Older Married Couples: A Dyadic Approach. *J Women Aging*. 2021 Mar-Apr 2021;33(2):137–152. doi:10.1080/08952841.2020.1852859 [PubMed: 33385305]
17. Smith J, Ryan L, Fisher G, Sonnega A, Weir D. *HRS Psychosocial and Lifestyle Questionnaire 2006-2016*. 2017.
18. Langa KM, Weir DR, Kabeto M, Sonnega A. *Langa-Weir Classification of Cognitive Function (1995 Onward)*. 2018.
19. Crimmins EM, Kim JK, Langa KM, Weir DR. Assessment of cognition using surveys and neuropsychological assessment: the Health and Retirement Study and the Aging, Demographics, and Memory Study. *J Gerontol B Psychol Sci Soc Sci*. Jul 2011;66 Suppl 1:i162–71. doi:10.1093/geronb/gbr048 [PubMed: 21743047]
20. Steffick D. *Documentation of affective functioning measures in the Health and Retirement Study*. Institute for Social Research, Ann Arbor, MI: University of Michigan.2000.
21. Lee HJ, Han SH, Boerner K. Psychological and Physical Health in Widowhood: Does Marital Quality Make a Difference? *Res Aging*. Jan 2022;44(1):54–64. doi:10.1177/0164027521989083 [PubMed: 33511917]

22. Pruchno RA, Cartwright FP, Wilson-Genderson M. Effects of marital closeness on the transition from caregiving to widowhood. *Aging Ment Health*. Nov 2009;13(6):808–17. doi:10.1080/13607860903046503 [PubMed: 19888701]
23. Kotwal AA, Cenzer IS, Waite LJ, et al. The epidemiology of social isolation and loneliness among older adults during the last years of life. *J Am Geriatr Soc*. Jul 11 2021;doi:10.1111/jgs.17366
24. Kotwal AA, Meier DE. A paradigm shift-Loneliness as a root cause of symptom distress among older adults. *J Am Geriatr Soc*. Aug 2022;70(8):2201–2204. doi:10.1111/jgs.17880 [PubMed: 35607720]
25. Lees Haggerty K, Epstein-Lubow G, Spragens LH, et al. Recommendations to Improve Payment Policies for Comprehensive Dementia Care. *J Am Geriatr Soc*. 11 2020;68(11):2478–2485. doi:10.1111/jgs.16807 [PubMed: 32975812]
26. Whitlatch CJ, Judge K, Zarit SH, Femia E. Dyadic intervention for family caregivers and care receivers in early-stage dementia. *Gerontologist*. Oct 2006;46(5):688–94. doi:10.1093/geront/46.5.688 [PubMed: 17050761]
27. Moon H, Adams KB. The effectiveness of dyadic interventions for people with dementia and their caregivers. *Dementia (London)*. Nov 2013;12(6):821–39. doi:10.1177/1471301212447026 [PubMed: 24337642]
28. Sadarangani T, Perissinotto C, Boafu J, Zhong J, Yu G. Multimorbidity patterns in adult day health center clients with dementia: a latent class analysis. *BMC Geriatr*. Jun 22 2022;22(1):514. doi:10.1186/s12877-022-03206-0 [PubMed: 35733122]
29. Holdsworth K, McCabe M. The Impact of Dementia on Relationships, Intimacy, and Sexuality in Later Life Couples: An Integrative Qualitative Analysis of Existing Literature. *Clin Gerontol*. 2018 Jan-Feb 2018;41(1):3–19. doi:10.1080/07317115.2017.1380102 [PubMed: 29161218]
30. Dahlberg L. Loneliness during the COVID-19 pandemic. *Aging Ment Health*. 07 2021;25(7):1161–1164. doi:10.1080/13607863.2021.1875195 [PubMed: 33491474]

KEY POINTS:

- In a U.S. population-based sample of 4,071 couples, nearly 1 in 3 spouses of persons living with dementia (PLwD) experienced frequent loneliness, and 1 in 6 spouses of persons with CIND along with more advanced disease (PLwD) experienced depressive symptoms.
- Marital quality was a key moderator of loneliness; among couples with higher marital quality, spousal cognitive impairment was associated with higher likelihood of loneliness, but no association existed among couples with lower marital quality.

Why does this matter?

Clinical teams caring for couples in which one individual is experiencing cognitive impairment should be aware of the high prevalence of loneliness and depression among partners, and the potential need for tailored psychosocial interventions.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

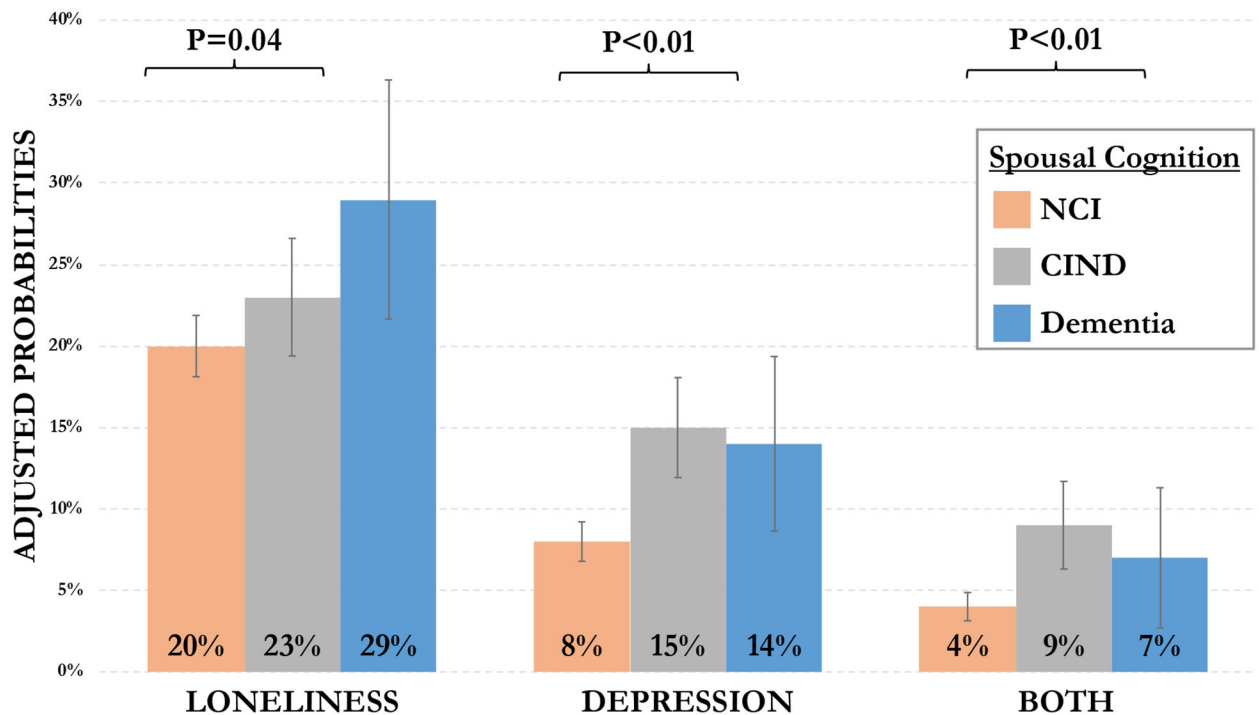


Figure 1. Adjusted Probabilities of Loneliness, Depressive Symptoms, and Both by Spousal Cognition

Adjusted probabilities were determined by multivariate logistic regression models adjusting for age, gender, race/ethnicity, education, social isolation, and spousal functional status and multimorbidity, in a U.S. population-based sample of N=4,071 couples. *P*-values represent an overall test of trend. Bars represent 95% CIs. Cognitive function was defined using Langa-Weir classification, including no cognitive impairment (NCI), cognitive impairment not dementia (CIND), or dementia. Loneliness was defined using the 3-item UCLA scale, and depressive symptoms using the CES-D 8 scale.

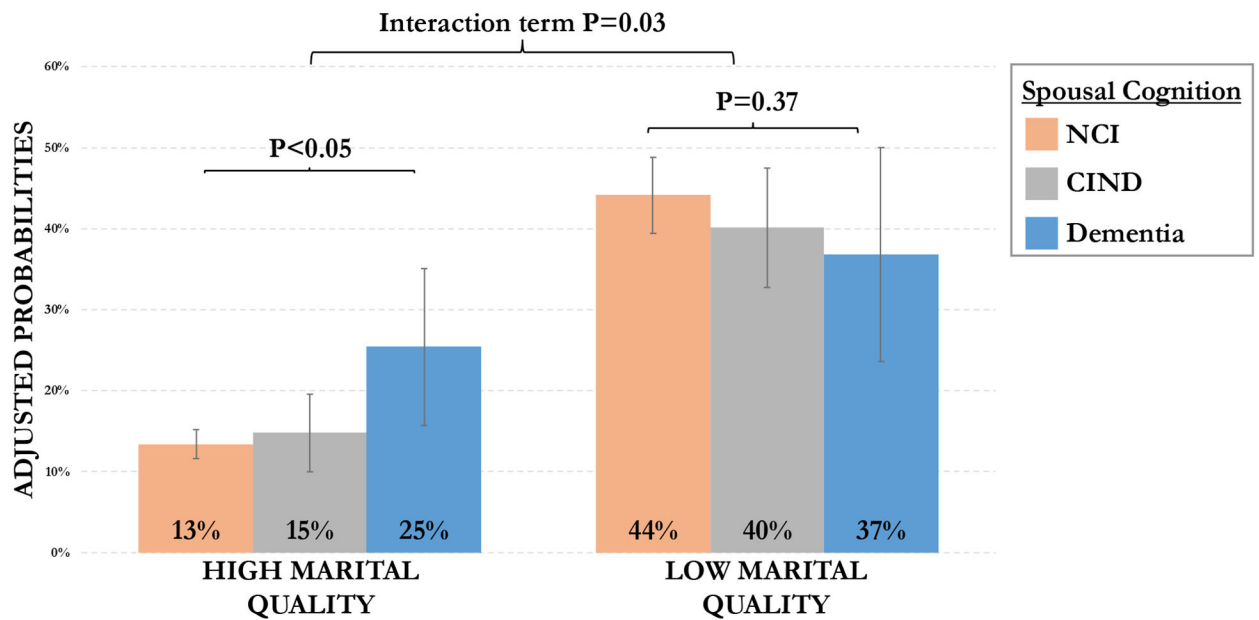


Figure 2. Adjusted Probabilities of Loneliness by Spousal Cognition and Marital Quality

Adjusted probabilities of loneliness were determined by a multivariate logistic regression model testing for an interaction term between marital quality and degree of spousal cognitive impairment, and adjusting for age, gender, race/ethnicity, education, social isolation, and spousal functional status and multimorbidity, in a U.S. population-based sample of N=4,071 couples. *P*-values represent an overall test of trend. Bars represent 95% CIs. Cognitive function was defined using Langa-Weir classification, including no cognitive impairment (NCI), cognitive impairment not dementia (CIND), or dementia. Loneliness was defined using the 3-item UCLA scale. High marital quality was assessed by the response of “a lot” or “some” to the first three questions and “very” or “quite close” to the fourth question: (1) How much does your spouse/partner really understand the way you feel about things?; (2) How much can you rely on your spouse/partner if you have a serious problem?; (3) How much can you open up to your spouse/partner if you need to talk about your worries?; and (4) How close is your relationship with your partner or spouse?

Table 1.Baseline Characteristics Overall and by Cognitive Status¹

Baseline Characteristic	Total population (N=4,071)	Spouse of person with NCI (N=2,959)	Spouse of person with CIND (N=885)	Spouse of PLwD (N=227)	P-value ²
Age, mean (SD)	66.7(9.6)	65.4(9.1)	69.4(9.9)	72.6(10.1)	<0.01*
Gender, Female, N(%)	2,231(55)	1,549(52)	531(60)	151(67)	<0.01*
Race/ethnicity, N(%)					<0.01*
White	2,909(71)	2,246(76)	533(60)	130(57)	
Black	503(12)	292(10)	166(19)	45(20)	
Hispanic	515(13)	307(10)	163(18)	45(20)	
Another Race	144(4)	114(4)	23(3)	7(3)	
Education, <HS, N(%)	426(10)	186(6)	176(20)	64(28)	<0.01*
Socially isolated, N(%) ³	197(5)	142(5)	43(5)	12(5)	0.95
High Marital Quality, N(%) ⁴	3,033(75)	2,312(78)	595(67)	126(56)	<0.01*
Years Married, mean (SD) ⁵	35.9(16.5)	34.5(15.7)	38.5(17.8)	43.8(17.9)	<0.01*
Partner ADL dep., N(%) ⁶	328(8)	143(5)	108(12)	77(34)	<0.01*
Partner multimorbidity, N(%) ⁷	2,461(60)	1,661(56)	630(71)	170(75)	<0.01*
Loneliness, N(%) ⁸	806(20)	559(19)	183(21)	64(28)	<0.01*
Depressive Symptoms, N(%) ⁹	403(10)	235(8)	134(15)	34(15)	<0.01*
Both, N(%) ¹⁰	206(5)	118(4)	73(8)	15(7)	<0.01*

¹Cognitive status was defined using Langa-Weir classification: (1) person with no cognitive impairment (NCI); (2) person with cognitive impairment, not dementia (CIND); or (3) person living with dementia (PLwD).

²P-values were derived from t-tests for age and years married, and chi-square tests for the remaining variables.

³Social isolation was identified based on a previously validated social connectedness score (2 on 0-6 scale) representing social isolation (Kotwal et al. Appendix Figure S1).²³

⁴High marital quality was assessed by the response of “a lot” or “some” to the first three questions and “very” or “quite close” to the fourth question: (1) How much does your spouse/partner really understand the way you feel about things?; (2) How much can you rely on your spouse/partner if you have a serious problem?; (3) How much can you open up to your spouse/partner if you need to talk about your worries?; and (4) How close is your relationship with your partner or spouse?

⁵Marriage or partnership duration was derived from a smaller cohort due to N=283 couples with missing data.

⁶ADL dependence of the partner living with cognitive impairment was defined as difficulty performing 1 activity of daily living.

⁷Multimorbidity of the partner living with cognitive impairment was defined as 2 self-reported chronic conditions, including diabetes, heart disease, lung disease, cancer, hypertension, stroke, or arthritis.

⁸Loneliness was defined using the 3-item UCLA scale (6 on 3-9 scale).⁷

⁹Depressive symptoms defined using the CES-D scale (4 on 0-8 scale).²⁰

¹⁰Both loneliness and depressive symptoms were assessed using the UCLA and CES-D scales as above.