

LETTER TO THE EDITOR

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Associations of social connections and motoric cognitive risk syndrome: A 4-year prospective cohort study

Dear Editor,

We are greatly fortunate to read the research of Joshi *et al.* (2023) and are interested in their research content. The study showed that social connections with lower risk of cognitive decline were related to social engagement and social activities. The lack of consensus on effective dementia treatment means that finding modifiable risk factors and effective early clinical evaluation tools is one of the key research contents at present (Lam & Lee, 2021). The motoric cognitive risk syndrome (MCR) is a pre-dementia stage that is recently discovered dementia syndrome defined by subjective cognitive complaint and sluggish gait (van der Leeuw *et al.*, 2020). As a convenient, low-cost, and effective clinical predictor, MCR has been widely used by the academic community in recent years (van der Leeuw *et al.*, 2020). Poor social connections (e.g., social isolation and loneliness) have been proven to be a key factor affecting the physical and mental health of older adults, especially cognition problems, including dementia, declining cognition, and subjective cognitive decline (Joshi *et al.*, 2023). However, the relationship between social connections with MCR in older adults is still unknown. This study sought to investigate the simultaneous association between social connections (i.e., social isolation and loneliness) with MCR using a prospective, multi-wave, longitudinal, and nationally representative large-scale survey.

Data were drawn from two waves of data (2011 and 2015) from the China Health and Retirement Longitudinal Study ($N = 2,969$ participants aged ≥ 60 years). To examine the association between social isolation and loneliness with MCR, we used the logistic regression to investigate the cross-sectional association and evaluated the longitudinal association based on generalized estimating equations (GEE) model parameter estimates, adjusted for confounders. Cohort definitions, data sources, and study variables are presented in the supplement (Zhao *et al.*, 2014).

At baseline, the average age of the 2,969 participants was 68.3 years (SD: 6.6 years). After 4 years, out of 1,848 longitudinal analytic samples, the mean age of the respondents rose to 71.0 years

(SD: 6.0 years), and 216 participants (11.7%) developed into new-onset MCR, score of social isolation was 2.0 (SD: 0.7 score), and the incidence of loneliness was 33.1%. (Supplementary Table S3)

Table 1 shows the correlations between social isolation and loneliness longitudinal with new-onset MCR based on GEE model parameter estimates. Social isolation was significantly associated with new-onset MCR after 4 years (Model 1B. OR: 0.984, 95%CI: 0.971–0.997; $p < 0.05$). As hypothesized, older adults with loneliness were related to a higher risk of new-onset MCR in the fully adjusted model (Model 2B. OR: 0.977, 95%CI: 0.955–0.999; $p < 0.05$). The interaction terms between social isolation and loneliness were not statistically significant for MCR (Model 4A and B. All p for interaction > 0.05), indicating that there was no synergistic effect between isolation and loneliness on MCR.

In this four-year longitudinal study, we found that social connections were associated with developing MCR among older adults. The majority of recent research has been on global cognition, largely ignoring any possible relationships between social connections and specific cognitive domains, such as MCR (Samtani *et al.*, 2022). Our findings add to previous research by providing new evidence for the relationship between social connection markers and specific cognitive areas.

Although distinct concepts, social isolation, and loneliness can together constitute a distinct geriatric syndrome, they are often used interchangeably, albeit they may have different associations with adverse health outcomes (Kuiper *et al.*, 2015; Penninkilampi *et al.*, 2018). Our study found that social isolation had no effect on the independent association between loneliness and MCR, and vice versa, indicating that there was no interaction between the two. In fact, previous studies on the relationship between social isolation and loneliness with other negative health outcomes (e.g., dementia, depressive symptoms, health span, and life span) found similar results (Kuiper *et al.*, 2015; Penninkilampi *et al.*, 2018). For example, a previous longitudinal cohort study in UK found that only social isolation is an early indicator of increased risk of dementia, not related to loneliness (Shen *et al.*, 2022). Social isolation and loneliness only have a weak correlation with one another (Spearman's correlation = 0.2) (Benson *et al.*, 2021). This demonstrates that, while social isolation and loneliness are both common and serious issues, they differ significantly not only in terms of definitions but also in terms of negative health consequences.

Table 1. Longitudinal analysis on predicting MCR from social connections at follow-up

PREDICTORS	MODEL 1 ^c		MODEL 2 ^d		MODEL 3 ^e		Model 4 ^f	
	A [OR (95% CI)] ⁺	B [OR (95% CI)] ⁺	A [OR (95% CI)] ⁺	B [OR (95% CI)] ⁺	A [OR (95% CI)] ⁺	B [OR (95% CI)] ⁺	A [OR (95% CI)] ⁺	B [OR (95% CI)] ⁺
Age (years)	1.002 (1.001–1.003)**	1.002 (1.001–1.003)**	1.002 (1.001–1.003)**	1.002 (1.001–1.004)**	1.002 (1.000–1.003)*	1.002 (1.001–1.003)**	1.002 (1.000–1.003)*	1.002 (1.001–1.003)**
Sex (male)	0.904 (0.879–0.930)***	0.906 (0.866–0.947)***	0.900 (0.858–0.943)***	0.906 (0.875–0.938)***	0.893 (0.859–0.928)***	0.899 (0.866–0.934)***	0.892 (0.858–0.928)***	0.899 (0.865–0.934)***
Education level (lower)	0.986 (0.963–1.011)	0.991 (0.967–1.015)	0.988 (0.964–1.012)	0.991 (0.967–1.015)	0.989 (0.965–1.013)	0.992 (0.968–1.016)	0.988 (0.965–1.013)	0.991 (0.968–1.016)
Residence (rural)	1.002 (0.977–1.027)	1.007 (0.982–1.032)	1.007 (0.982–1.033)	1.010 (0.985–1.036)	1.005 (0.980–1.031)	1.008 (0.983–1.034)	1.005 (0.980–1.031)	1.008 (0.983–1.034)
Current drinkers (yes)	—	1.008 (0.987–1.029)	—	1.008 (0.988–1.030)	—	1.008 (0.987–1.029)	—	1.008 (0.987–1.029)
Current smokers (yes)	—	0.989 (0.964–1.014)	—	0.990 (0.965–1.015)	—	0.990 (0.965–1.015)	—	0.990 (0.965–1.015)
CESD-9	—	1.007 (1.005–1.009)***	—	1.006 (1.003–1.008)***	—	1.006 (1.004–1.008)***	—	1.006 (1.004–1.008)***
Chronic disease (yes) ^a	—	0.998 (0.979–1.017)	—	0.999 (0.980–1.018)	—	0.999 (0.980–1.018)	—	0.999 (0.980–1.018)
Physical activity (yes) ^b	—	1.002 (0.982–1.023)	—	1.003 (0.983–1.024)	—	1.003 (0.983–1.024)	—	1.003 (0.983–1.024)
Social isolation	0.984 (0.971–0.997)*	0.984 (0.971–0.997)*	—	—	0.986 (0.974–0.999)*	0.985 (0.973–0.998)*	0.988 (0.965–1.011)	0.987 (0.964–1.010)
Loneliness	—	—	0.957 (0.937–0.977)***	0.977 (0.955–0.999)*	0.959 (0.939–0.979)***	0.979 (0.958–1.002)	0.964 (0.908–1.023)	0.984 (0.926–1.044)
Social isolation * Loneliness	—	—	—	—	—	—	0.997 (0.970–1.026)	0.998 (0.970–1.026)

Notes: MCR = motoric cognitive risk syndrome; CESD-9 = 9-item Center for Epidemiologic Studies Depression Scale; OR = odds ratio; 95% CI = 95% confidence interval.

^a Chronic disease: hypertension, arthritis (rheumatism), or stomach (digestive) disease.

^b Physical Activity: vigorous physical activity, moderate physical activity, or light physical activity.

^c Model 1: social isolation as predictor.

^d Model 2: loneliness as predictor.

^e Model 3: both social isolation and loneliness as predictors.

^f Model 4: Model 3 + social isolation * loneliness interaction.

⁺ All Models A were adjusted for age, sex, education level, and residence; All Models B is Model A plus the inclusion of current drinkers, current smokers, CESD-9, chronic disease, and physical activity.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In the future, more independent measurements of social isolation and loneliness will be required to further clarify the potential correlation mechanism.

Many interventions are currently being proposed to reduce social isolation and loneliness in older people, with the primary goals of improving social skills (e.g., interpersonal communication skills), strengthening social support (e.g., children's company), and increasing social interaction (e.g., chatting) (Kuiper *et al.*, 2015; Penninkilampi *et al.*, 2018). However, interventions to combat social isolation or loneliness have their own limitations. For example, loneliness can only be alleviated by changing one's negative mindset, which is unrealistic (Kuiper *et al.*, 2015; Penninkilampi *et al.*, 2018). Significantly, interventions that target social isolation may also lessen loneliness because social isolation might be considered a risk factor for loneliness (Fakoya *et al.*, 2020). Therefore, all intervention strategies to combat social isolation and loneliness must be further researched based on their characteristics.

In conclusion, poor social connections (i.e., social isolation and loneliness) have a longitudinal independent association with risk of MCR. Although effectively resolving social connections is a complex public health problem, it has a significant future potential to reduce or even prevent dementia in older adults.

Conflicts of interest

The authors have no conflicts of interest to declare.

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Description of author(s)' roles

H.X. Liang planned the study, performed all statistical analyses, and wrote the paper. Y.H. Liang planned the study and performed statistical analyses. Y. Fang helped to plan the study, including the instrumentation, and to revise the manuscript.

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Ethical statement

The study was approved by the Ethical Review Committee of Peking University (IRB000010 52-11015), which required informed consent to be obtained.

Data availability



Data available on request from the authors.

Supplementary material

The supplementary material for this article can be found at <https://doi.org/10.1017/S104161022400036X>.

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