Internet Use and Cognitive Function in Older Adults: A Narrative Review by Cognitive Outcome

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Abstract: *Internet use has become a common part of later life, but whether its association with cognitive aging differs across cognitive outcomes remains unclear. This narrative review synthesizes evidence published between 2020 and 2026 on the association between internet use and cognitive function in middle-aged and older adults. Evidence for episodic memory is comparatively consistent; findings for orientation and executive function remain limited and heterogeneous—whether this reflects smaller effects or measurement differences is unclear. Studies using global cognition and dementia incidence generally report favorable associations, but the evidence is primarily observational and remains open to self-selection, confounding, and reverse causation. Proposed mechanisms include cognitive stimulation, social participation, and psychological well-being, but most mediation studies are cross-sectional and cannot establish temporal ordering. The associations also vary with duration, purpose, age at first use, and socioeconomic context. Future research should adopt domain-specific measures and longitudinal or quasi-experimental designs, and model internet use as a multidimensional exposure rather than a binary indicator.*

Keywords: *internet use; older adults; cognitive function; episodic memory; dementia; digital divide*

1. Introduction

Population aging and digitalization are two parallel processes reshaping Chinese society. Between 2010 and 2022, internet use among Chinese adults aged 60 and above climbed from 4.9% to 54.5%, and going online has become part of everyday life for older people (Jin et al., 2024). Digital inclusion, however, remains uneven: the divide shows up not only in access but also in usage skills and knowledge gains (Lu & Wei, 2021). As aging deepens, cognitive decline and its extreme forms—mild cognitive impairment and dementia—place a growing burden on families and society, making the search for modifiable factors urgent. Although the review draws on evidence from several countries, China offers an especially relevant context: population aging and digital inclusion are unfolding there simultaneously and rapidly.

Is internet use one of these factors? Most studies report favorable associations. In longitudinal analyses, Kamin and Lang (2020) found that older internet users performed better on cognitive tests, while a systematic review identified 136 eligible studies, 57 of which were included in a quantitative meta-analysis covering 411,430 adults; digital technology use was associated with lower odds of cognitive impairment (odds ratio 0.42) and slower cognitive decline (hazard ratio 0.74) (Benge & Scullin, 2025). This literature, however, shares a methodological habit: cognition is compressed into a single total score. In the major surveys, cognition is measured by several subtests—word recall for episodic memory, naming the date for orientation, serial sevens for calculation and attention, figure copying for visuospatial skills—and these components may not respond equally to behavioral engagement. Collapsing a multidimensional measurement into one score can hide real differences in what internet use is associated with in each domain.

Two further gaps stand out: many studies are cross-sectional, making causal direction difficult to establish, and descriptions of internet use itself—what functions people use and for how long—remain crude. This review therefore organizes recent evidence along the dimensional structure of cognitive function, asking which domains of cognition internet use is associated with in older adults, how strong the evidence is, and through what mechanisms the associations might operate; it then turns to disagreements

and limitations, and closes with future directions.

2. Review Method and Scope

This article is a narrative review rather than a systematic review. Literature was identified through CNKI and Europe PMC, supplemented by searches of major academic publisher platforms (ScienceDirect, SpringerLink, Wiley Online Library, Frontiers, MDPI), using combinations of the terms internet use, older adults, cognitive function, and dementia, covering 2020–2026; the search was conducted in October 2026. Seventy-six records were identified; after removing duplicates, non-journal items, and studies without cognitive outcomes for middle-aged or older adults, 57 articles were read in full; the 29 most relevant to the three questions are cited here, while the remaining studies informed background comparison or were excluded for substantial overlap or limited additional information. The selection was purposive rather than exhaustive, prioritizing representative and methodologically informative studies.

The exposure itself also needs clarification, because the studies reviewed here measure internet use differently. Five forms can be distinguished: general use (whether and how often one goes online), platform use (e.g., WeChat), device use (smartphones or computers), purpose-specific use (socializing, information seeking, gaming), and digital exclusion or isolation, where access is lacking altogether. Digital health interventions form a separate category, since the exposure is designed by researchers rather than chosen by participants. These categories are related but not interchangeable: intervention studies are labeled as such below, and digital exclusion is treated as the absence of the exposure rather than a form of it. Finally, the three categories used below are pragmatic rather than strictly hierarchical: the first two represent domain-specific outcomes, whereas the third groups global scores with clinical endpoints, as studies in that category typically report them together.

3. Evidence across Three Cognitive Outcome Categories

Organizing the evidence by outcome is warranted because cognition is multidimensional in measurement, and the "use it or lose it" hypothesis implies that a cognitively stimulating activity may not relate to every component equally.

3.1 Episodic Memory: The Most Consistent Domain

Evidence linking internet use to better episodic memory is comparatively consistent across the studies reviewed here. Hua and Wang (2022) found cross-sectionally that WeChat users performed significantly better on memory tests, with depressive symptoms mediating the link. Longitudinal work points the same way: WeChat use is associated with preserved episodic memory among middle-aged and older Chinese adults (Zhou et al., 2024), and in a cross-lagged analysis of three waves of data from the English Longitudinal Study of Ageing, Toh and Khoo (2025) found use frequency prospectively associated with subsequent memory performance. Comparing five cohorts across 32 countries, Yuan et al. (2025) likewise found the associations strongest in the memory domain.

Evidence in this domain spans cross-sectional, longitudinal, and cross-lagged designs. Yet the same cross-lagged evidence shows that older adults with better cognition go on to use the internet more frequently (Toh & Khoo, 2025), so bidirectional causality is not ruled out even here.

3.2 Orientation and Executive Function: The Least Examined Domain

Studies examining orientation, calculation, and executive function as separate outcomes are rare, and findings here are less consistent than those for memory. The multi-cohort analysis of Yuan et al. (2025) places the association for orientation last among all cognitive domains; dedicated tests of executive function appear only sporadically (Xu, Li, et al., 2026); and the intervention meta-analysis by C. Chen et al. (2025) reports uneven domain-level effect sizes, with executive function and working memory responding less than global cognition.

Whether this pattern reflects genuinely smaller associations or differences in measurement and research

attention remains unclear: orientation is typically measured with fewer items than memory and is often not reported separately. One interpretation, drawing on cognitive reserve theory, is that internet use supplies stimulation that can be practiced and accumulated, so memory may benefit most—but this remains speculative. What the evidence does suggest is that the associations are not uniform across cognition; more domain-specific studies are needed to establish their boundaries.

3.3 Global Cognitive Status and Dementia Risk: The Largest Body of Evidence

Studies using global cognition, mild cognitive impairment, and dementia as outcomes form the largest body of evidence, with the longest follow-up. Intervention studies provide complementary evidence: meta-analyses of randomized trials indicate that digital technology interventions improve global cognitive function in older adults (C. Chen et al., 2025), and pooling 15 such trials, Xu, Qiu, et al. (2026) found benefits for those with subjective cognitive decline or mild cognitive impairment. Because these trials examine researcher-designed interventions rather than everyday internet use, they speak more to the potential of structured digital engagement than to the correlates of going online in daily life.

Long-term cohort studies provide stronger temporal evidence than cross-sectional designs. Drawing on up to 17.1 years of U.S. Health and Retirement Study follow-up, Cho et al. (2023) found that regular internet users had approximately half the dementia risk of non-regular users in that cohort, an association that remained after adjustment for observed indicators of self-selection and baseline cognitive decline. Two prospective Japanese cohorts report results in the same direction (Nakagomi et al., 2025; Imamura et al., 2025), and Deng et al. (2025) found digital isolation prospectively associated with dementia risk in a national U.S. cohort.

Evidence from China points the same way. Using three CHARLS waves with an instrumental-variable design, Tang et al. (2026) obtained estimates consistent with a possible causal contribution of internet use to cognitive ability, although such estimates rest on instrument validity. A five-year follow-up by B. Chen et al. (2024) linked sustained internet use to a lower risk of neurodegenerative disease. Community-level research links longer histories of online social networking to a lower risk of mild cognitive impairment (Feng et al., 2021), and pooling longitudinal data from five countries including China, Wang et al. (2024) found digital exclusion associated with elevated cognitive impairment risk.

Most studies report results in the same direction, though magnitude and causal interpretation vary by design: cross-sectional studies often report larger associations, whereas studies addressing self-selection tend to yield more modest estimates. This pattern is consistent with the possibility that self-selection and reverse causation have not been fully eliminated.

4. Mechanisms: Three Candidate Pathways

Through what routes might internet use be linked to cognition? Theory and evidence point to three candidate pathways, differing in how directly they have been tested.

The first is the cognitive reserve pathway. The "use it or lose it" hypothesis and cognitive reserve theory hold that internet use, as a cognitively stimulating activity, may compensate for brain aging by building reserve; both Cho et al. (2023) and Tang et al. (2026) adopt this framework. The pathway mainly supplies theoretical explanation, however, and has rarely been tested directly, so it should be read as a hypothesis rather than an established mechanism.

The second is the social pathway, which enjoys the most empirical support. Internet use expands the social networks and social participation of older adults, which in turn are linked to cognition. Structural equation modeling by Zhu et al. (2025) shows that social networks and depressive symptoms act as statistical mediators between internet use and cognition. Working with different datasets, Pan and Liu (2026) and X. Chen et al. (2025) each identified social participation as a significant mediator, while Yu et al. (2024) found social support's mediating role especially pronounced among rural older adults. Behavioral evidence also fits: online community participation can restructure older adults' family and friendship networks (Xie et al., 2022), and use frequency was prospectively associated with contact frequency and intimate network size two years later (Toh & Khoo, 2025). Purpose-specific evidence marks a boundary of this pathway: Tang et al. (2022) found that interpersonal uses expand social networks, whereas information-

seeking uses may shrink them.

The third is the psychological and behavioral pathway. Hua and Wang (2022) and Tang et al. (2026) both found that lower levels of depressive symptoms statistically mediated the observed internet use–cognition association, and Tang et al. (2026) further showed that health behaviors such as physical activity contributed comparatively little to the association in that study. Notably, in the chain-mediation analysis of X. Chen et al. (2025), the direct internet use–depression association was not significant; the observed association was largely accounted for by the indirect paths included in the model.

Taken together, available mediation studies are consistent with the possibility that social participation and psychological well-being jointly mediate the internet use–cognition association. Most of these studies are cross-sectional, however, so the temporal ordering of the pathways remains uncertain. A serial structure—internet use first reshapes social structure, then psychological state, and finally cognition—is one plausible account, but longitudinal mediation evidence is needed before it can be accepted.

5. Controversies and Disagreements

Although favorable associations dominate the literature, the studies reviewed here still disagree on three questions.

The first is causal direction. Cross-lagged analyses by Tang and Zheng (2026) show that older adults in poorer mental health are less willing to go online, implying that the digital divide has a psychological barrier and the association may run both ways. Kim and Han (2022) further found the associations of starting and stopping internet use to be asymmetric: starting use was associated with better performance and slower decline, whereas stopping use was associated with poorer performance and faster decline. Toh and Khoo (2025) add that cognitive function is itself prospectively associated with later internet use. Reading the overall association as one-way causation is risky; future designs should adopt random-intercept cross-lagged models or instrumental-variable methods.

The second question concerns dosage and possible negative effects. Cho et al. (2023) reported estimates suggestive of a U-shaped relationship between daily internet use and dementia risk, with the lowest estimated risk among those online for 0.1 to 2 hours per day; however, the duration-specific estimates were not statistically significant because of small subgroup sizes. In the Kailuan cohort, Li et al. (2026) found excessive use associated with worse cognitive performance, and Jin et al. (2024) reported a similar pattern. Yu et al. (2024) further caution that particular functions may be harmful: among rural older adults, playing games is negatively related to cognitive function. Asking whether going online is good or bad is the wrong question; the meaningful one is who uses which functions for how long.

The third question concerns the direction of heterogeneity. Machine-learning evidence from Nakagomi et al. (2025) indicates that the association between internet use and lower dementia risk is stronger among people with middle income, higher education, and low social activity, implying that universal promotion might widen cognitive inequality. With Chinese data, however, Tang et al. (2026) reached an apparently opposite conclusion: rural residents, the less educated, and those who started in midlife show stronger associations. The two findings need not conflict: heterogeneity may depend on a population's stage of digital penetration. In rural China, where access is still incomplete, the marginal return to going online may remain high; in digitally saturated Japan, benefits may have begun to concentrate among advantaged groups. This interpretation remains hypothetical and requires direct cross-national testing.

6. Limitations and Future Directions

Existing research has three limitations. First, cognition is usually reduced to a single total score, which conceals domain differences and may average away real associations. Second, although longitudinal and quasi-experimental evidence from China is emerging, it remains less extensive and less independently replicated than evidence from American, Japanese, and European cohorts, leaving local causal evidence relatively limited. Third, the exposure is still captured as a binary use-or-not measure, and function type, duration, and age at first use are rarely modeled together. In addition, as a narrative review with purposive study selection, this article does not claim exhaustive coverage.

Three directions follow. First, research should move from total scores to domain-specific tests, exploiting the subtest structure in surveys such as CHARLS and CFPS to model each domain separately and clarify the boundaries of the associations. Second, research should move from correlation toward causal inference, extending the cross-lagged designs of Tang and Zheng (2026) and Toh and Khoo (2025) and the instrumental-variable strategy of Tang et al. (2026) to confront bidirectional causality and self-selection. Third, research should move from whether one uses to a usage profile. Tang et al. (2022) linked function type to the direction of the associations, Cho et al. (2023) showed that duration relates to dementia risk in a U-shape, and Tang et al. (2026) showed that age at first use shapes their strength, while Xiao et al. (2026) have begun to decompose internet use into access, intensity, proficiency, and function type. Future studies should treat who uses what for how long as a combined variable.

For policy and practice, digital mentoring for older adults should not stop at teaching them to get online; it might also emphasize potentially beneficial patterns, such as socially oriented use and moderate duration, while recognizing that the optimal timing and content of use remain uncertain. In rural China, where digital access remains uneven, promoting digital inclusion may be a scalable and relatively low-cost strategy for supporting cognitive health, although its cognitive benefits and cost-effectiveness require direct evaluation.

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