The Relationship Between ICT Use and Age-Related Cognitive Decline in Older Adults: A Longitudinal Meta-Analysis

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Abstract/Background

Definitions/Existing Facts:

- Information communication technology (ICT) refers to all communication devices and services, such as computers, social media, and artificial intelligence (AI).
- A longitudinal study is a research method in which researchers observe the same group of participants over an extended period. This helps researchers identify patterns and investigate how things change over time.
- A meta-analysis is a method of synthesizing quantitative data from multiple independent studies to test for statistical significance.
- Some existing studies suggest that ICT use has both positive and negative impacts on cognition across various age ranges.
- As the global population ages, maintaining cognitive health has become increasingly important.

Shortcomings:

- The long-term effects of ICT use have not been thoroughly researched, particularly in aging populations.

Purpose:

- Our meta-analysis investigates the link between ICT use and age-related cognitive decline in older adults aged 50 and above at baseline.
- The purpose of our research is to examine how various modalities of ICT impact cognitive function in this demographic.

Methods

Participants/Procedures:

- Using Covidence, a web-based platform used to streamline the systematic review process, we conducted a meta-analysis of existing independent studies.
- Our study only includes objectively cognitively healthy older adults aged 50 and above at baseline. Various cognitive tests were used to assess cognition.
- The meta-analysis is a three-step process consisting of title and abstract screening, full-text screening, and extraction.
- At least two trained reviewers were assigned to each study and had to reach a consensus for the study to move on to the next stage.
- If there were any discrepancies, a third reviewer was used to resolve conflicts.

Data Analysis:

- A total of 251 studies were screened for inclusion.
- 87 full-text studies were assessed for eligibility.
- 35 studies were excluded for using the wrong study design (e.g., cross-sectional, case-control, interventional).
- 18 studies were excluded for using the wrong population.
- 10 studies were excluded for being about the wrong subject matter.
- 2 studies were excluded for not using objective cognitive measurements.
- 22 cases fulfilled all inclusion criteria and were kept for analysis.

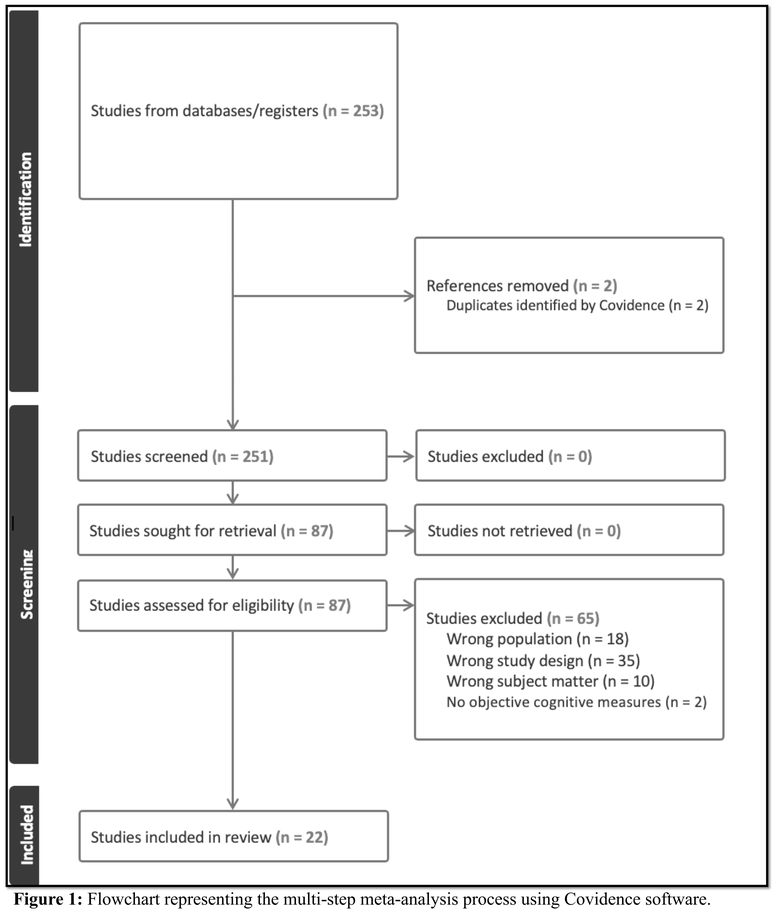

Figure 1: Flowchart representing the multi-step meta-analysis process using Covidence software.

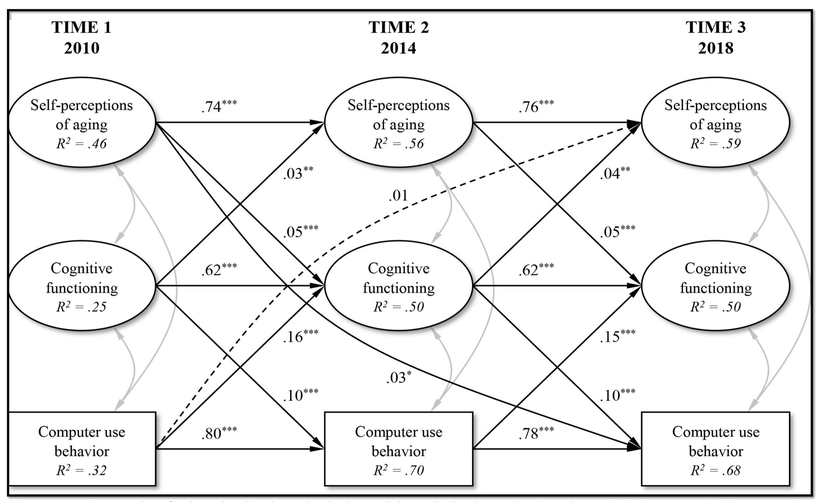

Figure 2: Example of a longitudinal study design with statistical results (Mariano, J., Marques, S., Ramos, M. R., & de Vries, H. 2021).

Preliminary Results

Preliminary findings suggest that:

- ICT use is associated with enhanced cognitive ability.
- Frequency of ICT usage was an effective measure of cognitive functioning.
- ICT use may promote neuroplasticity, helping the brain maintain proper function over time.
- Studies employing objective cognitive measures reported stronger relationships between ICT use and cognition.
- Older adults who engaged in social ICT activities (e.g., video calls, social networking) fared better cognitively than those who used ICT for passive viewing (e.g., news reading).

Limitations include:

- Variations in the measurement of ICT use between studies.
- Lack of long-term follow-up data in some studies.
- Potential self-selection bias, since already mentally engaged people would be inclined to utilize ICT.

Discussion

Significance of results:

- May help researchers work toward slowing or reversing the effects of cognitive decline in older adults.
- Findings may lead to developments in ICT use as a protective factor against dementia and other neurodegenerative diseases.

Ongoing research:

- Additional research is needed to examine causal relationships between ICT use and cognitive functioning.
- Standardized indicators of ICT use must be constructed to ensure maximum comparability between studies.
- Additional research is needed to explore specific facets of cognition most affected by ICT use.

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References

1. Mariano, J., Marques, S., Ramos, M. R., & de Vries, H. (2021, April 3). *Cognitive functioning mediates the relationship between self-perceptions of aging and computer use behavior in late adulthood: Evidence from two longitudinal studies*. Computers in Human Behavior. https://www.sciencedirect.com/science/article/pii/S0747563221001308?via%3Dihub