Dyadic Digital Health Interventions for Persons with Dementia and Their Family Caregivers: A Systematic Scoping Review

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INTRODUCTION

- User-facing digital technologies, like mobile applications or videoconferencing, have enhanced or even replaced in- person delivery of health interventions
- Innovative solutions must be accessible, acceptable, and scalable to meet the unique health needs of the growing number of adults with cognitive impairment, Alzheimer's disease, or other dementias and their family caregivers, including all informal care partners, who support them[1]
- Addressing individuals with dementia and their family caregivers together as dyads rather than separately may provide additional benefits

PURPOSE

The purpose of this scoping review is to identify and describe dyadic digital health interventions for adults with cognitive impairment or dementia and their family caregivers.

METHODS

Systematic search of the literature following the guidelines outlined in the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR)[2]

Databases Searched

- PubMed, CINAHL, PsycINFO

Search Strategy

- Search terms: (see Table 1):
  - Dementia or cognitive impairment
  - Family caregivers
  - Digital health interventions
- Search limits:
  - Article language: English; No publication date limits

Selection Criteria

- Inclusion criteria:
  - Dyads of adults with dementia or cognitive impairment AND their respective family caregivers
  - Both actively involved in digital health intervention
  - Any trial design
- Exclusion criteria:
  - Review articles, study protocols, or other non-trial study designs or reports

Screening

- Independent assessment by 2 reviewers at title and abstract screening stage and full-text screening stage
- Discrepancies resolved through discussion with third reviewer

Data Management

- Rayyan web-based software was used to import search records, manually screen, and extract data

Table 1. Full Search Strategy Example: PubMed

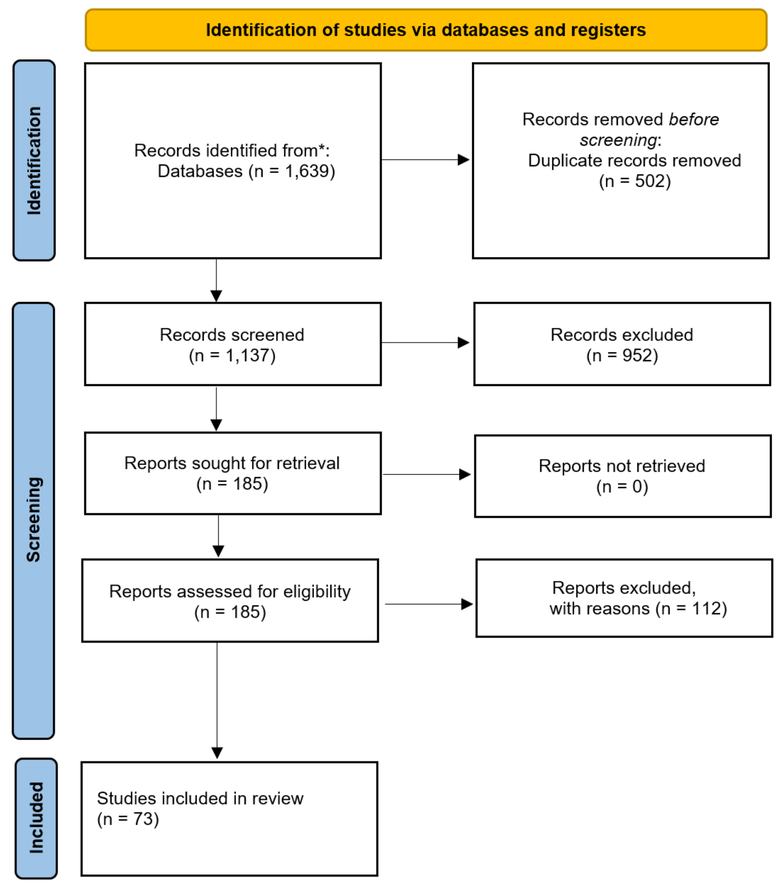
Search	Concept	Search terms
1	Dementia or cognitive impairment	"dementia"[MeSH Terms] OR "cognitive dysfunction"[MeSH Terms] OR "dementia*"[Title/Abstract] OR "cognitiv* impair*"[Title/Abstract]
2	Family caregivers	"caregivers"[MeSH Terms] OR "family caregiv*"[Title/Abstract] OR "care partner*"[Title/Abstract] OR "family member*"[Title/Abstract] OR "informal caregiv*"[Title/Abstract] OR "carer*"[Title/Abstract]
3	Population: Dementia or cognitive impairment AND family caregivers	#1 AND #2
4	Digital health intervention	"internet"[MeSH Terms] OR "telemedicine"[MeSH Terms] OR "mobile applications"[MeSH Terms] OR "videoconferencing"[MeSH Terms] OR "digital health"[MeSH Terms] OR "internet"[Title/Abstract] OR "ehealth"[Title/Abstract] OR "e-health"[Title/Abstract] OR "mhealth"[Title/Abstract] OR "m-health"[Title/Abstract] OR "digital health*"[Title/Abstract] OR "digital interfac*"[Title/Abstract] OR "digital tech*"[Title/Abstract] OR "digital info*"[Title/Abstract] OR "mobile app*"[Title/Abstract]
	Full search	#3 AND #4

RESULTS

Search Results

- n = 73 full-text articles included in review (Figure 1)

Figure 1. PRISMA Diagram



Data Extraction Summary

- Study Identification
  - Year of publication: range 2012-2025
- Participants
  - Adults with cognitive impairment or dementia
    - Diagnosed or experiencing cognitive symptoms without diagnosis
    - Full range from mild cognitive impairment to advanced dementia
  - Family caregivers
    - Spouses, partners, adult children, other family relationships, friends, some paid caregivers
- Study Design
  - Randomized controlled trials comparing intervention to waitlist or usual care; single-arm trials, pilot studies
- Intervention
  - Several types of digital health interventions with varying health-related purposes and active components for each dyad member (Table 2)
- Outcomes
  - Multiple physical, cognitive, psychosocial, and feasibility outcomes were represented (Table 3)

Table 2. Summary of Intervention Components

Intervention Component	Summary

Type of Digital Health Intervention	• Mobile or web-based application
	• Telehealth/telemedicine
	  • Telephone or videoconference visits with health provider
	  • Telerehabilitation/teletherapy sessions (e.g. cognitive and/or physical rehabilitation, speech-language therapy, music therapy, chair yoga)
	  • Telecommunication within dyads (e.g. hospitalized patient and family member outside of hospital)
	• Devices (e.g. telepresence robot, tablet-based task prompter)

Health-related purpose of intervention	• Improve well-being, health education, facilitate appropriate resource utilization, facilitate health and/or illness communication, optimize medication prescribing, promote physical activity, provide health services, support self-care/self-management, pain management, rehabilitation, sleep management, reminiscence
Active component for individual with dementia or cognitive impairment	• Participation in the intervention: e.g. using an app, accessing a website, attending videoconference sessions, using a device
Active component for family caregiver	• Participation in the intervention: e.g. using an app, accessing a website, attending videoconference sessions, using a device • Support for individual with dementia or cognitive impairment in participating in the intervention: facilitating technology use, scheduling and/or keeping track of appointments

Table 3. Summary of Outcomes Assessed in Included Studies

Outcomes for Individuals with Dementia or Cognitive Impairment	Outcomes for Family Caregivers

• Cognitive status
• Depression
• Anxiety
• Health services utilization
  • Emergency department visits
  • Hospitalizations
• Goal attainment
• Self-esteem
• Dyadic relationship quality
• Medication burden
• Neuropsychiatric symptoms
• Well-being/Quality of Life
	• Caregiver burden
	• Distress
	• Depression
	• Anxiety
	• Self-efficacy
	• Competence
	• Dyadic relationship quality
	• Perceived hassles of medication administration
	• Quality of life

• Feasibility of interventions, acceptability and usability of technology, satisfaction
  • Usage data, e.g. number of times accessed, task completion, attendance
  • Qualitative reports of benefits, barriers and challenges with technology
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	  • Usage data, e.g. number of times accessed, task completion, attendance
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Intervention Impacts

- Health
  - Digital delivery for health interventions is frequently feasible, highly acceptable, and usable for dementia caregiving dyads
- Feasibility
  - Some studies demonstrated positive impacts on physical or mental health or other psychosocial health outcomes
    - Digital health interventions may require initial training and ongoing support for dyads using technology
    - Dyad preferences and values regarding technology use should be taken into account by health researchers and providers

Limitations

- Scoping review design and heterogeneity of included studies preclude quantitative meta-analysis
- Dyadic conceptualization of caregiving may not always completely represent caregiving situations

CONCLUSION

- This review identified a wide variety of digital health interventions for adults with cognitive impairment or dementia and their family caregivers, many with potential to slow decline, maintain health, or improve outcomes in ways that are feasible, acceptable, and scalable
- Design of future digital health interventions and implementation of existing evidence-based interventions should be tailored to build on strengths and meet the health needs of dementia caregiving dyads

REFERENCES

1. Committee on Family Caregiving for Older Adults, Board on Health Care Services, Health and Medicine Division, National Academies of Sciences, Engineering, and Medicine, National Academies Press. In: Schulz R, Eden J, editors. Families caring for an aging America. Washington, D.C.: National Academies Press (US); 2016.
2. Tricco AC, Lillie E, Zarin W, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med. 2018;169(7):467–73.

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