

Teleneuropsychology in Clinical Practice: Current standards and future directions

Lindsay Clark, PhD

Assistant Professor / Clinical Neuropsychologist

University of Wisconsin – Madison School of Medicine & Public Health

Madison VA Geriatric Research Education and Clinical Center (GRECC)



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1

Learning Objectives



Describe the current evidence-based standards and guidelines for conducting neuropsychological assessments via telehealth



Evaluate the benefits and limitations of teleneuropsychological services across diverse patient populations and clinical settings



Discuss emerging trends, innovations, and future directions in teleneuropsychology, including advancements in digital tools and remote cognitive testing platforms



2

Why telehealth?

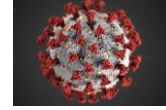


Photo by [Dave Hoefler](#) on [Unsplash](#)

Person living in rural area with limited access to specialty care



Person who is homebound or has limited access to transportation



Covid-19 or other conditions that limit in-person contact



3

What is Teleneuropsychology (TeleNP)?

Teleneuropsychology: the application of audiovisual technologies to conduct neuropsychological assessment and interventions with patients remotely located in clinic or home settings (Bilder et al., 2020)



In-Clinic or Satellite Model



- Larger hospital to outlying clinics (most common pre-Covid)
- Provider/patient separate rooms in same location (during/post-Covid)

In-home or Direct-to-Home Model



- Provider at clinic or home/patient at their home
- No evidence-base for this pre-Covid

Emerging Models



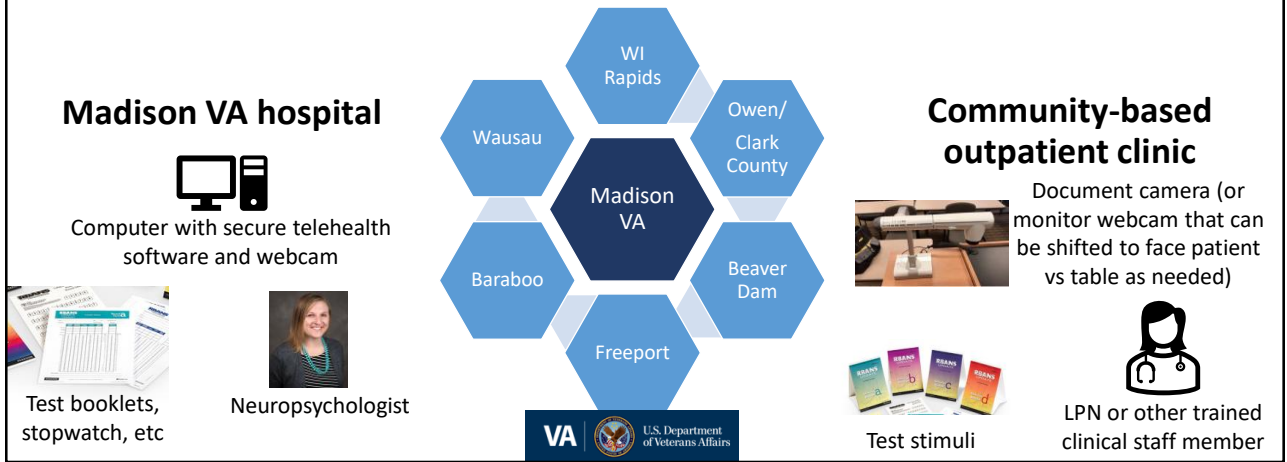
- Self-administered remote digital cognitive assessment

4

Teleneuropsychology – In-Clinic Model



Purpose: Address healthcare disparities by expanding access to neuropsychology services to those in rural or other areas that lack access to specialty care



5

Teleneuropsychology – In-Clinic Model

Initial practice guidelines (2011 Grosch, Gottlieb, Cullum)

Informed Consent

- Explain purpose of assessment and any limits of confidentiality regarding information transmitted over internet or televideo
- Information regarding retention/storage of data or involvement of third parties with access to information
- Highlight risks/benefits of telecognitive procedures

Competence

- Take reasonable steps to ensure competence in the practice of telecognitive assessment, including appropriate experience and education

Privacy & Confidentiality

- Establish security protocols (e.g., data encryption) to ensure maximum protection of PHI
- Make patients aware of all people in both rooms
- Emphasize that privacy cannot always be guaranteed

Licensure

- Obtain licensure in both jurisdictions, obtain temporary licensure in the remote state, or obtain an Interjurisdictional Practice Certificate if available

As of 2025, 42 states participate in PSYPACT – allows psychologists to practice telepsychology in participating states without additional licensure (<https://psypact.gov/page/psypactmap>)



6

Teleneuropsychology – In-Clinic Model

Initial practice guidelines (2011 Grosch, Gottlieb, Cullum)

Assessment

- Use tests empirically demonstrated to be appropriate for use in teleNP.
- Ensure videoconference interaction mimics face-to-face administration as much as possible.
- Describe limitations, including modifications, in report. Discuss how changes may have affected results or interpretation.
- Describe any transmission interruptions or other situational factors that may have affected test administration.
- For writing/drawing tests, ensure there is a system to transmit test data to the practitioner (e.g., faxing or scanning).

Technology

- High-quality videoconferencing equipment with adequate transmission speed to optimize sound and picture quality
- Be aware of equipment necessary and make effort to use such equipment (e.g., remote controlled cameras)
- Staff at the remote location to assist with supplies, technical difficulties, or other issues. Staff should not be present in the room during testing but should be available to the patient if needed.



7

Teleneuropsychology – In-Clinic Model

Early literature demonstrated feasibility and user acceptability

202 urban (Dallas, TX) and rural (Talihina, OK serving Choctaw Nation) older adults

- 59% healthy controls and 41% with MCI or dementia (range of MMSE went as low as 15)
- In-person vs televideo (room to room in clinic or clinic to clinic); no additional remote assistance
- No significant problems with audio or visual transmission or patients' ability to understand and comply with instructions
- Good agreement between VTC and face-to-face test scores (mean correlation=.74)

Cullum et al., 2014

Consistently positive feedback from older adults with and without cognitive impairment, including appreciation for the opportunity to receive specialty care without the logistical hurdles of travel distance

Barton et al. 2011; Harrell et al. 2014; Parikh et al. 2013; Turner et al. 2012



8

Teleneuropsychology – In-Clinic Model Systematic Review and Meta-analysis (2017)

“The current findings did not reveal a clear trend towards inferior performance when tests were administered via videoconference.”

N=497 across 12 studies; Included studies=counter-balanced cross-over designs with adult samples; Brearly et al., 2017

- The overall effect size distinguishing TNP from FTF performance was small and non-significant
 - 26 mean scores were higher for the videoconference condition (32.91%)
 - 48 mean scores were higher for the FTF condition (60.76%)
 - 5 mean scores were identical in both conditions (6.33%)
- Small, but significant effect size for timed tests or tests where a disruption of stimulus presentation may affect test results (e.g., digit span, list-learning tests), with TNP performance approximately 1/10 of a SD lower than FTF testing performance. Similar, small difference found for BNT-15 test.



9

Teleneuropsychology – In-Clinic Model Systematic Review and Meta-analysis (2017)

“The current findings did not reveal a clear trend towards inferior performance when tests were administered via videoconference.”

N=497 across 12 studies; Included studies=counter-balanced cross-over designs with adult samples; Brearly et al., 2017

- Supports use of videoconferencing technology in remote neuropsychological testing
 - Verbal test (e.g., digit span, verbal fluency, verbal learning and memory) scores were particularly close to FTF.
 - No difference in FTF vs. virtual performance for adults aged 65–75
 - Age and internet connection speed were significant moderators, with less consistent results in patients older than age 75 and on slower connections.
- Variable outcomes on tests requiring a motor response, though literature suggests that administration assistance from remote support staff provides results comparable to on-site administration.
 - In the future, web and mobile application-based tests will likely facilitate the collection of motor and visually-dependent performance without remote assistance.



10

Teleneuropsychology – In-Clinic Model Systematic Review and Critical Review (2020)

Purpose: Update prior review + review validity of individual neuropsychological tests

- Cognitive screeners** **MMSE and MoCA**, had the best support; ADAS-cog and RBANS showed promise, but had limited validity studies
- Memory** **Verbal list-learning tasks (e.g., HVLt-R)** have strong support for validity in TNP assessments.
- Language** **Letter fluency** had excellent validity and **category fluency** had moderate validity (possibly due to single-trial nature of test). **Object naming tasks** (e.g., Boston Naming Test) showed good validity.
- Attention** Moderate-to-strong evidence for **Digit Span Task**
- Executive functioning** Clock Drawing task only had moderate support due to variability in test findings and less-than-optimal validity metrics (e.g. highest ICC = .71). No other executive functioning measures included in studies.

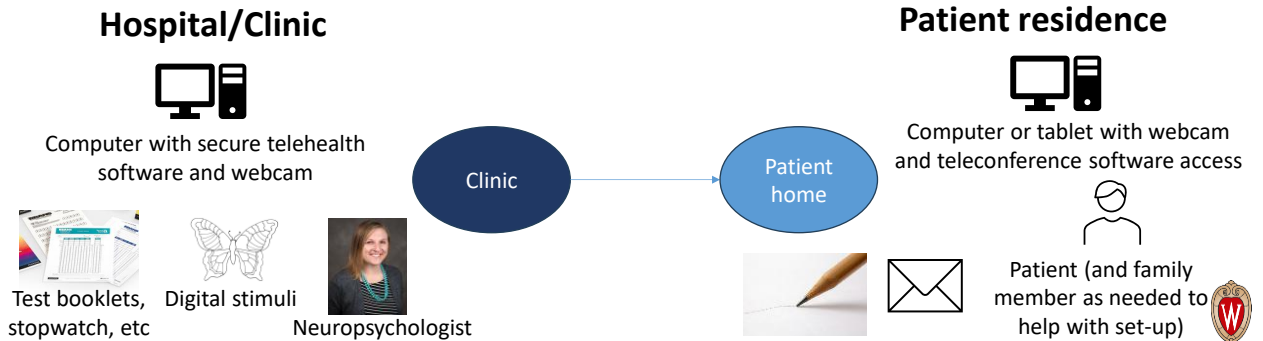
Marra et al., 2020



11

Teleneuropsychology – In-Home Model

- Purpose:
 - Provide neuropsychology services during Covid-19 pandemic
 - Expand neuropsychology services or research opportunities for those in rural areas, individuals who are homebound, or others who lack access to specialty services



12

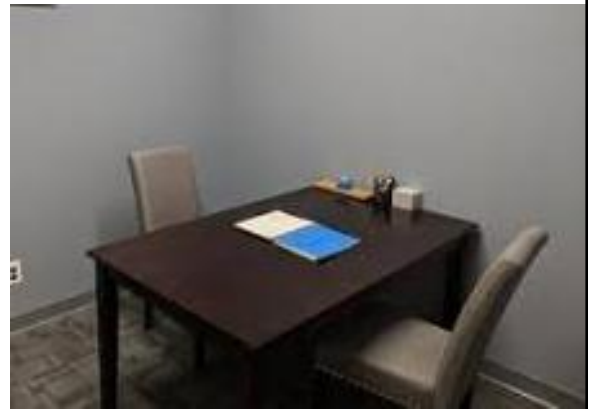
Teleneuropsychology – In-Home Model

A goal of neuropsychological assessment is to provide a measure of an individual's **"true cognitive ability."**

However, at the end of the day, we are only able to capture **"observed test performance"** that can be impacted by a variety of factors, including:

- Testing environment
- Motivational state
- Test anxiety
- Fatigue
- Methodological factors

Testing environment is especially important, as all psychometric instruments are based on a standard administration in a distraction free setting.

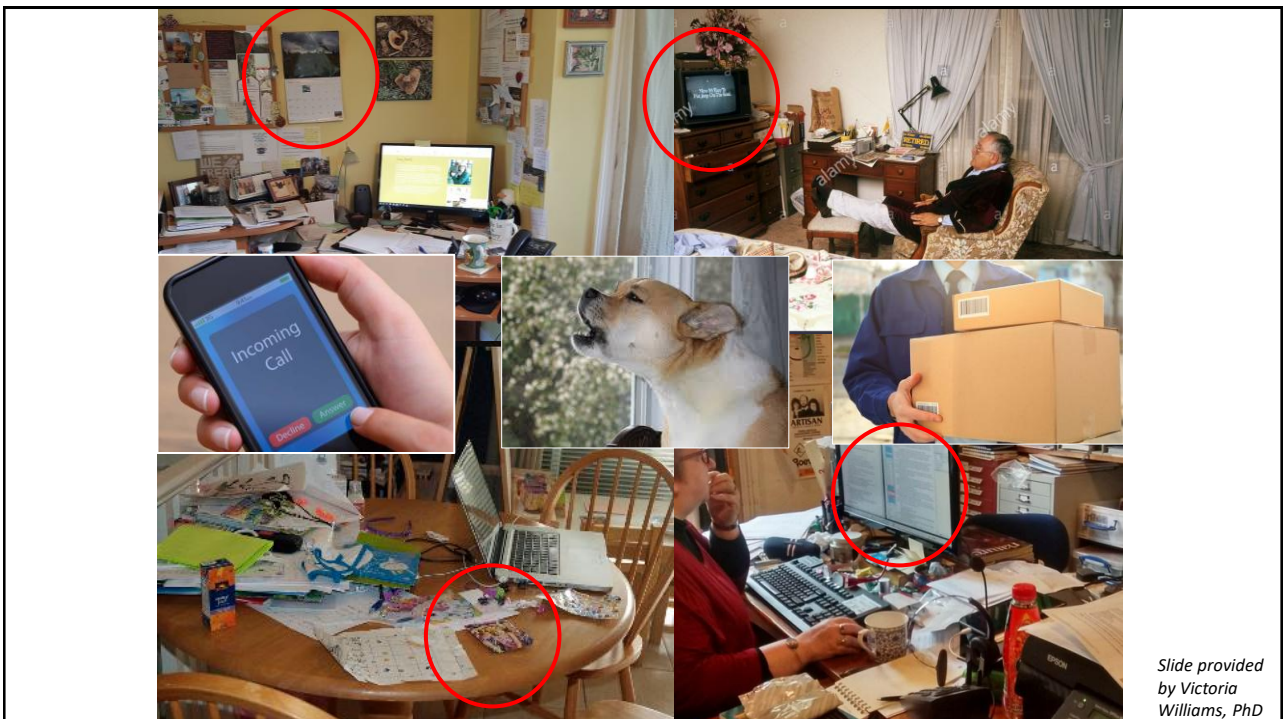


This is ideally what we are trying to replicate – but in a person's home!

Slide provided by Victoria Williams, PhD



13



Slide provided by Victoria Williams, PhD

14

Teleneuropsychology – In-Home Model Clinical practice guidelines (2020 APA/AACN/NAN)

Technical specifications

- **Platform:** HIPAA-compliant, established Business Associate Agreement, may be advantageous if easily accessible through EMR vs needing to download an app
- **Bandwidth:** Test and confirm sufficient bandwidth speed on clinician and patient sides (patient use private vs. public wifi)
 - Two-way live video services through consumer devices should have a bandwidth of at least 384 Kbps in both downlink and uplink directions.
 - Test your speed and get more information here: <https://telehealthtechnology.org/>
- **Device:** Some test developers recommend display size of at least 9.75” diagonal on the patient side if using visual stimuli (typically computer or tablet); webcam on both sides



15

Teleneuropsychology – In-Home Model Clinical practice guidelines (2020 APA/AACN/NAN)

Test selection / modification

- Use tests with previously demonstrated reliability and validity in TNP
- Rely on standard normative data with clear documentation regarding non-standard administration
- Not sufficient evidence available to recommend remote web-based or computerized digital cognitive tests in lieu of conventional paper/pencil tests over telehealth



16

Teleneuropsychology – In-Home Model Clinical practice guidelines (2020 APA/AACN/NAN)

Pre-Session Preparation

- Consider patient’s clinical & cognitive status – can the patient effectively participate?
- Does the patient have technology resources for a videoconference – e.g. webcam on tablet or computer? If not, is it possible to provide a device for the visit?
- Does the patient have physical space for a private teleneuropsychology session?
- Does the exam require on onsite facilitator? If so, make sure have provided training to facilitator in advance.

APA telepsychology pre-visit checklist: <https://www.apa.org/topics/disasters-response/telepsychological-services-checklist>



17

Teleneuropsychology – In-Home Model Clinical practice guidelines (2020 APA/AACN/NAN)

Beginning of Session

- Confirm patient identity
- Conduct informed consent – potential risks/benefits of teleneuropsychology
- Ensure back-up plan in case of technical difficulties or of a crisis situation (phone number to contact)
- Assist patient to scan room and remove potential distractions; may ask patients to “hide self view” on screen
- Ensure patient has all needed materials

Informed consent example:

“Some measures used in tele-assessment may not be as precise or accurate as they would be in face-to-face, in-person assessment sessions. This is because some measures used in tele-assessment are being administered in a way that they were not specifically developed to be administered. I am aware and understand these issues and I will use the data in a way to maximize their accuracy and work with any unsure circumstances. This may include not being able to make as specific conclusions, decisions, or recommendations as would be possible in face-to-face, in-person assessment services. Knowing these limitations, do you feel comfortable proceeding with our assessment today?”



18

Teleneuropsychology – In-Home Model Clinical practice guidelines (2020 APA/AACN/NAN)

During Session

- Use screen share feature to present high quality images of test stimuli
- Instruct patient to hold written work up to screen and examiner take screen shot. Instruct patient to place written work into an envelope as soon as completed so not visible during exam
- Track and document any technological problems, environmental distractions, or specific patient characteristics that may interfere with teleNP experience
- Document limitations in report

Example of documenting limitations:

“Due to circumstances that prevent in-person clinical visits, this assessment was conducted using telehealth methods (including remote audiovisual presentation of test instructions and test stimuli, and remote observation of performance via audiovisual technologies). The standard administration of these procedures involves in-person, face-to-face methods. The impact of applying nonstandard administration methods has been evaluated only in part by scientific research. While every effort was made to simulate standard assessment practices, the diagnostic conclusions and recommendations for treatment provided in this report are being advanced with these reservations.”



19

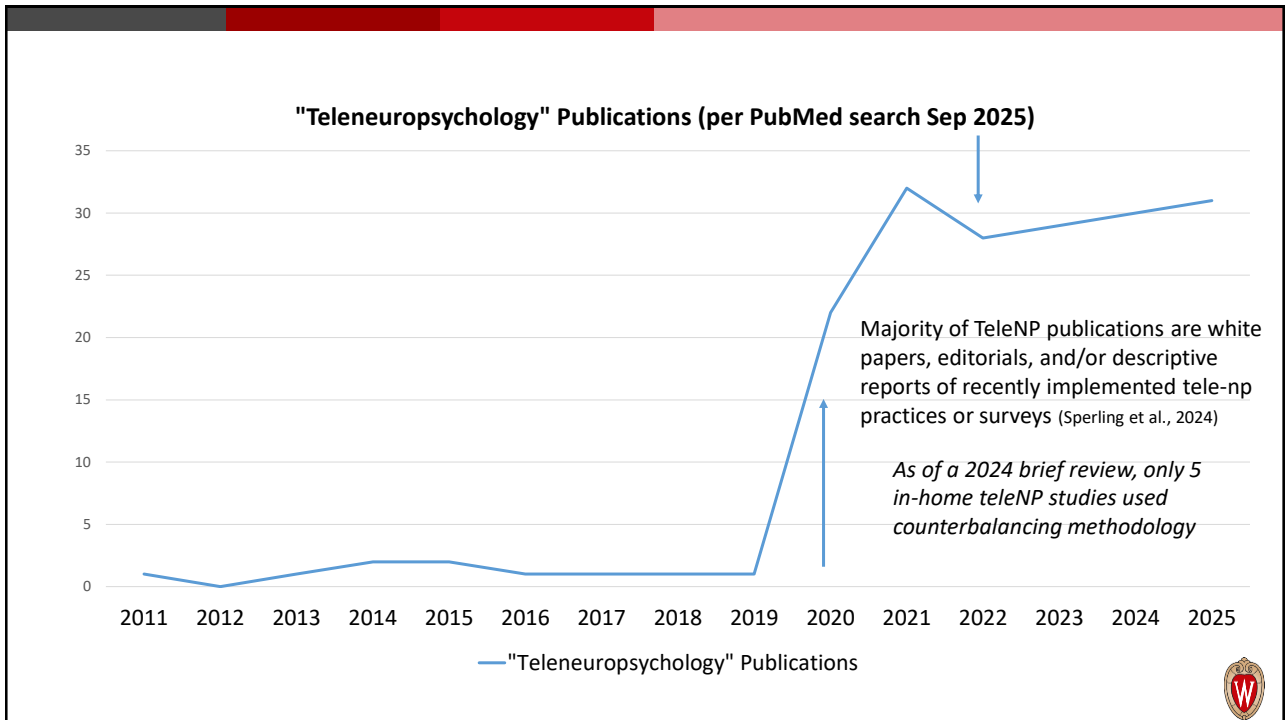
Teleneuropsychology – In-Home Model Practitioner experience

- TeleNP largely initiated during COVID-19 pandemic
- Mostly in-home teleNP, unlike the clinic-to-clinic model used by most prior teleNP studies
- 71% percent felt teleNP where the patient is located in clinic was feasible and acceptable
 - Fewer (45%) felt teleNP where the patient is located in home was generally feasible and acceptable.
 - Most respondents currently engaged in teleNP (46% of sample) agreed that teleNP enabled them to provide similar quality of care as face-to-face neuropsychology.
- Challenges to using teleNP included
 - Issues with internet connectivity
 - Environmental distractions
 - Examinees limited or lack of access to requisite technologies
 - Concerns regarding validity
 - Limited uniform guidance and practice recommendations
- Systemic barriers to implementation included rollback of Covid-19 waivers, coverage and payment policies, lack of insurer coverage, lack of technical support, cost of implementing or maintaining teleNP, and limited buy-in from administrators.

Fox-Fuller et al., 2021; Messler et al., 2023



20




21

Teleneuropsychology Systematic review and meta-analysis (2025)

“TeleNP has a nonsignificant and exceptionally minimal effect on test scores with a high certainty of evidence.”

N=1,197 adult participants across 24 studies; counterbalanced and non-counterbalanced studies included; Alva et al., 2025

- Included several teleNP models
 - 16 satellite [13 clinic-to-clinic; 3 room-to-room in pt home], 7 direct-to-home, 1 both
- Mean in-person test scores were 0.01 standard deviations greater than teleNP.
 - Examination of mean differences revealed 77% of tests/subtests with a difference of less than one point.
 - Greatest mean difference reported for TMT-B (in-person 3-12 sec slower – test included in only 2 studies)
- Administration modifications
 - Single front-facing webcam for participant observation
 - Envelopes used to conceal response forms at patient location
 - Screen sharing used to show visual stimuli OR onsite facilitator present to show visual stimuli
 - Visual responses reviewed in-process (via document camera) or in final form (via front-facing camera)



22

Teleneuropsychology – In-Home Model

UW Geriatric Memory Clinic Pilot



48 patients (mean age 76; 45% female; 4 Dementia, 28 MCI, 16 Subjective cognitive decline) completed in-home teleNP visit within 3 months of their face-to-face memory clinic visit

Satisfaction/Acceptance:

- Most participants were satisfied with televideo testing (96%), felt comfortable with the technology (85%), and would recommend it to others (81%). 60% had no preference for either in-person or televideo testing, indicating similar participant experiences across both visit types.

Reliability/Validity:

- Learning/memory, language, attention, and mood measures had moderate to good reliability across visits
- Measures of visuospatial/construction abilities, as well as non-identical measures (e.g., MMSE vs TICS, Trailmaking vs Oral Trailmaking) exhibited poor reliability
- Test performance variation across cognitive groups was similar across visits (non-significant visit x group interactions)
 - Exceptions: Visual attention (Trails A/Oral Trails A) and Visuospatial/Construction

Wisconsin ADRC REC Scholar Project (PI: Clark): Validating teleneuropsychology for earlier dementia diagnosis

23

Teleneuropsychology – In-Home Model

Validation of Video Administration of a Modified UDsv3 Cognitive Battery (VCOG)

463 older adult participants across 12 Alzheimer's Disease Research Centers (including Wisconsin)

- 156 (34%) healthy controls, 230 (50%) persons with MCI, 77 (17%) persons with dementia
- Mean age 75, 53% female, 26% non-white
- Randomized counter-balanced in-home teleNP and face-to-face visits completed within 4-8 weeks
- Used own device (81%) or provided a user-friendly tablet (Grandpad; 19%) with secure Zoom

In-home video-based testing was feasible and acceptable with older adults with and without cognitive impairment

- Most rated video testing as easy (90%), convenient (95%) and would accept it in future visits (76%).
- Greater cognitive impairment was associated with more difficulty with setup and use of video.
- Staff rated most administrations as producing valid data (95%).
- Analyses on reliability and validity of in-home teleNP measures ongoing.

Sachs et al., under revised review



24

Emerging trends

Remote self-administered digital assessment

Similar to in-home teleNP

- Reduced “white coat effect”
- Decreased patient burden and increased convenience to not have to travel to research or clinic locations
- Access to smart device and dependable network connection
- Environmental distractions

Beyond in-home teleNP

Potential advantages:

- Improved measurement precision (e.g., reaction time, automated scoring)
- Novel paradigms quantifying cognition (e.g., speech tasks, learning curves)
- Increased frequency of within-person testing:
 - Improve reliability of assessment
 - Improve sensitivity to intra-individual variability and subtle decline
- Monitor cognitive decline and/or treatment outcomes over time
- Improve ecological validity through data collection in natural environments

Potential challenges:

- Threats to data fidelity
- Digital literacy needed
- Infrastructure and resources dedicated to data storage and handling, with data privacy and protection systems in place



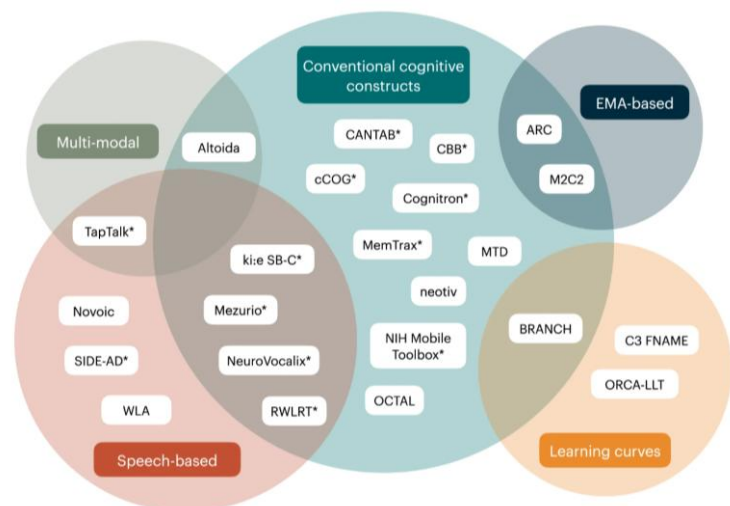
25

A scoping review of remote and unsupervised digital cognitive assessments in preclinical Alzheimer’s disease

Sarah E. Polk  Fredrik Öhman, Jason Hassenstab, Alexandra König, Kathryn V. Papp, Michael Schöll & David Berron 

npj Digital Medicine 8, Article number: 266 (2025) | [Cite this article](#)

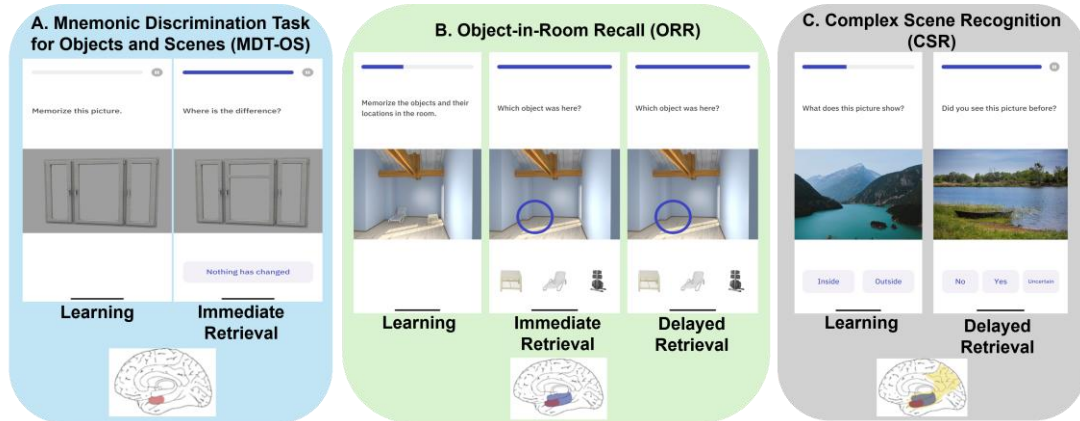
- 28 papers reporting on 23 digital tools for the remote and unsupervised assessment of cognition in preclinical AD
- Remote studies of cognition in healthy older adults are largely feasible
 - Bottleneck=registration in digital app after consenting to study
 - More dropout if less technical support
 - Feasibility reduced if more technologically demanding
- Reliability generally good
- Correlations between digital and traditional tasks were moderate to strong (but none greater than 0.70)



26

UW Assessing Memory with Mobile Devices study

Neotiv digital cognitive battery



Participant-owned smartphone or tablet



27

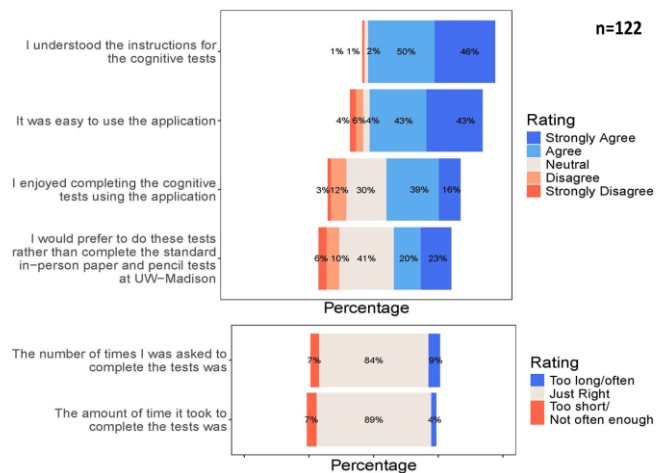
UW Assessing Memory with Mobile Devices study

Feasibility

- 64% consented
- 74% enrolled (registered in app and completed at least one session)
- 78% completed all sessions
- People with lower education or from racially minoritized groups more likely to decline or be lost to follow-up

Acceptability

- Easy to use, frequency and duration of testing appropriate, most would recommend remote testing to other
- Recommendation: Improve instructions, reminders, and stimuli presentation; provide feedback



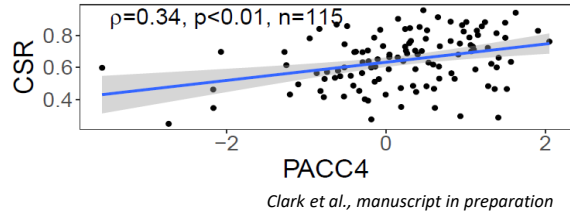
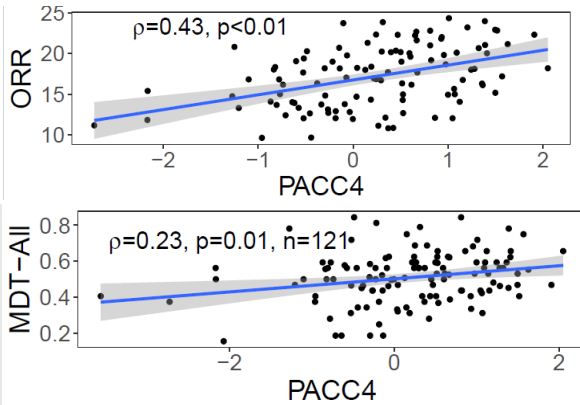
Clark et al., manuscript in preparation



28

UW Assessing Memory with Mobile Devices study

Remote digital cognitive tests significantly correlate with in-person paper-and-pencil cognitive tests



Remote digital cognitive performance also significantly associated with in-person performance after controlling for demographic factors, screen size, retrieval time, time between remote and in-person tests, and cognitive status



29

Is it time?



95% of Americans use internet (80% high-speed at home)
 90% own a smartphone
 74% own a desktop or laptop
 50% own a tablet
 (Pew Research 2019 and 2023)



Provider and patient satisfaction with teleNP is high in people with and without cognitive impairment



Minimal differences between in-person and teleNP (mostly in-clinic model) → goals of testing can be accomplished via televideo



Costs of shifting to and maintaining a practice model that includes teleNP as a service offering are low

Issues remaining



More high-quality research on direct-to-home teleNP is needed, including study of executive functioning and motor, perhaps through incorporation of web-based tasks



Reimbursement rates for neuropsychological testing via telehealth needs to be permanent vs provisional



Formal training opportunities are needed to provide exposure and increase competency for providers in teleNP



30

Teleneuropsychology - Reimbursement issues

- Historically, psychological and neuropsychological testing via telehealth were not reimbursed.
- Due to the Covid-19 pandemic, coverage for in-home mental and behavioral telehealth, including neuropsychology services (e.g., CPT 96116, 96121, 96136-96139, 96132, 96133), was allowed
- Testing codes remain covered as telehealth services on a provisional basis until **9/30/25**
- Starting 10/1/25, Medicare will reinstate restrictions:
 - Generally limiting telehealth to patients in rural areas
 - Patient’s home will no longer qualify as an originating site (except end-stage renal disease, acute stroke, or services for the diagnosis, evaluation, or treatment of a mental and/or behavioral health disorder)
 - An in-person visit is required within six months before the first telehealth service

The Telehealth Policy Cliff: Preparing For October 1, 2025



AMERICAN PSYCHOLOGICAL ASSOCIATION SERVICES, INC.

ADVOCACY SCIENCE PRACTICE EDUCATION PUBLIC INTEREST ABOUT NEWS & EVENTS

Home > Practice > Reimbursement > Government Papers >

The telehealth waiver: What psychologists need to know

Answers to your questions about the evolving Medicare in-person telehealth requirement and upcoming expiration deadline

Last updated: September 4, 2025 | Date created: February 13, 2025 | 6 min read

31

From science to policy to practice

Clinical practice

In-clinic teleNP through VA or in rural areas in a qualifying medical site

Evidence over last 15 years indicates feasibility, reliability, and validity, and coverage exists in these settings

Research

Conduct high-quality experimental studies to assess the reliability and validity of in-home teleNP

- Clearly describe study design
- Use randomization
- Include diverse patient populations
- Use Bayes factors or equivalence testing methods to formally establish equivalence

Policy

Support legislation to expand telehealth coverage through Medicare (e.g., CONNECT for health act)

Advocate for placement of teleNP services on the CPT and CMS permanent telehealth lists

Engage with government and community agencies to address structural factors in access to broadband internet and healthcare

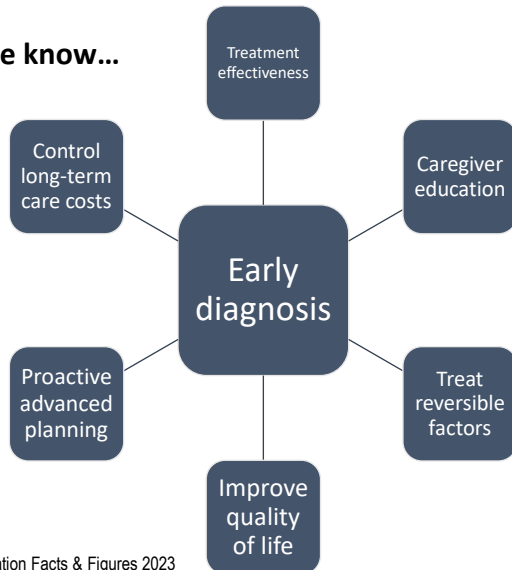
Sperling et al., 2024



32

Improving access to screening and diagnosis

What we know...



What actually happens...



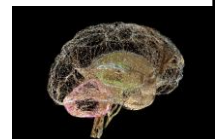
- Many people who meet criteria for AD dementia are not diagnosed
- Only half of Medicare beneficiaries who have dementia are told the diagnosis
- Diagnosis is lower in non-White populations
- Less than half of those with cognitive impairment receive recommended diagnostic services

Alzheimer's Association Facts & Figures 2023
Tsoy et al., 2021 - JAMA Neurology

33

Take Home Message

- Teleneuropsychology is a growing specialty that has the potential to expand access to cognitive diagnostic services
- Existing literature demonstrates clear evidence of feasibility, user acceptability, reliability, and validity of clinic-to-clinic teleNP services
- Current needs in this area include: high-quality research studies on in-home teleNP, policy changes to expand Medicare coverage for teleneuropsychology services, and training/education for students and clinicians
- Future directions include validation and implementation of digital cognitive assessment into teleNP services to supplement traditional teleNP assessment or as stand-alone tests for cognitive screening, case finding, and symptom/treatment monitoring



34

How can I learn more?

Research-related references

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- Marra DE, et al. (2020). Validity of teleneuropsychology for older adults in response to COVID-19: A systematic and critical review. *Clin Neuropsychol.*
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Podcasts



41| Teleneuropsychology - A Conversation With Dr. Munro Cullum

Policy-related articles

- Advocacy in action: Supporting telehealth. *AMA 1/22/25*. <https://www.ama-assn.org/practice-management/digital-health/advocacy-action-supporting-telehealth>
- The Telehealth policy cliff: Preparing for October 1, 2025. *Telehealth resource centers*. <https://telehealthresourcecenter.org/resources/the-telehealth-policy-cliff-preparing-for-october-1-2025/>



35

Thank you!



Contact information: lrclark@medicine.wisc.edu

Website: www.clarklab.medicine.wisc.edu

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VA



U.S. Department
of Veterans Affairs



36