uptake in teleneuropsychology (TeleNP). Many clinicians and researchers used videoconferencing technologies (e.g., Zoom®) to conduct remote neuropsychological assessments. Prior reviews (e.g., Marra et al., 2020) have indicated promise for the use of videoconference-based approaches to cognitive assessment under certain circumstances, though arguably nobody foresaw the widespread use of teleNP during the pandemic. Given the rapid expansion in the teleNP literature in the past couple of years, in this scoping review we specifically discuss research updates made during the COVID-19 pandemic pertaining to teleNP assessment of adults conducted via videoconferencing and their potential clinical applications.
Participants and Methods: GoogleScholar and PubMed were used to search for peer-reviewed original research articles published between January 1, 2020 (i.e., the approximate beginning of the COVID-19 pandemic) and August 1, 2022. Broad search terms were used pertaining to teleNP, remote cognitive assessment, videoconferencing, and neuropsychological assessment, resulting in 16 articles.
Results: Though most of the included studies were based in the United States (n=5), there was international representation across studies (Chile=1; United Kingdom=1; Australia=2; New Zealand=1; France=2; Greece=1; Japan=2, Singapore=1). All of the identified articles examined TeleNP-related research questions using cognitive tests administered via videoconferencing that have been previously studied in-person to varying degrees. Several of the studies focused on psychometric characterization (i.e., reliability and validity) of the examined tests when delivered via videoconferencing, whereas others focused on demonstrating the relative equivalence of neuropsychological scores obtained via videoconferencing versus in-person evaluations.
Conclusions: Formal psychometric studies of traditional in-person neuropsychological tests delivered via videoconferencing since the start of the COVID-19 pandemic suggest that this remote modality of assessment is generally reliable and valid. Moreover, multiple recent studies have demonstrated relative equivalence of neuropsychological scores obtained via videoconferencing versus neuropsychological test scores obtained in-person. When considered alongside teleNP research conducted prior to the COVID-19 pandemic (e.g. Cullum et al., 2014), recent studies on videoconference-based neuropsychological assessment indicate that videoconferencing may not necessarily be a complete substitute for an in-person comprehensive evaluation given the inherent limitations of the procedure. However, teleNP via videoconferencing may be a promising tool in the neuropsychologist's toolbox because it can help reduce common barriers to in-person neuropsychological assessment (e.g., travel time to clinics). Additional research on videoconferencing-based cognitive assessment is needed, especially in low-and-middle income countries (LMIC) and diverse populations where there may be more economic barriers to remote neuropsychological assessment relative to more economically-developed countries. Notably it is possible that research from LMIC may have been missed through the screening processes used in this review (e.g., inclusion of articles written in English).

Categories: Teleneuropsychology/ Technology
Keyword 1: teleneuropsychology
Keyword 2: psychometrics
Keyword 3: technology
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98 Remote App-Based Assessment of Memory and Executive Functioning in Aging and Pre-Clinical Alzheimer's Disease

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Objective: Mobile, valid, and engaging cognitive assessments are essential for detecting and tracking change in research participants and patients at risk for Alzheimer's Disease and Related Dementias (ADRDs). This pilot study aims to determine the feasibility and performance of app-based memory and executive functioning tasks included in the mobile cognitive app performance platform

https://doi.org/10.1017/S135561772300958X Published online by Cambridge University Press

(mCAPP), to remotely detect cognitive changes associated with aging and preclinical Alzheimer's Disease (AD).
Participants and Methods: The mCAPP includes three gamified tasks: (1) a memory task that includes learning and matching hidden card pairs and incorporates increasing memory load, pattern separation features (lure vs. non-lure), and spatial memory (2) a stroop-like task ("brick drop") with speeded word and color identification and response inhibition components and (3) a digit-symbol coding-like task ("space imposters") with increasing pairs and incidental learning components. The cohort completed the NACC UDS3 neuropsychological battery, selected NIH Toolbox tasks, and additional cognitive testing sensitive to pre-clinical AD, within six months of the mCAPP testing. Participants included thirty-seven older adults (60% female; age=72±4.4, years of education=17±2.5; 67% Caucasian, 30% Black/AA, 3% Multiracial) with normal cognition who are enrolled in the Penn Alzheimer's Disease Research Center (ADRC) cohort. Participants completed one in-person session and two weeks of at-home testing, with eight scheduled sessions, four in the morning and four in the afternoon. Participants also completed questionnaires and an interview about technology use and wore activity trackers to collect daily step and sleep data and answered questions about mood, anxiety, and fatigue throughout the two weeks of at-home data collection.
Results: The participants completed an average of 11 at-home sessions, with the majority choosing to play extra sessions. Participants reported high usability ratings for all tasks and the majority rated the task difficulty as acceptable. On all mCAPP tasks, participant performance declined in accuracy and speed with increasing memory load and task complexity. mCAPP tasks correlated significantly with paper and pencil measures and several NIH Toolbox tasks ($p<0.05$). Examination of performance trends over multiple sessions indicates stabilization of performance within 4-6 sessions on memory mCAPP measures and 5-7 sessions on executive functioning mCAPP measures. Preliminary analyses indicate differences in mCAPP measures and imaging biomarkers.
Conclusions: Participants were willing and able to complete at-home cognitive testing and most chose to complete more than the assigned sessions. Remote data collection is feasible and well-tolerated. We show preliminary construct validity with the UDS3 and NIH Toolbox and test-retest reliability following a period of task learning and performance improvement and stabilization. This work will help to advance remote detection and monitoring of early cognitive changes associated with preclinical AD. Future directions will include further evaluation of the relationships between mCAPP performance, behavioral states, and neuroimaging biomarkers as well as the utility of detection of practice effects in identifying longitudinal change and risk for ADRD-related cognitive decline.

Categories: Teleneuropsychology/ Technology
Keyword 1: teleneuropsychology
Keyword 2: technology
Keyword 3: aging disorders
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99 Validation and clinical translation of a remote self-administered cognitive measure and models for cultural and linguistic adaptations through Mayo Test Drive

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Objective: Despite significant recent advances in test development in research settings, neuropsychological tests and normative data used in clinical settings have fallen behind in innovation in terms of empiricism and modality of administration (Bilder & Reise, 2019). Most widely-used test paradigms were initially developed 50-150 years ago with normative data that is often limited to White American-born monolingual English samples (Pugh et al., 2022; Rabin et al., 2016). Few digital tests have successfully translated into clinical use (Collins & Riley, 2016).
Participants and Methods: Mayo Test Development through Rapid Iteration, Validation, and Expansion (Mayo Test Drive) is a remote platform for neuropsychological test development and self-administration that is accessible through any web-based device (Stricker et al., 2022). To date, we have demonstrated rapid validation and clinical

https://doi.org/10.1017/S135561772300958X Published online by Cambridge University Press