Using Mobile Health Technology to Support Medication Self-Management in Persons with Mild Cognitive Impairment: A Case Study

Smira Sonthalia, Timber Rose, Elizabeth Geraghty, Teresa S. Warren

Aging and NeuroCognition Laboratory, Department of Speech and Hearing Science, College of Applied Health Sciences, University of Illinois Urbana-Champaign

Aging And NeuroCognition Laboratory

INTRODUCTION

- Persons with mild cognitive impairment (PwMCI) have cognitive decline beyond what is expected for a person's age and education without meeting criteria for a dementia (Petersen, 2004)
- Uncontrolled high blood pressure can exacerbate risk of accelerated cognitive decline in PwMCI (Sierra, 2020)
- Antihypertensive drugs have proven to be an effective means of risk reduction (Alagiakrishnan et al., 2024)
- PwMCI often struggle with taking medications on time due to underlying deficits in prospective memory (O'Conor et al., 2024)
- Mobile health (mHealth) technology may support medication adherence, but it's unclear whether PwMCI can consistently use mHealth tools as designed

AIM

To compare medication-taking analytics captured by an mHealth application, called Medication Education Decision Support, Reminding and Monitoring-Memory (MEDSReM-M), with actual medication usage recorded by Medication Event Monitoring System (MEMS; van Onzenoort et al., 2012)

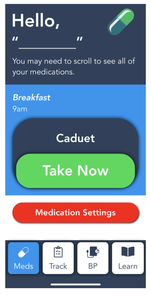
METHODS

Participants:

- 4 older adults with cognitive impairment
- Participants enrolled in a 16-week randomized controlled trial (R01NR020261) testing the use of MEDSReM-M to support blood pressure medication adherence

MEDSReM-M:

- This app was created to support hypertension medication adherence among PwMCI by reminding participants to take their medication through a notification
- Participants were given instructions on how to navigate the MEDSReM-M app



MEMS:

- Medication adherence was monitored for one prescribed antihypertensive medication via MEMS cap
- The cap is designed to record the time the bottle opens
- An adherence window was defined as 3 hours before and after the scheduled time to take the medication.

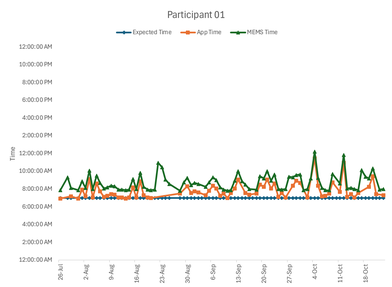
Analyses:

- We analyzed the time participants confirmed the medication was taken in MEDSReM-M app to the time participants opened their MEMS to take their antihypertensive medication

RESULTS

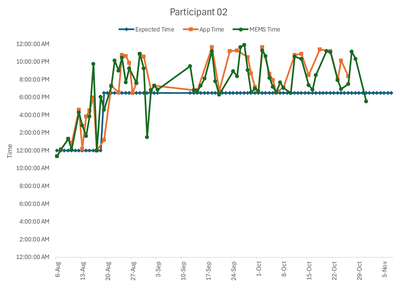
Participant 01:

Participant 01	
Age	61
Gender	Female
Race	White
Ethnicity	Non-Hispanic/Latino
Education	Bachelor's Degree
Montreal Cognitive Assessment	25
Geriatric Depression Scale	0



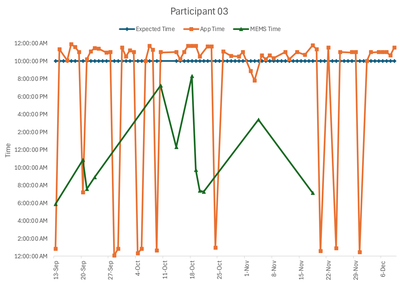
Participant 02:

Participant 02	
Age	74
Gender	Female
Race	White
Ethnicity	Non-Hispanic/Latino
Education	Bachelor's Degree
Montreal Cognitive Assessment	22
Geriatric Depression Scale	4



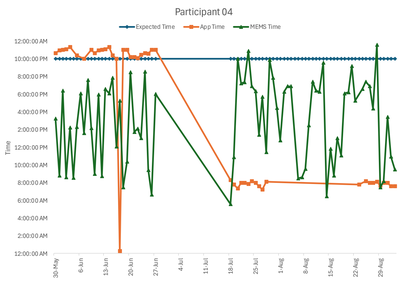
Participant 03:

Participant 03	
Age	89
Gender	Female
Race	White
Ethnicity	Non-Hispanic/Latino
Education	Associate's degree
Montreal Cognitive Assessment	22
Geriatric Depression Scale	6

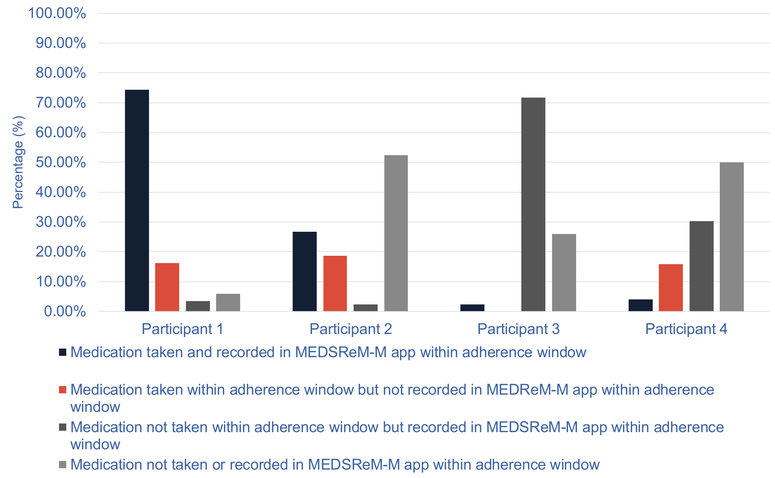


Participant 04:

Participant 04	
Age	73
Gender	Male
Race	More than one race
Ethnicity	Non-Hispanic/Latino
Education	Master's Degree
Montreal Cognitive Assessment	26
Geriatric Depression Scale	2



RESULTS CONTINUED



DISCUSSION

- We found different trends in MEDSReM-M app usage and medication taking from MEMS
- One participant had relatively high medication adherence, while the others demonstrated low adherence with frequent discrepancies
- Individual characteristics may contribute to differences in trends across participants
- These patterns suggest that the app may be capable of helping some individuals with MCI, and is less effective for others
- Future Direction: To examine the data in relation to 4-week adherence period before the MEDSReM-M was deployed

ACKNOWLEDGEMENTS

We would like to thank Dr. Raksha Mudar for her support and guidance, as well as the START program for the opportunity to be involved in research. This research is funded by National Institute of Nursing Research of the National Institutes of Health under Award Number Award No: R01NR020261.

REFERENCES

- Alagiakrishnan, K., Halverson, T., Ahmed, A., Frishman, W. H., & Aronow, W. S. (2024). Hypertension and Cognitive Disorders. Cardiology in Review. https://doi.org/10.1097/CRD.0000000000000825
- O'Conor, R., Russell, A. M., Pack, A., Oladejo, D., Filec, S., Rogalski, E., Morhardt, D., Lindquist, L. A., & Wolf, M. S. (2024). Managing Medications Among Individuals with Mild Cognitive Impairment and Dementia: Patient-Caregiver Perspectives. Journal of the American Geriatrics Society, 72(10), 3011–3021. https://doi.org/10.1111/jgs.19065
- Petersen, R. C. (2004). Mild cognitive impairment as a diagnostic entity. Journal of Internal Medicine, 256(3), 183–194. https://doi.org/10.1111/j.1365-2796.2004.01388.x
- Sierra C. (2020). Hypertension and the Risk of Dementia. Frontiers in cardiovascular medicine, 7, 5. https://doi.org/10.3389/fcvm.2020.00005
- Tschanz, J. T., Welsh-Bohmer, K. A., Lyketsos, C. G., Corcoran, C., Green, R. C., Hayden, K., Norton, M. C., Zandi, P. P., Toone, L., West, N. A., Breitner, J. C. S., & the Cache County Investigators. (2006). Conversion to dementia from mild cognitive disorder: The Cache County Study. Neurology, 67(2), 229–234. https://doi.org/10.1212/01.wnl.0000224748.48011.84
- van Onzenoort, H. A., Verberk, W. J., Kroon, A. A., et al. (2012). Electronic monitoring of adherence, treatment of hypertension, and blood pressure control. American Journal of Hypertension, 25(1), 54–59. https://doi.org/10.1038/ajh.2011.178