

Smartphone training helps people with memory impairment regain independence

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The treatment for moderate-to-severe memory impairment could one day include a prescription for a smartphone.

Baycrest has published the strongest evidence yet that a smartphone training program, theory-driven and specifically designed for individuals with [memory](#) impairment, can result in "robust" improvements in day-to-day functioning, and boost independence and confidence levels.

The promising results appear online this week, ahead of print publication, in the international journal *Neuropsychological Rehabilitation*.

"The goal of our study was to demonstrate the generalizability of our training protocol to a larger number of individuals with moderate-to-severe memory impairment," said Dr. Eva Svoboda, a clinical neuropsychologist in the Neuropsychology and [Cognitive Health](#) Program at Baycrest, and lead author of the study.

"Our findings demonstrate that it is possible to harness powerful emerging technologies with [brain science](#) in an innovative way to give people with a range of [memory deficits](#) some of their independence back."

Memory impairment, particularly when it is severe, can impact virtually all aspects of everyday life. Individuals are unable to readily acquire new information making it difficult or impossible to keep appointments and

stay on top of changing personal, social and occupational responsibilities.

Two decades ago, Baycrest pioneered a theory-driven training program that tapped into preserved implicit memory systems in people with [amnesia](#) to teach them to use assistive [memory devices](#). Implicit or procedural memory is a type of memory that supports learning but does not require conscious executive control. Common examples of this type of memory include riding a bicycle or brushing one's teeth which doesn't require conscious remembering of where the procedure was learned in order to perform it.

Commercial technologies such as smartphones and other mobile [electronic devices](#) have immense potential for individuals with memory impairment as they offer high storage capacity, auditory and vibration alerts, rich multimedia capability and high user acceptability.

The Baycrest study involved 10 outpatients, 18 to 55 years of age, who had moderate-to-severe [memory impairment](#), the result of non-neurodegenerative conditions including ruptured aneurysm, stroke, tumor, epilepsy, closed-head injury, or anoxia (insufficient oxygen to the brain) after a heart attack.

Participants completed two phases of training on either a smartphone or another personal digital assistant (PDA) device. Prior to the training, all participants reported difficulty in day-to-day functioning. Some required ongoing supervision and regular assistance from family members due to their forgetting to pay bills, take medications or attend appointments.

In the first phase, instructors from Baycrest's Memory Link program taught participants the basic functions of their device, using an errorless fading of cues training method that tapped into their preserved implicit /procedural memory. Each participant received several one-hour training sessions to learn calendaring skills such as inputting appointments and

reminders.

In the second phase, participants took the device home to apply their newly-acquired calendaring skills in real-life situations. This included setting alarm reminders to take medications and attend future appointments, charging the device, and remembering to keep the device with them at all times. They also learned how to use other software functions, such as phone, contacts, and camera.

As part of the outcome measures, participants were given a schedule of 10 phone calls to complete over a two-week period at different times of the day – to closely approximate real life commitments. Family members who lived with participants kept a behavioural memory log of whether real-life tasks were successfully completed or not by their relative. Participants and family members completed a "memory mistakes" questionnaire which involved rating a list of common memory mistakes on a frequency-of-occurrence scale, ranging from "never" to "all the time".

Participants and family also completed two additional questionnaires. One measured confidence in the participant when dealing with various memory-demanding scenarios (e.g. dentist calls to change appointment dates). The other examined the participant's use of the device to support traveling back in time (e.g. searching activities and events from preceding days, weeks and months), traveling forward in time (e.g. planning ahead, entering future events and appointments), and technical ease of use of the device.

All 10 individuals showed "robust increases" in day-to-day memory functioning after taking the training, based on results from the functional and questionnaire-based measures. Participants continued to report benefit from smartphone and PDA use in short-term follow-up three to eight months later.

Provided by Baycrest Centre for Geriatric Care

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