OCCUPATIONAL THERAPY, ARTIFICIAL INTELLIGENCE AND TECHNOLOGY

Artificial intelligence (AI) is concerned with designing and building systems that think and act like humans and think and act rationally. AI is able to do tasks that usually demand human intelligence, including visual perception, decision making, language and speech recognition, and translation between languages.

In a systematic literature review[1] on the role of AI in future rehabilitation services, three categories of the use of AI in rehabilitation were identified:

- **Activity recognition:** Remotely tracks a person's adherence to their prescribed therapy and helps to measure treatment outcomes in real-world life.
- **Movement classification:** Assists in the assessment of the quality of rehabilitation exercises performed remotely.
- Assists in the **prediction of a client's clinical functional status**.

AI and other technologies have also been found to support rehabilitation clinicians with:

ASSESSMENT AND MONITORING	• Data from wearable devices, sensors, and AI algorithms can provide valuable insights about a client's physiological, behavioural, and environmental health [2]. This data could be used by OTs for assessment and monitoring purposes. • OTs can use AI and wearable devices to support clients with chronic disease management; AI enables continuous real-time monitoring which can support clients to self-manage their condition and to improve prognosis [3]. • AI can assist clinicians in making better clinical decisions by analyzing a clients' historical and current information.
INTERVENTION	• Virtual reality (e.g., virtual affective agents) and AI-driven avatars can mimic real-life experiences. OTs can use these technologies to guide clients through tasks to improve their skills and achieve their goals [2]. • Apps and technology can also be used to communicate with clients via life-chatting and text messaging and engage in video-based and tele-rehabilitation services [2].
ADMINISTRATIVE TASKS	• Chat GPT could support OTs with administrative tasks including: the wording of evaluation sections, wording of treatment notes, breaking writer's block, notes to parents, educational handouts, checklists, ideas for activities, explanations for parents and clients [4]. • Apps and technology can be used to send clients reminders and help schedule appointments [2]. • Robots could support clinicians in their work (assessment, intervention, and monitoring) which could help reduce burnout [2].
EDUCATION	• Virtual reality and robots can be used to support the training of students and care givers (e.g., simulating clients) [2].
AGING-IN-PLACE	• **Voice-controlled intelligent personal assistants** (VIPAs; Amazon Echo and Google Home) with their natural interaction style and ease of use, have simple interfaces that may be useful to older adults and their families in the home setting. VIPAs have been found to support older adults by providing entertainment, companionship, control of the home, reminders, and emergency communication [5]. Refer to Figure 1 for examples. OTs can use VIPAs as part of their treatment recommendations to support older adults in aging in their place of choice. • **Smart home technologies** include a variety of sensors and devices integrated into the home infrastructure. These technologies have been found to support aging-in-place by supporting older adults with their daily activities (e.g., reminders to take medication), detection of abnormal behaviour (e.g., lack of movement for an extended period of time), cognitive impairment (by analyzing patterns of daily activities), alerting when a fall has happened and monitoring sleep quality [6] . Refer to Figure 2 for an overview of how in-home monitoring sensors supports overall wellbeing. OTs are encouraged to familiarize themselves with these technologies and to utilize them in their assessment and intervention planning.

[1]Mennella et al. (2023). The role of artificial intelligence in the future rehabilitation services: a systematic literature review. IEEE Access. https://ieeexplore.ieee.org/abstract/document/10015010

[2]Luxton & Rick. (2019). Artificial Intelligence and Robotics in Rehabilitation. In Handbook of Rehabilitation Psychology, Third Edition. https://cseweb.ucsd.edu//~lriek/papers/luxton-riek-rehab-ai-robotics.pdf

[3]Xie et al. (2021). Integration of artificial intelligence, blockchain and wearable technology for chronic disease management: A new paradigm in smart healthcare. Current Medical Science, 41, 1123-1133. https://link.springer.com/content/pdf/10.1007/s11596-021-2485-0.pdf

[4]Schwartz, M. (n.d). How to use artificial intelligence as a therapist (blog). https://www.thevirtualpediatricot.com/artificial-intelligence/

[5]O'Brien et al. (2020). Voice-controlled intelligent personal assistants to support aging in place. The American Geriatrics Society. https://agsjournals.onlinelibrary.wiley.com/doi/pdfdirect/10.1111/jgs.16217

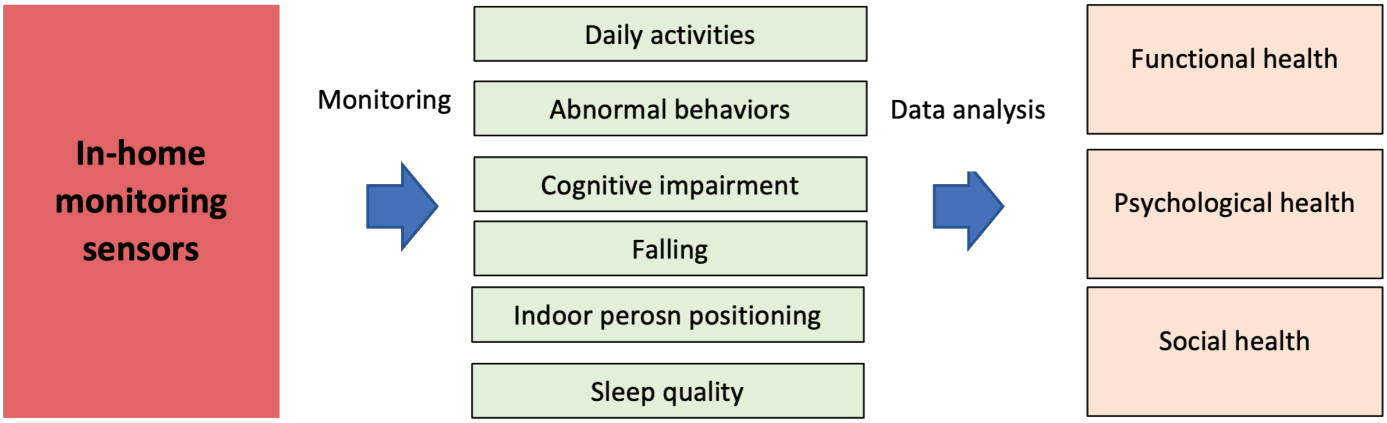
[6]Kim et al. (2022). In-home monitoring technology for aging in place: scoping review. Interactive Journal of Medical Research, 11. https://www.i-jmr.org/2022/2/e39005/PDF

Figure 1. Examples of how voice-controlled intelligent personal assistants support aging-in-place.

Theme	Representative quotes
Entertainment	"The other night, I found my spouse playing his own version of a memory game with Alexa. He was trying to come up with songs he remembered and would ask her to play them." "We are seniors and I got this for my husband for Father's Day…he so enjoys it…his music, the weather, spelling, playing trivia and has it right by his chair."
Companionship	"As a caregiver for my wife with dementia we are together 24/7 with little to no conversation. Echo now keeps me company and allows me to keep my brain active too. 'She' is more than a great bit of electronics…she is also a great companion." "Alexa is also like having a little robot friend to talk to. I am a senior citizen and live alone. I think the Echo is a great device for seniors. You can ask Alexa the same question 50 times and she won't get irritated with you."
Reminders	"I needed something that would provide me with info I couldn't remember well, such as the date and day. I highly recommend for anyone with memory challenges." "Good for letting Alexa know where you've put things so you don't have to tear the house apart because you forgot where you placed it. (We're both senior, senior citizens!)"
Control of the home	"…this handy device manages my ceiling fan and lights in the house, without me having to leave my bed or chair." "I recently ordered a switch attachment to turn my fan on and off, which will be a great help not on only for me but my caregiver as well. Alexa probably wasn't designed with the disabled community in mind, but regardless it is extremely helpful to those lacking independence." "My husband had been hospitalized for several weeks. He is currently wheelchair bound. We immediately installed the bridge and lights as well as the outlet. With these, and dear, dear, Alexa, he has a great deal of control of his environment in ways that make him much more independent. Others might enjoy Echo for fun and convenience, but for him it is a lifeline! He has even had her turn the lights on in my bedroom when I didn't hear him call.
Emergency communication	This is great in the event of anything from a slip in the shower to any medical or emergency issue or if I feel in danger." "Most importantly for me and my wife, both of us senior citizens, it gives her such a feeling of security when I'm not home that she can speak to Alexa and have all of our exterior lights without leaving her chair. It really is just another layer of security for her having Alexa around."

Citation: O'Brien et al. (2020). Voice-controlled intelligent personal assistants to support aging in place. The American Geriatrics Society. https://agsjournals.onlinelibrary.wiley.com/doi/pdfdirect/10.1111/jgs.16217

Figure 2. Features of smart home technologies.



Citation: Kim et al. (2022). In-home monitoring technology for aging in place: scoping review. Interactive Journal of Medical Research, 11. https://www.i-jmr.org/2022/2/e39005/PDF