Editorial

Tele-health, tele-exercise and tele-assessment: an example of a fitness app for individuals with spinal cord injury

Rodrigo Rodrigues Gomes Costa[1,2]^, Frederico Ribeiro Neto[1], Ciro Winckler[2]

[1]Department of Paralympic Sports, the SARAH Rehabilitation Hospital Network, Brasilia, DF, Brazil; [2]Department of Rehabilitation and Science of Movement, the São Paulo Federal University, São Paulo, SP, Brazil

Correspondence to: Rodrigo Rodrigues Gomes Costa, MD. Department of Paralympic Sports, The SARAH Rehabilitation Hospital Network, SQS 402, Bl Q, ap 106, Brasilia, DF 70236-170, Brazil. Email: rodrigorodrigues1@gmail.com.

Comment on: Haley JA, Rhind DJA, Maidment DW. Applying the behaviour change wheel to assess the theoretical underpinning of a novel smartphone application to increase physical activity in adults with spinal cord injuries. Mhealth 2023;9:10.

Keywords: Telerehabilitation; mobile applications; spinal cord injury (SCI)

Received: 21 April 2023; Accepted: 30 May 2023; Published online: 20 June 2023.

doi: 10.21037/mhealth-23-21

View this article at: https://dx.doi.org/10.21037/mhealth-23-21

Haley *et al.* (1) published an interesting study about the use of smartphone application (Accessercise) to encourage physical activity in individuals with spinal cord injuries (SCI). The Accessercise offered users the capability, opportunity, and motivation to undertake physical activity and reduce sedentary behaviors. Another important aspect of this study was to reveal the value of using the theoretical underpinning [behavior change wheel (BCW)] to systematically identify the potential mechanisms of action for improving physical activity levels in adults with SCI, as well as the potential of Accessercise to change behavior.

The smartphone application is one of the health-related intervention alternatives. Recent innovations allow healthcare professionals to provide remote services through communication technologies, such as a smartphone or video call via computers with the internet) (2,3), known as tele-health.

Tele-health can be divided into different types of interventions in the practice of physical activities, such as tele-assessment and tele-exercise. The tele-assessment is a remote assessment, and the tele-exercise is the intervention that offers remote physical training (3). The tele-assessment and tele-exercise can also be divided into two types: synchronous and asynchronous. The first is characterized by a real-time approach, in which the service occurs simultaneously between the patient and the professional via video conference, audio, or textphone conversations (4). The second is the asynchronous model that provides an alternative to traditional synchronous technologies, allowing communication without the need for real-time (e.g., photo, video, e-mail and other messaging systems) (4) (*Figure 1*).

Tele-assessment in the context of physical activities in individuals with SCI has already been described in the literature on the evaluation of strength (5,6) and balance (5). The studies presented clinic and in-home tele-assessments of an individual with SCI. In the first condition, the participant had to go to the clinic with a device for measuring balance and leg strength and then subsequently send the data to the university laboratory (5). In this study, strength measures presented better reliability and validity compared to balance. In the home condition, the tele-assessment was performed using synchronous and asynchronous push-up tests, which involved performing a maximum number of repetitions consecutively without rest (6). The synchronous push-up test was performed with a video call, while the asynchronous push-up test was assessed using the recorded test and self-reported the test repetition numbers. The synchronous push-up tele-assessment was a feasible and valid way to assess the maximum resistance strength of individuals with SCI, and the asynchronous

^ ORCID: 0000-0001-7836-2579.

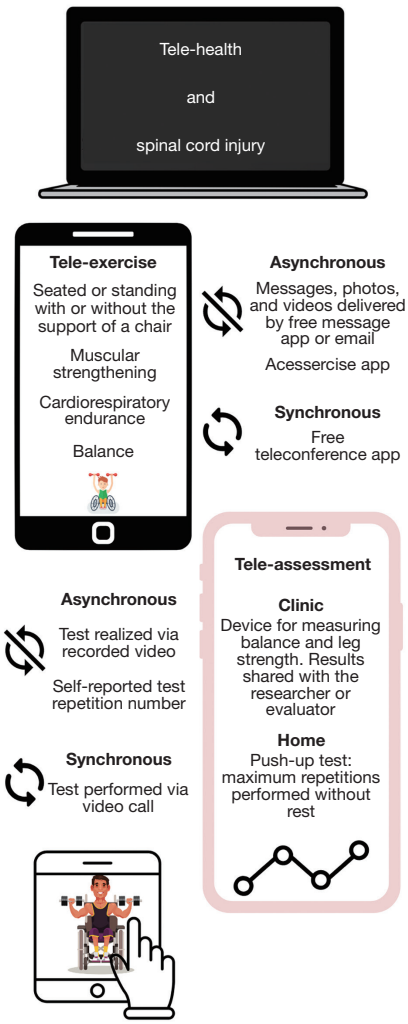

Figure 1 Infographic of tele-health, tele-exercise and tele-assessment in spinal cord injury.

push-up tele-assessment underestimated the synchronous push-up tele-assessment by 15.5%.

Four studies were found in the literature about tele-exercise and SCI, in addition to the study by Haley *et al.* The first study was published in 2016 and involved individuals who performed a remotely delivered aerobic exercise training program (30–45 minutes, 3 times per week) (3). The instrumentation included an upper body ergometer, a tablet, a physiological monitor, and a custom application that delivered a video feed to a remote trainer, monitored and recorded exercise data in real-time. The authors showed that the tele-exercise can be a safe and feasible option for delivering home-based exercise to persons with SCI who responded favorably to the intervention and valued tele-exercise for its ability to overcome common barriers to exercise (3).

Two other studies on tele-exercise and SCI were published in 2021 (7,8). One of the studies presented a protocol for a randomized controlled trial evaluating two types of synchronous tele-exercise over 8 weeks (three sessions per week): an intervention that involved combinations of movement forms choreographed to music to create movement routines, and another intervention that involved standard exercises performed in both standing and seated positions (7). In both interventions, the participants watched pre-recorded exercise videos with a seated range of motion exercises, followed by muscular strengthening exercises using wrist weights, cardiorespiratory endurance, and balance exercises either seated or standing with or without the support of a chair.

The other study compared implementation and training load between asynchronous and synchronous tele-exercise programs in individuals with SCI (8). The participants performed tele-exercises for 6 weeks, three times a week, with the objective of training muscle strength. The synchronous tele-exercise was delivered using a free teleconference application, and asynchronous tele-exercise were delivered using a free message application. Synchronous tele-exercises took place in groups through video calls, accompanied by a physical education teacher. In asynchronous tele-exercises, participants performed the same exercises practiced in the three synchronous weeks individually, without the real-time presence of the teacher during the moment of execution (8). The authors concluded that the training load for each session showed no differences between synchronous and asynchronous tele-exercises, and the implementation showed more favorable values for synchronous tele-exercise.

The initiatives with tele-exercise support the proposition of the World Health Organization (WHO), which recommends research into innovation physical activity proposals that enable full and effective participation of people with disabilities (9). The most commonly reported barriers to exercise by persons with SCI include both intrapersonal issues (e.g., lack of energy, motivation, or knowledge) and those related to the built or organizational environment (e.g., lack of accessible or affordable fitness facilities, equipment, and/or knowledgeable staff) (10).

The smartphone application Accessercise, presented by Haley *et al.* (1), is one of the innovative possibilities for physical activity proposals to population with impairment. Other synchronous and asynchronous tele-exercise programs and tele-assessment can be found in the literature. These options can assist in rehabilitation programs for

individuals with SCI and can also be used in public and private physical activity programs to include this population in regular physical activity. Therefore, it is essential to consider tele-exercise in the guidelines for physical activity guidance and assess the tele-exercise program's effect to improve the benefices of the physical exercise.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the editorial office, *mHealth*. The article did not undergo external peer review.

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://mhealth.amegroups.com/article/view/10.21037/mhealth-23-21/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

References

1. Haley JA, Rhind DJA, Maidment DW. Applying the behaviour change wheel to assess the theoretical underpinning of a novel smartphone application to increase physical activity in adults with spinal cord injuries. Mhealth 2023;9:10.
2. Smith AC, Thomas E, Snoswell CL, et al. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). J Telemed Telecare 2020;26:309-13.
3. Lai B, Rimmer J, Barstow B, et al. Teleexercise for Persons With Spinal Cord Injury: A Mixed-Methods Feasibility Case Series. JMIR Rehabil Assist Technol 2016;3:e8.
4. Chan S, Li L, Torous J, et al. Review of Use of Asynchronous Technologies Incorporated in Mental Health Care. Curr Psychiatry Rep 2018;20:85.
5. Yozbatiran N, Harness ET, Le V, et al. A tele-assessment system for monitoring treatment effects in subjects with spinal cord injury. J Telemed Telecare 2010;16:152-7.
6. Gomes Costa RR, Dorneles JR, Veloso JHCL, et al. Feasibility and validity of the push-up test for synchronous and asynchronous strength tele-assessment in spinal cord injury individuals with paraplegia.J Spinal Cord Med 2022;1-10.
7. Young HJ, Mehta T, Kim Y, et al. The Spinal Cord Injury Program in Exercise (SCIPE) study: study protocol for a randomized controlled trial evaluating teleexercise programs for people with spinal cord injury. Trials 2021;22:551.
8. Costa RRG, Dorneles JR, Veloso JH, et al. Synchronous and asynchronous tele-exercise during the coronavirus disease 2019 pandemic: Comparisons of implementation and training load in individuals with spinal cord injury. J Telemed Telecare 2023;29:308-17.
9. World Health Organization. WHO guidelines on physical activity and sedentary behaviour. 2020. Available online: https://www.who.int/publications/i/item/9789240015128
10. Cowan RE, Nash MS, Anderson KD. Exercise participation barrier prevalence and association with exercise participation status in individuals with spinal cord injury. Spinal Cord 2013;51:27-32.

doi: 10.21037/mhealth-23-21
Cite this article as: Gomes Costa RR, Ribeiro Neto F, Winckler C. Tele-health, tele-exercise and tele-assessment: an example of a fitness app for individuals with spinal cord injury. mHealth 2023;9:20.