

ORAR - an eHealth app for oral-motor rehabilitation: Its development and potential applications

Dr. Wing-Sze Winsy WONG^{1*}, Anne Chi Hay Yip², Cheung Leong Tung¹, Derun Chen¹, Ka Ming Wu¹, and Dr. Wing Yee Cymie NG¹

¹Speech Therapy Unit, Department of Chinese and Bilingual Studies, The Hong Kong Polytechnic University, Hong Kong, China

²Feelings Group Limited

***corresponding author, winsyws.wong@polyu.edu.hk**

Background

Oral-motor deficit is a common sequela of stroke. It affects one's ability to communicate and swallow, impacting their participation in daily activities and quality of life. The prevalence of dysarthria and dysphagia ranged from 8-60% (AHSA; 2020) and 29-64% (ASHA; n.d.). Meanwhile, there is an emerging use of mobile health (eHealth) apps for swallowing training on older adults (e.g., Kim et al., 2020; Cho et al., 2021) and dysarthria rehabilitation (Kim et al., 2024). However, the use of artificial intelligence (AI)-assisted eHealth apps for evaluating oral-motor functions has been less explored.

Objective

The current study describes the development of ORAR – an eHealth app specifically designed to evaluate the oral-motor functions of adult speakers and its potential applications.

Methods

A total of 122 neurotypically normal Chinese adults aged from 20-79 years (65 females; mean age = 51.4 years; S.D. = 18.3) were recruited to carry out a series of speech and non-speech oral-motor tasks such as diadochokinetic rate, maximum phonation time, range-of-motion of the jaw, tongue, and lips. Their performance was captured via a mobile phone and analysed using commercially available image-based object detection and speech recognition algorithms with customization. The performance of subjects on six image-based tasks (i.e., range of motion of the jaw, tongue and lips) was compared between genders and across different age groups.

Results

Among the six tasks studied, a gender difference was observed only in the range of motion of the jaw ($t = 3.73$; $p < .001$). Age difference was not found in all tasks.

Conclusion

ORAR appears to be a feasible method for evaluating oral-motor functions. Its potential in assisting clinicians in screening or assessing the oral-motor functions of various populations, e.g., stroke and dementia, deserves further investigation.

Keywords

eHealth app, oral-motor functions, artificial intelligence, assessment

Learning Outcomes

1. Recognize the potential use of artificial intelligence in oral-motor functions
2. Understand how image-based artificial intelligence algorithms may assist oral-motor evaluation.
3. Compare the performance of image-based oral-motor tasks in different age/gender groups.