Asia Proceedings of Social Sciences
Journal Homepage: https://readersinsight.net/APSS

9th ASIA International Conference (Langkawi, Malaysia)

Intelligent System for Elderly Health Promotion

Chao-Fen Pan*,

Department of Industrial Engineering and Management
National Kaohsiung University of Science and Technology, Kaohsiung 80778
Taiwan
i108143104@nkust.edu.tw

Chien-Der Lin

Digital Transformation Research Institute
Institute for Information Industry, Kaohsiung 806611
Taiwan
chiender@iii.org.tw

Yun-Cheng Jhong

Digital Transformation Research Institute
Institute for Information Industry, Kaohsiung 806611
Taiwan
chiender@iii.org.tw

***Corresponding Author email: i108143104@nkust.edu.tw**

Submitted: 09 January 2024 *Revised: 18 March 2024* *Accepted: 24 March 2024*

Peer-review under responsibility of 9th ASIA International Conference (Langkawi, Malaysia) Scientific Committee
http://connectingasia.org/scientific-committee/

https://doi.org/10.31580/pk2m4834

ABSTRACT

This study addresses the decline in mental and physical function among the elderly, leading to limitations in daily activities due to disability and dementia. The aim is to enable healthy and autonomous aging by developing an Intelligent System for Elderly Health Promotion. The system systematically promotes physical and mental health, aiming to enhance the quality of life for the elderly, delay disability or dementia, and achieve active aging. The research employs IoT sensors on rehabilitation devices, integrating gaming elements to make elderly activities more engaging. The system collects multi-directional data from sensors and games, conducting exercise analysis for preliminary staff suggestions. Reports are generated every 12 weeks for overall analysis, with weekly reports for individual participants utilizing statistical methods for initial insights. The comprehensive 12-week report provides detailed movement analysis, aiding staff and physical therapists in assessing effectiveness. Results indicate the Intelligent System Health Promotion effectively maintains and improves elderly exercise training. The number of participants has grown from six to over fifty in two months, with an increase in regular and correct exercise. Individual reports show improved operation of rehabilitation equipment and cognitive abilities, as evidenced by achieving target scores in the game. In discussion, the study introduces a technological solution for elderly health promotion, providing concrete benefits. However, the reports and recommendations are considered preliminary, requiring validation by professionals and multiple devices to assess elderly physical conditions accurately. The system is envisioned to support frontline staff with real-time information, aiding in quick decision-making to enhance the pleasure of elderly exercise, consistently improving quality of life and physical abilities. A positive impact on the future of elderly health promotion and technology applications is anticipated.

Keywords: *Elderly; Health Promotion*

RESEARCH HIGHLIGHTS

Intelligent system health promotion can provide specific solutions for the promotion of elderly health and then effectively maintain and improve the exercise training of the elderly, which will positively impact the application of technology in the field of elderly health promotion.

Research Objectives

Mental function declines due to disability and dementia, and there is a decline in physical function due to weakness (Gobbens & van Assen, 2014), thus limiting disability in life ability and overall activities in this study, to enable the elderly to be healthy and autonomous and maintain their participation in health activities, we developed an Intelligent System for Elderly Health Promotion. By systematically promoting the physical and mental health of the elderly while improving their quality of life and delaying disability or dementia, we can achieve active aging (Hall & Marston, 2017; Kappen et al., 2019).

Methodology

This system combines IoT sensors on the rehabilitation device. It connects the game to enable role movement while operating the rehabilitation equipment to enhance the fun of the elderly's activity (Ding et al., 2022). The system will collect the multi-directional data of

sensors and games and perform subsequent exercise analysis to provide preliminary suggestions for staff. The system will report the overall analysis report of all personnel in the output institution every 12 weeks, and it will also conduct an analysis report of a single person per week. A single person's information will use some statistical methods for preliminary analysis and comments (such as whether regular exercise, excessive rest time, etc.), and the final overall report will be based on what the elderly has done in the past twelve weeks in the past twelve weeks The comprehensive analysis and comments of the movement are conducted to observe the training status of the elderly during this time, and provide staff or physical therapists to master the effectiveness of the elderly.

Results

The results show that the Intelligent System Health Promotion developed by this study can effectively maintain and improve the exercise training of the elderly (Hatem et al., 2016; Liu et al., 2019). The number of people who exercise has grown from six people initially introduced into the system to more than fifty in two months. Regular and correct exercises have also increased, indicating that the elderly have gradually become familiar with and correctly using rehabilitation equipment. In a single person's report, it can also be seen that the elderly can efficiently operate the rehabilitation equipment and control the objects in the game to achieve the target score, which shows that the physical and cognitive abilities of the elderly have improved (Chang et al., 2022).

Findings

This study has successfully introduced a new technology system in elderly health promotion, which can provide concrete solutions for elderly health promotion. However, the reports and recommendations are preliminary and still need to be verified by more professionals or multiple professional devices to assess the physical condition of the elderly correctly. The system is expected to play a supporting role in providing real-time information to the frontline staff to help them quickly grasp the situation of each older adult to take the corresponding measures and enhance the pleasure of older adults' exercise to promote them to exercise consistently and regularly to improve the quality of life and enhance the physical ability, which will have a positive impact on the future of the field of elderly health promotion and the application of science and technology.

Acknowledgment

Thanks to the Digital Transformation Research Institute, and Institute for Information Industry for cooperating to develop a senior technology care digital system.

References

Chang, C.-H., Yeh, C.-H., Chang, C.-C., & Lin, Y.-C. (2022). Interactive somatosensory games in rehabilitation training for older adults with mild cognitive impairment: Usability study. *JMIR Serious Games, 10*(3), e38465.

Ding, Y., Han, T., Liu, C., Zhang, Y., & Zhao, S. (2022, May). Analysis of the Influencing Factors of the Elderly User's Somatosensory Game Themes Preferences–Based on the DEMATEL Method. *Human Aspects of IT for the Aged Population. Technology in Everyday Living: 8th International Conference*, ITAP 2022, Held as Part of the 24th HCI International Conference, HCII 2022, Virtual Event, June 26–July 1, 2022, Proceedings, Part II,

Gobbens, R. J., & van Assen, M. A. (2014). The prediction of quality of life by physical, psychological and social components of frailty in community-dwelling older people. *Quality of Life Research, 23*, 2289-2300

Hall, A. K., & Marston, H. (2017). Games for health in the home: Gaming and older adults in the digital age of healthcare. *Handbook of Smart Homes, Health Care, Well-being. Charn, Switzerland: Springer International Publishing*.

Hatem, S. M., Saussez, G., Della Faille, M., Prist, V., Zhang, X., Dispa, D., & Bleyenheuft, Y. (2016). Rehabilitation of motor function after stroke : a multiple systematic review focused on techniques to stimulate upper extremity recovery. *Frontiers in human neuroscience*, *10*, 442.

Kappen, D. L., Mirza-Babaei, P., & Nacke, L. E. (2019). Older adults' physical activity and exergames: a systematic review. *International Journal of Human–Computer Interaction, 35*(2), 140-167.

Liu, W.-M., Chieh, M.-J., Chen, S.-W., Lu, S.-H., Lai, T.-R., Wu, M.-R., & Lin, L.-F. (2019). Interactive somatosensory game for functional fitness of older adults in community. *Asian Journal of Gerontology Geriatrics*, *14*(1), 48-48.