

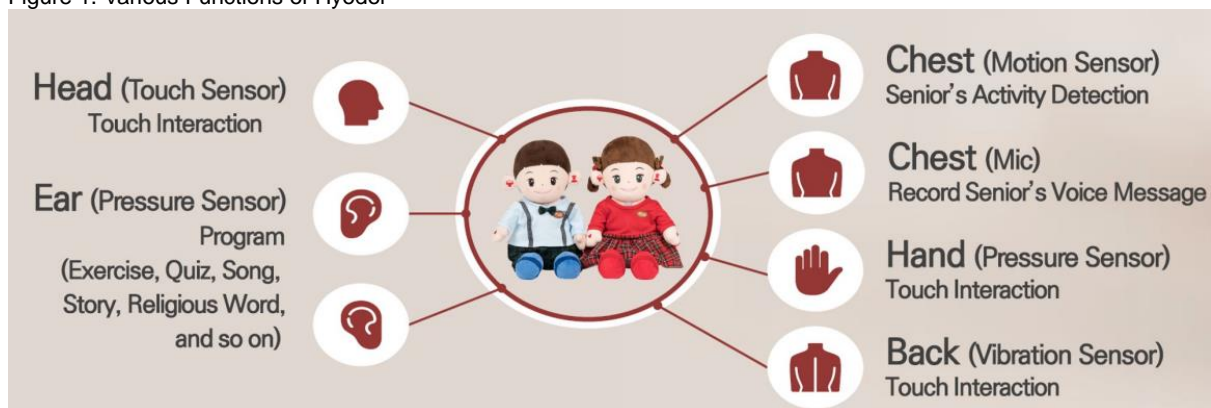
# SYMPOSIUM PRESENTATION 3: PHYSICAL AND MENTAL HEALTH

## Effects of companion robots for socially isolated older adults

O. Lee (Convener)

**Participants:** I. Nam (Korea), H. Jo (Korea), H. Shin (Korea), C. Jeon (Korea), H. Lee (Korea) O. Lee (USA) **ISSUE** Considering the current social isolation 'epidemic' and its deleterious mental, cognitive, and physical health effects, especially among solo-living older adults, human-robot interactions have the potential to provide emotional support and to reduce social isolation. Companion robots that can engage emotionally with older adults, and provide continuous monitoring and assessment of healthcare needs, have been proposed to help older adults who may lack human caregivers. **CONTENT** Our symposium is designed to bring together interdisciplinary speakers to present study findings 1) to evaluate the effects of affordable, multifunction companion robots called Hyodol and its acceptability among socially isolated older adults and 2) to discuss ways in which technology can improve the lives of older adults when barriers to use and adoption are overcome. Figure 1 presents various functions of Hyodol. **STRUCTURE** This mixed-method study by Lee and colleagues examined the effects of Hyodol on depressive symptoms and quality of life among impoverished and isolated older adults in South Korea. Next, Jo and colleagues demonstrated the effectiveness of Hyodol in homecare for community dwelling older adults with mild cognitive impairment. Finally, Shin and Jeon discuss the barriers that hinder effective use of robots and call for a dynamic and situated understanding of robots and their uses. **CONCLUSION** Findings illustrated high acceptability of Hyodol among these socially isolated older adults during the global pandemic, suggesting that a humanoid like Hyodol could be complementary to homecare services for solo-living older adults. Companion robots can help users better manage their physical and mental healthcare needs. Most interestingly, older users were well aware of its artificial nature, yet they made a conscious choice to anthropomorphize in search of meaningful social connection and emotional bonding.

Figure 1. Various Functions of Hyodol



**Keywords:** companion robots, emotional support, social isolation

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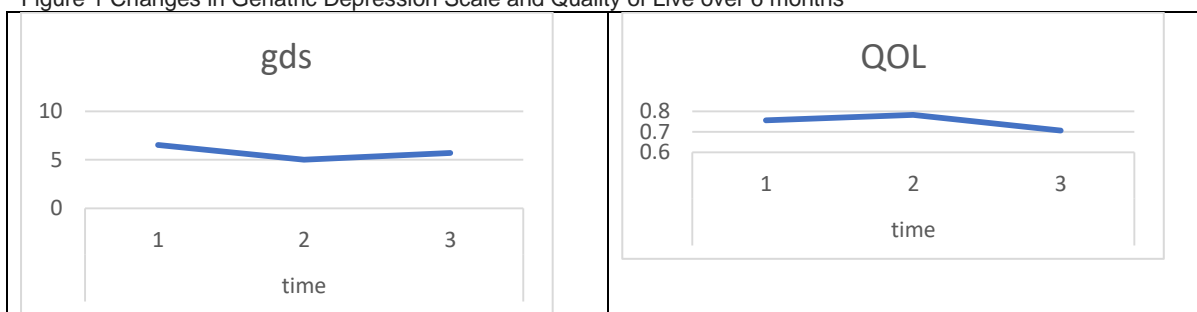
# SYMPOSIUM PRESENTATION 3: PHYSICAL AND MENTAL HEALTH

## **Socially assistive humanoid robots for home care: Investigating depressive symptoms and quality of life among impoverished and isolated older adults in South Korea**

O. Lee, I. Nam, H., Lee, Y. Chon

**Purpose** This mixed-method study examined the effects of a socially assistive humanoid robot (SAHR) on depressive symptoms and quality of life among impoverished and isolated older adults in South Korea. Our qualitative study explores perceptions of a multi-functional companion robot among older adults residing in a low-resource community. **Method** Our study uses Hyodol, a Korean-manufactured SAHR system, to enable verbal or textual communication. The 20" doll incorporates a fabric body, dressed in a girl or boy costume, which contains embedded sensors with Artificial Intelligence features enabling two-way conversations. Participants (n=116) interacted with Hyodol for 6 months. In a prospective longitudinal design, 116 older adults were assessed. Outcome measures were taken at baseline (Time 1), at 3 months (Time 2), and at 6 months (Time 3), after the deployment of the SAHRs. In-depth interviews were conducted with 12 older adults who kept a doll-shaped companion robot called Hyodol for 18 months on average. We used the Framework Analysis Method to explore types of friendships that participants cultivated with the robot. **Results and Discussion** As shown in Figure 1, results showed patterns of curvilinear relations indicating changes in geriatric depression and quality of life scores across the 6-month study period. Furthermore, the evaluation of this mixed-method study on the acceptability of Hyodol, based on perspectives of older adults and their experiences of interacting with the SAHR, suggest that SAHRs may be an appropriate tool for improving behavioral health among community dwelling and socially isolated older adults. In the qualitative study the most common patterns of utility companionship reported by all participants were the role of health coach who reminded them to take medication and to exercise. Participants also found pleasure in playing with Hyodol, reporting reduced feelings of loneliness. In the absence of other social supports, all participants regarded Hyodol as a surrogate family member or human-friend, and interacted with the doll as such. Findings illustrated high acceptability of Hyodol among these socially isolated older adults during the global pandemic, suggesting that a humanoid like Hyodol could be complementary to homecare services for solo-living older adults. Our findings can help researchers, robot developers, and clinicians better understand the acceptability and viability of using low-cost companion robots to benefit socially isolated older adults.

Figure 1 Changes in Geriatric Depression Scale and Quality of Live over 6 months



1 = PRE: baseline

2 = POST: 3 month

3 = FOLLOW-UP: 6 month

**Keywords:** companion robots, emotional support, social isolation

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# SYMPOSIUM PRESENTATION 3: PHYSICAL AND MENTAL HEALTH

## Verification of the effectiveness of a social robot according to the cognitive function of the older adults

J. Jang, Y. Hwang, K. S. Kim, H. Jo

**Purpose** The population of people with dementia in South Korea is growing concurrently with population aging, thus information and communications technology (ICT)-based dementia management technologies have attracted much attention in recent years. This study aimed to investigate the effectiveness of using a social robot at home for six weeks on perceived health, cognitive function, and depression in older adults with cognitive decline, diagnosed with MCI or dementia. We hypothesized that the use of a social robot would have a positive effect on perceived health, depression, and cognitive function in older adults with cognitive decline. **Method** This study enrolled older adult with cognitive decline (determined by K-MMSE score  $\leq 26$ , Clinical Dementia Rating 0.5–2). Study participants were divided into very mild cognitive impairment (vMCI), mild cognitive impairment (MCI), and moderate cognitive impairment (MOCI) groups based on their cognitive function and were instructed to use a socially assistive robot called Hyodol at home for six weeks. Baseline and post-intervention surveys after six weeks were performed to examine the changes in perceived health, depression, and cognitive function in the intervention and control group. **Results and Discussion** As shown in table 1, the vMCI group showed a reduction in the depression score after the intervention ( $t=-2.447$ ,  $p=.040$ ), while the MCI and MOCI group did not show significant changes in the depression score. Further, the MCI group showed an improvement in the cognitive function score after the intervention ( $t=2.690$ ,  $p=.021$ ), but the vMCI and MOCI groups did not show significant changes. The significance of this study is that it evaluated the effectiveness of a SAR (Hyodol) by dividing older adults into groups based on the degree of cognitive impairment. Moreover, it presented foundational data for prevention policies and services targeting cognitive decline in older adults.

<Table 1> Comparison of mean values between groups at the baseline and post-intervention survey

vMCI						
	Experimental group (n=9)		Control group (n=21)		$t_1$	$t_2$
	Pre-test	Post-test	Pre-test	Post-test		
Depression	4.67	2.78	1.71	2.86	-2.447*	1.679
MCI						
Cognitive function	15.33	17.50	18.53	19.53	2.690*	1.234
MOCI						

**Keywords:** social robot, cognitive function, effectiveness, older adults

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## SYMPOSIUM PRESENTATION 3: PHYSICAL AND MENTAL HEALTH

### What hinders robotic care? Towards situated understanding of elder care robots and their uses

H. Shin, C. Jeon

**Purpose** A growing number of robots are developed and trialed for elderly care services in South Korea. Among them is Hyodol, a toy robot for the elderly living alone. Since the product's market release in 2017, almost 6,000 units have been distributed nationwide, known to be the most widespread elderly care robot in South Korea. In particular, over 90 percent of the robots have been distributed through healthcare institutions with public funding, which demonstrates the potential of information and communication technologies (ICT) successfully being incorporated into the state-run welfare system. While Hyodol's therapeutic efficacy has been investigated by a number of scholars (Jo et al., 2019; Kim et al., 2020a; Kim et al., 2020b; Lee et al., 2019), less focus has been placed on cases in which the robotic care does not operate as expected. This study aims to address and characterize the barriers that hinder the seamless introduction and sustainable use of robots. **Method** This study is based on multi-sited ethnography of Hyodol. For over 18 months, we have attended as participant observers at various events including robot training sessions for caregivers, robot installation at older adults' houses, robot repair and maintenance, and meetings among institution managers. In addition, we had in-depth interviews with stakeholders including the company staff, institution managers, caregivers, and older adults using Hyodol. Either semi-structured or unstructured interviews were conducted according to the interview subjects and settings. After the data was collected, the reported problems were grouped thematically. **Results and Discussion** Our results show that sustainable use of Hyodol is impeded by multiple problems involving technological, operational, financial, and institutional and policy issues. This demonstrates that the effect of care robots is determined not only by technology acceptance of the older adults and how much the robot is technologically advanced. Rather, it is dependent on sociocultural context and the existing eldercare ecology in which the robots are put into. For example, robots are usually not purchased by individual older adults but introduced as a municipal project with a two-year fiscal budget plan in Korea. This bureaucratic management system puts robotic care in a precarious position after the initial financial support. Furthermore, the quality of the robotic care is contingent upon the mediators between the older adults and the robot (Shin and Jeon, 2018; Jeon et al., 2020) that are in charge of managing and checking the app/web monitoring system. By pointing out the need for a dynamic and situated understanding of robots and their uses, this study contributes to developing culturally robust robots (Šabanović et al., 2014) and designing sustainable robotic eldercare services.

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**Keywords:** care robot, barrier, situated understanding

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**Acknowledgement** This research was supported by Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education(NRF-2022R1A6A3A13065675) and the international cooperation program managed by National Research Foundation of Korea(NRF-2018K1A3A7A03089893).