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## Feature Article

## Psychometric evaluation of the Korean Version of the Self-Efficacy for Exercise Scale for older adults

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## ABSTRACT

We evaluated the psychometric properties of the Korean version of the Self-Efficacy for Exercise Scale (SEE-K). The SEE-K consists of nine items and was translated into Korean using the forward-backward translation method. We administered it to 212 community-dwelling older adults along with measures of outcome expectation for exercise, quality of life, and physical activity. The validity was determined using confirmatory factor analysis and Rasch analysis with INFIT and OUTFIT statistics, which showed acceptable model fit. The concurrent validity was confirmed according to positive correlations between the SEE-K, outcome expectation for exercise, and quality of life. Furthermore, the high physical activity group had higher SEE-K scores. Finally, the reliability of the SEE-K was deemed acceptable based on Cronbach's alpha, coefficients of determination, and person and item separation indices with reliability. Thus, the SEE-K appears to have satisfactory validity and reliability among older adults in South Korea.

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## Introduction

Physical activity helps to promote and maintain older adults' health. Regardless of sex, people with high levels of physical activity are likely to have a longer life expectancy than people who are sedentary.<sup>1</sup> Furthermore, physical activity can help reduce depression, particularly in older adults.<sup>2</sup>

Despite these facts, older adults appear to participate less in physical activity compared with adults younger than 65 years old. For instance, in the United States, 11.9% of older adults aged 65 and over in 2012 met the recommended guidelines for physical activity, contrary to the 17.2% of adults aged 45–64.<sup>3</sup> In the United Kingdom, the number of people who do not participate in at least moderate-intensity activity increases proportionally with age, with an especially steep rate among people aged 65 or older.<sup>4</sup> Physical activity in older adults in South Korea has been gradually decreasing since 2008: Among those aged 70 years or older, only 30.4% and 45.5% of women and men, respectively, participate in moderate-intensity

physical activity.<sup>5</sup> Indeed, men and women aged 70 years or older appear to be the age group with the lowest level of participation in moderate-intensity physical activity in South Korea.<sup>6</sup>

The above examples indicate that older adults' rate of participation in physical activity tends to be lower than that of other age groups, which is problematic because physical activity is expected to help reduce the burden on health and social care by enabling healthy aging<sup>7</sup>; it is difficult for older adults to expect this benefit unless they regularly take part in physical activity. The factors related to decreased physical activity in older adults include medical problems, physical frailty, negative experience, fear of activity-related injury or falling, having a sedentary lifestyle in the past, insufficient understanding of physical activity, living in an unsafe neighborhood, and lack of company.<sup>8,9</sup> In contrast, people with higher self-efficacy for exercise are known to be more likely to initiate and maintain physical activity. In this regard, self-efficacy has been referred to as an important factor influencing physical activity.<sup>10–12</sup>

Self-efficacy theory originated in social cognitive theory,<sup>13</sup> which has been used to explain the factors affecting exercise behavior among older individuals. The primary assumption of self-efficacy theory is that behavioral change and maintenance of that change rely predominantly on an individual's belief in their ability to perform a certain behavior (i.e., their self-efficacy).<sup>13</sup> Self-efficacy plays an important role in maintaining older adults' participation in

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functional activities and exercises.<sup>14</sup> Several interventions have been developed and tested to strengthen self-efficacy expectations related to exercises.<sup>12,15,16</sup>

There have been many efforts to measure people's confidence in maintaining physical activity when confronting obstacles to exercise. One such measure, the Self-Efficacy for Exercise scale (SEE), was developed and verified as a valid and reliable tool in older populations,<sup>17</sup> and further applied to African American and Latino older adults<sup>18</sup> in the United States. The SEE has also been translated into Chinese<sup>19</sup> and Swedish,<sup>20</sup> and these two translated versions were evaluated for the reliability and validity in samples of Taiwanese and Swedish population. We found no scale in Korean for self-efficacy for exercise for older adults available; thus, we deemed the SEE scale a suitable choice for measuring self-efficacy expectation because it is developed specifically for older adults and easily applicable to them, owing to its short length. With the aim of wide use of the SEE scale in the geriatric care and physical activity fields for Korean older adults, we evaluated the psychometric properties of the Korean version of the SEE (SEE-K) by using confirmatory factor analysis and Rasch analysis.

## Material and methods

### Participants and procedures

Study participants were recruited from three community welfare centers for older adults in two districts of Seoul, South Korea, and one located close to Seoul. The inclusion criteria were being aged 65 years or older, community dwelling, and independent in activities of daily living. With the cooperation of personnel from the three community welfare centers, we visited the centers and announced this research study to older adults who were at the community welfare centers in August, 2013. Trained research assistants approached about 240 older adults, of which 215 consented to participate in the study. A signed informed consent form was procured from each participant before data collection. The questionnaires were completed either by participants themselves or, for participants unable to complete the questionnaires by hand, by research assistants using interviews. After completion of the questionnaire, a small gift was given to the participants. After removing incomplete questionnaires, 212 surveys were included in the final data analysis. This study was approved by the institutional review board of the College of Nursing at Yonsei University in Seoul, South Korea (No. 2013-0024).

### Measurements

We collected information on participants' age, sex, education, height, weight, perceived health status, and number of diseases using the questionnaire. Then, body mass index (BMI) was calculated from participants' reported height and weight. The other measurements used in this study are described below.

### Self-Efficacy for Exercise

The original English version of the SEE contains nine items measuring confidence in ability to exercise under certain conditions, for example, bad weather, emotions, and busy or stressful situations. Participants rated their confidence about maintaining exercise three times per week for 20 min for each condition, ranging from 0 (not confident) to 10 (very confident). A higher score represents better self-efficacy for exercise.<sup>17</sup>

After permission was received from the original developer of the SEE, the English version was translated into Korean (forward translation). Then, two nursing professors in Korea reviewed the translation accuracy. Finally, this version was back-translated into

English by a Korean-American, who is proficient in both Korean and English.

### Outcome Expectations for Exercise-2

The Korean version of the Outcome Expectations for Exercise-2 scale (OEE-2-K)<sup>21</sup> was also used. This scale was derived from the OEE-2, which consists of 13 items, measuring nine positive and four negative outcome expectations for exercise.<sup>22</sup> The scale uses a 5-point Likert scale, ranging from 1 (not at all) to 5 (absolutely agree). A higher score indicates higher expectations for the outcomes of exercise. The Cronbach's alpha in the present study was 0.834.

### Quality of life

The EuroQol group's 3-level version of the EQ-5D was used to measure quality of life (QoL).<sup>23</sup> This tool was developed as a generic core index of health for use in health care evaluation worldwide, including in South Korea. Using a questionnaire format, this tool requires each participant to rate five dimensions of QoL—mobility (M), self-care (SC), usual activities (UA), pain/discomfort (PD), and anxiety/depression (AD)—on a three-point scale of severity, as follows: no problem (level 1), some or moderate problem (level 2), and serious problem (level 3). The EQ-5D health states can be converted into a single summary index by applying a formula that essentially attaches values (i.e., weights) to each of the levels in each dimension. The following formula has been used in the Korean population to calculate the EQ-5D-3L index<sup>24</sup>:

$$\begin{aligned} \text{EQ-5D index} = & 1 - (0.050 + 0.096 \times M2 + 0.418 \times M3 \\ & + 0.046 \times SC2 + 0.136 \times SC3 + 0.051 \times UA2 \\ & + 0.208 \times UA3 + 0.037 \times PD2 + 0.151 \\ & \times PD3 + 0.043 \times AD2 + 0.158 \times AD3 \\ & + 0.050 \times N3) \end{aligned}$$

For example, "M2" represents someone who gave a level 2 (some or moderate problem) for mobility and "N3" indicates whether there is any dimension rated on a level 3. Thus, the EQ-5D index value for an individual who gave ratings of 3, 2, 3, 2, and 2 for the five dimensions would be calculated as follows:  $1 - (0.050 + 0.418 + 0.046 + 0.208 + 0.037 + 0.043 + 0.050) = 0.148$ .<sup>24</sup>

### Physical activity

To assess physical activity, the International Physical Activity Questionnaire-short form (IPAQ) was used. This consists of assessments of vigorous- and moderate-intensity activities and walking. We converted minutes and number of days spent engaging in those three types of physical activity into total MET minutes per week. Then, we categorized participants into three groups—low, moderate, and high physical activity—based on the total MET minutes per week. The IPAQ data processing guideline<sup>25</sup> was used for calculation of MET minutes per week and grouping.

### Data analysis

Stata version 12 was used for descriptive and inferential statistics and confirmatory factor analysis, and Winsteps 3.81 was used for Rasch model testing.

### Validity

Construct validity was tested using confirmatory factor analysis with the maximum likelihood estimation method. To estimate model fit, the chi-square statistic, chi-square/degrees of freedom ratio, comparative fit index (CFI), Tucker–Lewis index (TLI), and

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