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## Geriatric Nursing

journal homepage: [www.gnjournal.com](http://www.gnjournal.com)

## Feature Article

## Predictors of subjective age in community-dwelling older adults in Korea

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## ARTICLE INFO

## Article history:

Received 19 August 2018

Received in revised form 22 November 2018

Accepted 30 November 2018

Available online 14 December 2018

## Keywords:

Depression

Korea

Older adults

Perceived age

Subjective age

## ABSTRACT

Subjective age, or felt age, is highly related to one's actual health and survival. This study was conducted to explore subjective age in community-dwelling older adults in Korea, and to identify predictors of subjective age. Participants were 616 Korean older adults who were living in the community. A multiple regression analysis with a stepwise method was conducted to analyse subjective age. On average, the participants felt 7.8 per cent younger than their actual age. A multiple regression analysis revealed that less severe depression, having better perceived health, having no visual impairment, having higher handgrip strength, and living in a metropolitan area were associated with younger subjective age. Further studies are needed to determine the factors associated with subjective age in older adults. Based on this study, conceptual analyses of subjective age or longitudinal studies to determine the factors affecting subjective age are advisable.

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## Introduction

There are two main concepts currently used in the scientific community with regards to age: chronological age and subjective age. To date, chronological age has been frequently used when classifying older adults into age groups.<sup>1,2</sup> However, in older populations, chronological age may not be as much important as it is believed to be, because both health status and the degree of aging can vary between individuals in spite of them sharing the same chronological age. For example, for older adults who are in their 70s, some of them might be healthy enough to be considered to be in their 50s, while others might be frail, suffer from diseases, and look to be in their 90s. Chronological age solely is not good information to estimate one's health status or the degree of aging.

On the other hand, subjective age, or felt age has recently come into the spotlight, as it is proven to be closely associated with one's actual health and survival.<sup>3</sup> Some longitudinal studies have also demonstrated relationships between older subjective age and higher mortality rates a decade after subjective age assessment.<sup>4,5</sup> According to previous studies, younger subjective age has been associated with numerous demographic, health-related, and social factors. For demographic characteristics, feeling older was positively correlated with advanced chronological age.<sup>6</sup> Having a higher education level,<sup>7,8</sup> having a higher socioeconomic status,<sup>9</sup> and living in an urban area<sup>7</sup> were related to feeling younger. Subjective age has also been related to

living arrangement; there was a difference in subjective age according to whether subjects lived alone or with others.<sup>10</sup>

There are many health-related factors that have been reported to be associated with subjective age among older adults. A faster walking speed was significantly related to a younger subjective age.<sup>11</sup> Older adults who reported feeling younger than their chronological age also tended to have stronger handgrip strength<sup>12</sup> and vice versa.<sup>13</sup> In a prior study, there was a positive association between feeling younger than actual age and lower level of C-reactive protein, an inflammation marker.<sup>14</sup> Younger subjective age among older adults was also related to higher scores for activities of daily living or instrumental activities of daily living,<sup>6,7</sup> smaller number of diseases,<sup>15,16</sup> lower body mass index (BMI),<sup>8</sup> and no visual impairment.<sup>17</sup> On the contrary, older adults with physical symptoms or pain tended to feel older than their true age.<sup>18</sup> These previous studies clearly represent the relationship between subjective age and physical health.

Moreover, as subjective age reflects one's perspective of themselves, subjective age is also related to many psychological factors among older adults. According to previous research, people who felt younger than their chronological age tended to be mentally healthy and had fewer psychological problems.<sup>15,19</sup> In addition, a younger subjective age was associated with better self-rated health,<sup>16,20</sup> less stress,<sup>18</sup> fewer depressive symptoms,<sup>6,7</sup> and strong mastery belief.<sup>6,21</sup> Older adults who felt themselves younger also had the tendency to have better memory efficacy and cognition.<sup>8,16</sup>

Many social factors are also known to be related to subjective age. Experience of age discrimination<sup>13</sup> and negative age stereotypes<sup>22</sup> were associated with subjective age in previous studies. Cultural

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backgrounds were also important to one's subjective age according to previous reports.<sup>6,7,23,24</sup> Thus, it could be worthwhile to explore subjective age in older adults in different cultures. However, to the best of our knowledge, research that has dealt with the relationship between subjective age and health-related factors among Korean older adults was very limited. In this limited research, subjective age was explored only in relation to psychological factors, or subjective age was measured with a nominal scale of "feeling younger than my actual age", "feeling similar to my actual age", and "feeling older than my actual age", making it impossible to know the exact extent to which subjects felt younger.<sup>9,25,26</sup> As subjective age is related to various factors, it is necessary to explore subjective age using a comprehensive set of factors.

Likewise, since subjective age is closely related to many factors, subjective age may function as a good health-related indicator among older adults, potentially to an even better extent than chronological age. Yet, there is lack of knowledge on how people from different culture perceive subjective age, and what factors influence their subjective age. In order to utilize subjective age in practice, more evidence would be needed. Accordingly, the purpose of this study was to examine subjective age among community-dwelling older adults in Korea using a proportional age discrepancy score and to explore predictors of subjective age. The study variables were selected based on a review of the previous literature, and they were tested to see if they influence subjective age in this population.

## Methods

### *Participants and data collection*

The sample of this study was gathered from community-dwelling older adults living in nine different metropolitan cities and provinces in Korea: Seoul, Incheon, Daejeon, Gyeonggi-do, Chungcheong-do, Jeolla-do, Gangwon-do, and Gyung-sang-do. In order to gain representative data of community-dwelling older adults in Korea, a quota sampling method was used to recruit older adults for specific area groups. The eligibility criteria for the study were 65 years or older, able to communicate without difficulties, able to understand the purpose of the study, and agreement to participate in the study. Participant ability to provide consent was determined based upon coherent and clear communication ability during the recruiting process.

Data were collected from public health centres, senior welfare centres, and through home visits. Before data collection, the researcher made contact with public health centres and senior welfare centres in each area. Data were collected only at those facilities which were pre-approved for the study.

For data collection, three research assistants who were majoring in nursing in undergraduate studies were hired. They were educated for an hour about the purpose of this study and how to obtain data for the study. In addition, they were trained on gathering consistent measurements and the scoring used in the study. The researcher and these research assistants gathered data by individual interviews using structured questionnaires. The interviews were conducted in common lounges or reception areas of each facility and in living rooms in cases of home visit. The interviews were performed from August 2017 to October 2017.

Before starting individual interviews, the researcher and research assistants provided sufficient information about the purpose of this study to potential participants. The data were collected only after receiving informed consent from the participants. The researchers tried to reach as many potential participants as possible during the visit in each facility until each quota was met. A total number of 616 community-dwelling older adults who were 65 years or older agreed to participate in this study. However, ten participants had large amount of incomplete

data, either due to having serious problems understanding the interviewers' questions or to having been diagnosed with dementia. For these reasons, a total number of 606 older adults were used for the analysis. This study was approved by the H University Ethical Review Board (HYI-17-158-1).

## Measures

### *Subjective age*

In this study, the dependent variable was subjective age. In line with previous literature,<sup>8,11–14</sup> a proportional age discrepancy score was used to represent subjective age. The participant's felt age was subtracted from their chronological age, and this difference was divided by their chronological age to give the proportional age discrepancy score [(Chronological age – Felt Age)/Chronological Age]. Felt age was measured by asking participants to specify in years how old they felt at the point of the interview. A positive value for the proportional discrepancy score meant the patients had a younger subjective age compared to their chronological age. For example, if someone whose chronological age is 70 years old feels like he is 60 years old, his proportional discrepancy score would be  $(70-60)/70=0.14$  which indicates he feels about 14% younger than his actual age. This standardized value, the proportional age discrepancy score, represents the extent to which someone feels young. Kotter-Gruhn et al. insisted in their study that the proportional age discrepancy score presented an advantage over a simple discrepancy score, as felt age may have different meanings according to one's chronological age.<sup>27</sup> In addition, since using measurements consistent with those used in previous studies would make it easy to compare results, the proportional age discrepancy score was used to represent subjective age in this study.

### *Demographic characteristics*

For general characteristics, chronological age, gender, residential area, education, socioeconomic status, and living arrangements were included. The participants' residential areas were classified into metropolitan area (1) or non-metropolitan area (0). The level of education was measured by the years of formal education. Socioeconomic status was measured by asking "How would you rate your socioeconomic status?" with the possible answers being high (3), middle (2), and low (1). For living arrangements, the participants were asked whether they lived alone (1) or with others (0).

### *Health-related factors*

*Number of diagnosed diseases*. The number of diagnosed diseases for each patient was assessed by asking the participants, "Do you currently have any diseases diagnosed by physicians?". Then, the number of the diagnosed diseases were calculated.

*Body mass index (BMI)*. BMI was calculated using the height and weight of the participants. After asking the participants their weight (kg) and height (m), the weight was divided by the height squared. The raw value for BMI was used for analysis.

*Handgrip strength*. Handgrip strength was measured with a hand dynamometer (Tanita Hand Grip Meter Blue 6103, Tokyo, Japan). Handgrip strength was measured twice in the dominant hand in the same position, and the average value of the two measurements was used to represent handgrip strength.<sup>28,29</sup>

*Pain*. Pain was measured with a numerical rating scale from 0 to 10. Pain was assessed based on the answer to "How much pain do you currently have?". Zero represented no pain and 10 represented the worst possible pain.

**Depression.** Depression was measured with the Korean version of the Short Form of the Geriatric Depression Scale (SGDS).<sup>30</sup> The Korean version of the SGDS is a 15-item scale which was translated from the SGDS developed by Sheikh and Yesavage in 1986.<sup>31</sup> The possible range on the SGDS is 0–15, and a higher score means more depressive symptoms. When developed, the reliability of the Korean version of SGDS was 0.89 and, in this study, the coefficient for the reliability of this version based on the Kuder–Richardson Formula 20 (KR-20) was 0.91.

**Perceived hearing impairment.** Perceived hearing impairment was measured with single question which was used in the 2014 National Survey on Korean Older Persons.<sup>32</sup> The participants were asked by “Do you have any difficulties in daily life due to hearing impairment?” and the answer was either yes (1) or no (0).

**Perceived visual impairment.** Perceived visual impairment was also measured with “Do you have any difficulties in daily life due to visual impairment?”<sup>32</sup> and the answer was either yes (1) or no (0).

**Perceived health.** Perceived health was assessed with the single question: “How do you rate your health in general?” and the participants answered using the Likert scale ranging from very poor (1) to very good (5).<sup>32</sup>

#### Social factors

**Social competence.** As representative national data on Korean older adults indicated that most community-dwelling Korean older adults did not have limitations in their activities of daily living, such as eating, bathing, and toileting,<sup>32</sup> we decided to examine social competence, instead of activities of daily living, when measuring subject's ability to get by in daily life. Social competence was assessed with the Tokyo Metropolitan Institute of Gerontology Index of Competence (TMIG-IC), which was originally developed to measure the social aspects of individuals' daily functions in community-dwelling older adults.<sup>33</sup> The TMIG-IC is a binary scale using yes (1) or no (0) and consisting of 13 items, with a higher score indicating better social competence. Examples of items on the scale include whether the older adult subjects could use public transportation by themselves, whether they could shop for daily necessities, whether they could handle their own banking, and whether they visit friends' houses.<sup>33</sup> At the time of the development, the reliability coefficient alpha was 0.913, and the test-retest reliability coefficient was 0.859.<sup>33</sup> In this study, the Korean translated version of the TMIG Index of Competence was used.<sup>34</sup> The coefficient for reliability in this study based on the KR-20 was 0.74.

**Perceived limitation in daily life.** Perceived limitation in daily life was measured with single question, asking participants “Is there any limitation in your daily life due to aging?” The participants were asked to choose either yes (0) or no (1).

**Experiences of age discrimination.** Patient experiences of age discrimination were assessed with the question “Have you ever experienced age discrimination?”<sup>32</sup> The possible answers were either yes (1) or no (0).

#### Data analysis

Descriptive analyses were conducted for all demographic characteristics, health-related factors, and social factors. Correlation coefficient tests were conducted for continuous variables and for final analysis, multiple regression analyses were performed using a

stepwise method to identify the predictors of subjective age. Variables in dichotomous form were included in the regression model as dummy variables.

The data were checked for all the criteria needed for inclusion in the multiple regression analysis. All variables were normally distributed, as their skewness were between  $-1.29$  and  $1.70$  and kurtosis was between  $-1.69$  and  $4.18$ .<sup>35</sup> All independent variables used in the final analysis had linear relationships with the dependent variable. As the Durbin–Watson value was  $1.821$ , which was close to  $2$ , the residuals were considered to be independent. The correlations between independent variables were checked, and the coefficients did not exceed an absolute value of  $0.80$ . No multicollinearity was detected with a tolerance value larger than  $0.1$  and a variance inflation factor less than  $10$ . Cook's distance and standardized residuals were used to determine if any outliers existed. As 12 cases exceeded the absolute value of three in standardized residuals, those 12 cases were excluded from the final multiple regression analysis. As a result, a total of 594 participants were used for the final multiple regression analysis. All analyses were performed using the Statistical Package for the Social Sciences (SPSS) for Windows version 24.0. The level of statistical significance was set at less than  $0.05$ .

## Results

Descriptive statistics for the study variables are presented in Table 1. The average proportional age discrepancy score of the participants was  $0.078 \pm 0.11$  (range =  $-0.19$  to  $0.70$ ), which means, on average, the participants felt themselves to be 7.8% younger than their actual age. Although not described in the table, when participants were broken down into three groups of 1) feeling younger than their actual age, 2) feeling the same as their actual age, and 3) feeling older than their actual age, with a positive value, 0, or negative value for proportional age discrepancy scores, respectively, 63.9% of

**Table 1**  
Characteristics of the participants (N = 606).

Characteristics	n(%) or M ± SD	Range
Subjective age <sup>b</sup>	0.078 ± 0.11	-0.19 to 0.70
Chronological age	76.90 ± 6.35	65–99
Gender (Female)	385 (63.5)	
Residential area (Metropolitan area)	336 (55.4)	
Education (years)	8.01 ± 5.02	0–20
Socioeconomic status		
Low	233 (38.4)	
Middle	354 (58.4)	
High	19 (3.1)	
Living arrangement (Living with others)	373 (61.6)	
Number of diagnosed diseases	1.33 ± 1.10	0–6
Body mass index <sup>a</sup> (kg/m <sup>2</sup> )	23.57 ± 3.06	15.43–35.71
Handgrip strength (kg)		
Male	30.13 ± 7.06 kg	7.00–50.25
Female	18.85 ± 4.99	6.00–29.75
Pain <sup>a</sup>	3.02 ± 2.97	0–10
Depression	3.21 ± 4.00	0–15
Perceived hearing impairment (No)	499 (82.3)	
Perceived visual impairment (No)	493 (81.4)	
Perceived health	3.24 ± 1.07	1–5
Very poor	41 (6.8)	
Poor	110 (18.2)	
Fair	172 (28.4)	
Good	228 (37.6)	
Very good	55 (9.1)	
Social competence	10.85 ± 2.20	1–13
Perceived Limitation in daily life <sup>a</sup> (No)	382 (63.0)	
Experiences of age Discrimination (No)	483 (79.7)	

SD = standard deviation.

<sup>a</sup> Missing data excluded.

<sup>b</sup> Proportional age discrepancy score; higher values indicate younger subjective age.

**Table 2**Correlation between the continuous variables ( $N = 606$ ).

	1	2	3	4	5	6	7	8	9
1. Chronological age	1								
2. Education (years)	-0.29***	1							
3. Number of diagnosed diseases	0.07	-0.08	1						
4. Body mass index (kg/m <sup>2</sup> )	-0.09*	0.06	0.16***	1					
5. Hand grip strength (kg)	-0.36**	0.51***	-0.11**	0.14***	1				
6. Pain	0.11**	-0.31***	0.29***	0.01	-0.31***	1			
7. Depression	0.22***	-0.32***	0.19***	-0.11*	-0.33***	0.40***	1		
8. Social Competence	-0.25***	0.42***	-0.13**	0.07	0.36***	-0.26***	-0.57***	1	
9. Subjective Age <sup>a</sup>	-0.11**	0.22***	-0.12**	0.05	0.22***	-0.18***	-0.40***	0.26***	1

<sup>a</sup> Proportional Age Discrepancy Score; higher values indicate younger subjective age.\*  $p < 0.05$ .\*\*  $p < 0.01$ .\*\*\*  $p < 0.001$ .

participants felt themselves to be younger than their actual age, 25.4% felt themselves to be the same age as their actual age, and 10.7% felt themselves to be older than their actual age. The average chronological age of participants was  $76.90 \pm 6.35$  (range = 65–99). The majority of participants were female (63.5%), lived in a metropolitan area (55.4%), ranked in the middle for socioeconomic status (58.4%), and were living with others (61.6%). On average, the participants had  $8.01 \pm 5.02$  years of education (range = 0–20 years). Table 2 presents correlation coefficients of continuous variables.

Table 3 summarizes the results of the multiple regression model for factors associated with subjective age. In the final model (Adjusted  $R^2 = 0.234$ ,  $F = 35.50$ ,  $p < 0.001$ ), less severe depression ( $\beta = -0.281$ ,  $p < 0.001$ ) was the strongest factor for youthful subjective age, followed by better perceived health ( $\beta = 0.171$ ,  $p < 0.001$ ), no perceived visual impairment ( $\beta = -0.107$ ,  $p = 0.005$ ), better handgrip strength ( $\beta = 0.092$ ,  $p = 0.018$ ), and living in a metropolitan area ( $\beta = 0.086$ ,  $p = 0.02$ ).

## Discussion

This study was conducted to explore subjective age using a proportional age discrepancy score among community-dwelling older adults in Korea, and to identify predictors of subjective age. In this study, the participants felt themselves to be about 7.8% younger than their actual age, on average. This result is in line with previous reports which also measured subjective age with a proportional age discrepancy score. In a previous study of 2970 American adults aged 65 years and older, the participants reported to feel about 15% younger than their actual age, on average.<sup>11</sup> The sample used was quite representative of American older adults, as it was drawn from national data. Although the current study did not use a nationwide dataset, participants were recruited from nine different metropolitan cities and provinces in Korea. As both the current study and the previous study

used the same measurement for subjective age and the population in both studies was adults aged 65 years and older, it is still worthwhile to compare the results. Upon comparison, it was evident that American older adults reported a much younger subjective age than Korean older adults.

In addition, in a study conducted with 49 French adults aged from 52 to 91 years old, the participants reported to feel about 8% younger than their actual age when measured with the same proportional age discrepancy score used in this study.<sup>12</sup> Even though the number of participants used in that study was small and the age range was slightly different when compared to that used in this study, the method of patient recruitment was similar in both studies; community-dwelling older adults were recruited from community centres and senior clubs.<sup>12</sup> Given that subjective age might vary according to individual's activity levels, it is worthwhile to compare the results from these two studies since, unlike the American study, the French used subjects living in similar conditions to the subjects in our study. Upon comparison, we found that the results were similar between these two studies.

In this study, the majority of the participants (63.9%) felt younger than their actual age. In a study conducted with 267 older adults aged 84–90 years old recruited from a large city in Sweden, the respondents were divided into three groups: feeling old, feeling partly old, and not feeling old, with 64% of participants reporting not feeling old.<sup>6</sup> In both the previous study<sup>6</sup> and our current study, the majority of participants reported feeling that they were not old.

However, these results are quite different from those of a different study where 92% of the Chinese oldest old reported that they felt old.<sup>7</sup> The data were representative of the Chinese oldest old, as it was drawn from a national dataset. Although it is difficult to directly compare the results from the previous study<sup>7</sup> and our current study due to the different age ranges used, it is still noteworthy that subjective age can be different even in adjoining Asian countries. Westerhof and

**Table 3**Predictors of subjective age<sup>a</sup> ( $N = 594^b$ ).

	B	SE	$\beta$	$t$	$p$
(Constant)	0.015	0.018		0.832	0.406
Depression	-0.007	0.001	-0.281	-6.002	<0.001
Perceived health	0.015	0.004	0.171	3.712	<0.001
Perceived visual impairment (1 = Yes, 0 = No)	-0.025	0.009	-0.107	-2.834	0.005
Handgrip strength (kg)	0.016	0.007	0.086	2.333	0.02
Residential area (1 = Metropolitan area, 0 = Non-metropolitan area)	0.001	0.000	0.092	2.375	0.018

 $R^2 = 0.241$ , Adj.  $R^2 = 0.234$ ,  $F = 35.50$ ,  $p < 0.001$ 

Multiple regression with stepwise method.

<sup>a</sup> Proportional age discrepancy score; higher values indicate younger subjective age.<sup>b</sup> Only 594 cases from initial 606 cases were included in the final analysis due to outliers.

Barrett<sup>36</sup> once suggested that in more individualistic societies, a youthful age identity works as a more self-enhancing strategy than in collectivistic societies. Thus, although the age ranges in these studies were different, the differences between Chinese older adults and Korean older adults might result from certain cultural differences.

While 63.9% of participants felt themselves to be younger than their actual age in the current study, in a previous study conducted in Korea, only 19.4% of participants thought themselves younger than their actual age.<sup>9</sup> These findings might be explained by the different sampling methods used. While the previous study<sup>9</sup> recruited older adults within a small city, this study recruited older adults from nine different metropolitan cities and provinces in Korea to have a more representative dataset. As subjective age can be different according to the geographical regions where people live,<sup>7</sup> this might explain the difference. However, as this previous study conducted in Korea<sup>9</sup> did not use the proportional age discrepancy score, caution should be used when directly comparing these results.

In the final multiple regression model in the current study, the following factors were shown to be significant predictors for feeling younger: less severe depression, better perceived health, no visual impairment, stronger handgrip strength, and living in a metropolitan area. Having less depression was the highest factor for feeling younger in our study. This is consistent with previous research showing that people with less depressive symptoms reported feeling younger.<sup>6,7</sup> Similarly, Kotter-Gruhn et al.<sup>18</sup> indicated in their study that negative mood could influence subjective age. As depression and self-esteem are known to be strongly related,<sup>37</sup> people with less depression might feel younger than their actual age.

Perceived health, which is known to be significantly associated with one's objective health status,<sup>38</sup> was another strong factor related to feeling younger. This is similar to previous research that proved self-rated health worked as a predictor for subjective age.<sup>20</sup> Many other studies have also shown significant relationships between perceived health and subjective age.<sup>12,15,16,39</sup> In research by Infurna et al.,<sup>6</sup> the majority of older adults who perceived themselves to be healthier than their peers also felt themselves younger than their actual age. Infurna et al.<sup>6</sup> suggested that social comparison might play a role in subjective age. In addition, Diehl and Wahl<sup>40</sup> once stated that awareness of age-related changes includes comparison of oneself to one's peers. Thus, it is possible that the reason why better perceived health worked as a predictor for youthful subjective age might be because perceived health and subjective age are both related to social comparison with peers. Further research into the relationships between social comparison, perceived age, and subjective aging is advisable.

In this study, another factor that influenced feeling younger was having no visual impairment. Eibach et al.<sup>17</sup> found that visual fluency manipulation affected the subjective age of study participants. As part of the aging process, some people experience visual impairment. As a result, when older adults experience visual impairment, they might think they are in the middle of the aging process, thus causing them to feel they are old.

Handgrip strength was a predictor of feeling younger in our final model. This finding is consistent with a previous study which reported a meaningful relationship between handgrip strength and subjective age.<sup>12</sup> Handgrip strength is well-known as a marker of physical performance in older adults.<sup>41</sup> It is likely that older adults with stronger handgrip strength might actually be in better physical health, and by being in better physical health, they might feel younger.

Lastly, living in a metropolitan area was another factor related to feeling younger. This result is similar to a previous study.<sup>7</sup> This might be due to the larger portion of younger adults living in urban areas compared to rural areas; living with younger adults in urban areas might have influenced the older adults to feel younger.

In this study, although demographic characteristics, health-related factors, and social factors were all included in the final multiple regression analysis, no variable from the category of social factors was significant. This fact can be interpreted as health-related factors having had a stronger effect on subjective age than the other factors. This finding is different from previous research; Diehl and Wahl<sup>40</sup> insisted that social factors, such as age discrimination, were more closely related to one's awareness of age-related changes rather than demographic characteristics or health-related factors. In addition, Stephan and colleagues<sup>13</sup> reported that fewer experiences of age discrimination worked as a predictor for feeling younger. Unlike these studies, in the final model of the current study, experiencing age discrimination did not affect subjective age. This phenomenon might be due to the longstanding tradition of Confucianism in Korea, which stresses respect for older adults.<sup>42</sup> In this type of culture, it has been suggested that age discrimination is a less significant problem compared to Western cultures.<sup>43</sup> Therefore, it can be hypothesized that cultural differences might have influenced the relationship between age discrimination and subjective age in this study.

There are a few limitations to this study. First, by recruiting study participants mainly from public health centres and senior welfare centres where older adults with good mobility frequently visit, subjects with relatively healthy characteristics might have been sampled. In addition, although subjective age is a changeable concept, only the subjective ages reported at the time of the interviews were used. It is also a limitation that there were not many objective variables in this study. For example, for hearing impairment and visual impairment, it might have been more precise to measure actual hearing acuity or visual acuity. It also might have been better if the height and weight of the participants were measured by the interviewers for calculating BMI, instead of using self-reported information from the participants. Finally, while many other variables may influence one's subjective age, only a limited number of variables were included in this study.

## Conclusions

This unique study fills the gap in the previous literature where research about subjective age and its relationship to health among Korean older adults was lacking. As subjective age was measured with a proportional age discrepancy score, which had been widely used in previous research, it was easy to compare results.

This study clearly shows that having fewer depressive symptoms, having better perceived health, having no visual impairment, having higher hand grip strength, and living in a metropolitan area were associated with a younger subjective age. The results of this study have a potential to be used in practice; by simply inquiring about subjective age, depression and physical health may be screened. For example, for people who feel older than their actual age, healthcare professionals can further look for possible depression or physical problems such as vision problem or weak muscle strength. Further research such as conceptual analyses for subjective age or longitudinal studies to determining predictors of subjective age is needed to better understand subjective age. Moreover, previous research indicated that subjective age is a concept that can change with interventions or manipulation.<sup>12,17</sup> Therefore, based on the results of this study, healthcare professionals should make assessments and develop interventions that allow older adults to feel younger for better health outcomes and for successful aging.

## Acknowledgment

This article is part of the first author's master's thesis. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## Declarations of interest

None.

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