



Do Factors Associated Self-rated Good Health and Their Influences Differ between Males and Females across Different Age Groups in Korean and Australia?

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Objectives: This was a comparative study between Australia and Korea that investigated whether and to what extent factors related to self-rated good health (SRGH) differ by gender among age groups.

Methods: This study was a secondary analysis of data that were collected in nationally representative, cross-sectional, and population-based surveys. We analyzed Australian and Korean participants > 20 years of age using 2011 data from the Australian National Nutritional Physical Activity Survey (n = 9,276) and the Korean National Health and Nutritional Examination Survey (n = 5,915). Analyses were based on multiple logistic regression after controlling for covariates.

Results: Factors associated with SRGH and the extent of their influence differed by gender among age groups within each nation. Australian SRGH was associated with more factors than Korean SRGH, except in participants > 65 years old. Many differences among adults aged 20–44 years were observed, particularly with regard to the influence of socioeconomic factors. Living with a spouse only influenced SRGH in men 20–44 years old in both countries, negatively for Korean men and positively for Australian men. In this same age group, SRGH was positively influenced by employment and attainment of a higher education level in Australian men but not among Korean men; among women, income, but not education, affected SRGH in Korea, whereas in Australia, women were more influenced by education than by income. Lack of chronic disease had a strong influence on SRGH in both countries and was influential in all Australians and Koreans except those ≥ 65 years old.

Conclusion: Broad features of society should be considered when discussing health and differences in associated factors and their influences. For focused public health interventions of population groups, it is also necessary to consider gender and age groups within social environments.

Key Words: self-rated good health, factors, gender, age groups, social environment

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INTRODUCTION

Australia and Korea have similar population compositions and age structures. Both countries have low rates of fertility (1.9 in Australia and 1.3 in Korea for the period 2010–2015), resulting in proportionately fewer children and increased life expectancies (82.1 years in Australia and 81.4 years in Korea for the period 2010–2015). This dynamic also results in proportionately more elderly people (14.9% in Australia and 13.0% in Korea) [1,2]. However, the social environments of Australia and Korea differ, which might have marked effects on health and associ-



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ated factors that exceed the differences between two Western countries or two Asian developed countries. In addition, health outcomes differ by gender among age groups, and the associated factors were markedly affected by these factors [3–5].

Korea has undergone rapid social change in the recent past. In 2014, the elderly population showed 12.7%, and women's social participation reached its highest rate (51.3%) in history [2,6]. These changes have resulted in some problems with regard to providing long-term care for the elderly and child rearing, which is generally the role of women. To address these problems, the Korean government created national long-term care insurance and training programs for caregivers [7]. It also devised resource development plans and protections of rights that support women [8]. Another major change in Korea is that young adults have seen an increase in unemployment; this has created social problems that serve as a source of so-called 'generational conflict' [9].

By contrast, in Australia, the proportion of the population aged ≥ 65 years old increased from 11.6% to 14.4% between 1993 and 2013, and is projected to increase more rapidly over the next decade, as further cohorts of baby boomers turn 65 years old [1]. About 72% of Australians aged 15–64 years have a paying job (78% for men vs. 67% for women). This group tends to be more satisfied with their lives than the Organization for Economic Co-operation and Development (OECD) average, as 83% of this group reports a positive experience during an average day [10].

Health outcomes are related to many factors, including gender, age, economic status, employment, and health behaviors [4,11,12]. Recently, factors influencing health have become an important concern for health promotion [13]. Australia's Health 2014 reported individual physical condition and health determinants, and introduced four domains that can influence health and well-being: broad features of society, socioeconomic characteristics, health behaviors, and biomedical factors [14].

Health status usually includes objective diagnoses by a physician, whereas individuals may focus more on subjective health based on symptoms and functional limitations. Self-rated health is a good predictor of future health and use of healthcare (OECD, 2015). It has been used as a worldwide measure to assess health and is an independent predictor of morbidity and mortality [15–18], even though the ability of explanatory factors to account for self-rated health and mortality relationship differs among ages [4].

Most previous studies on this topic have identified whether health-related factors are associated within a particular region; few comparative studies are available [19,20]. The few that have been conducted compared the prevalence of diseases or differences in health behaviors based on socioeconomic factors in order to reveal differences in health and healthy behaviors [21].

Banks et al [21] reported that self-rated health is strongly associated with socioeconomic distribution, and that health differs due to socioeconomic differences across a country. Janevic et al [19] compared self-rated good health (SRGH) between two ethnicity groups in one region. In contrast, Kim et al [20] reported that the influences of socioeconomic factors on a healthy lifestyle are quite different between China and the United States. High income and education levels have positive influences on adults in the United States, but negative effects on adults in China. These results may be due to differences in the broad features of these societies.

This study explored the influence of factors associated with SRGH in a cross-country comparison based on socioeconomic characteristics, health behaviors, and health status, which might differ in different social environments. The objectives of the study were to collect evidence for the planning of focused public health interventions to improve the health of population groups, namely, to investigate whether and to what extent factors associated with SRGH differed by gender among age subgroups within different social environments.

MATERIALS AND METHODS

1. Data sources and study population

This study was a secondary analysis of data that were collected in nationally representative cross-sectional and population-based surveys conducted in Australia and Korea [13,22]. A total of 14,363 private Australian households were selected in the National Nutritional Physical Activity Survey (NNPAS) sample and were reduced to 12,366 households after a loss of samples during the field stage. Of the 12,366 households, 9,519 (77.0%) fully or adequately responded to the interview. Of the 9,519 Australians who participated, 9,276 participants aged ≥ 20 years were included in this study. The samples were selected based on area, which ensured that all sections of the population living in private residences within the geographic scope of the survey were represented; 70.6% of the Australians were urban residents. A total of 8,598 Koreans participated, including 5,915 Koreans aged ≥ 20 years. The survey participants were selected using a complex stratified multistage probability sampling method. The sampling districts were based on geographic area, housing type, age, and gender. Twenty households per district were chosen using a systematic sampling method; the response rate was 81.9%, with 81.1% of those being urban residents [13]. Information about Australians for the 2011 NNPAS was obtained by trained Australian Bureau of Statistics interviewers using a computer-assisted personal interview, and Korean participants were interviewed by trained

interviewers at mobile medical examination centers [13,22].

Ethics approval for the NNPAS was granted by the Australian Government Department of Health and Ageing Departmental Ethics Committee in February 2011. The Korean National Health and Nutrition Examination Survey was approved by the Korea Centers for Disease Control Institutional Ethics Review board (No. 2011-02CON-06-C), and all participants provided written informed consent before data collection [13,22].

2. Measurements

The socioeconomic variables included in our study were gender, age group (20–44, 45–64, and ≥ 65 years), marital status (living with spouse/not living with spouse), labor force status (employed, unemployed and other), income (low, middle low, middle high, or high), educational level (< 9 years, 10–12 years, college or higher). We used equalized household income (total household income divided by the square root of the number of household members) as the income variable, which was calculated into tertiles.

1) Health status

Two subjective and two objective variables were examined to compare health status. Self-rated health (very good, good, fair, bad, or very bad for Koreans and excellent, very good, good, fair, or bad for Australians) in the last 12 months and perceived body image (underweight, acceptable weight, or overweight) were investigated. The self-rated health responses were divided into good (excellent/very good/good), fair, and bad (bad/very bad). Chronic disease (no/yes) and body mass index (BMI; underweight, normal, or obese) were examined as objective variables. A “yes” response for chronic disease indicated that the participant had at least one of the following seven chronic diseases according to a physician’s diagnosis: diabetes, kidney disease, high cholesterol, hypertension, ischemic heart disease, heart failure or other heart failure, or cerebrovascular disease. The BMI was categorized into three groups; for Koreans, it was based on the World Health Organization BMI parameter for the western Pacific region, including < 18.5, underweight; 18.5–25, acceptable weight; and ≥ 25 kg/m², obese. For Australians, it was based on the international BMI parameters, including < 18.5, underweight; 18.5–25, acceptable weight; 25–29.99, overweight; and ≥ 30 kg/m², obese.

2) Health behaviors

Daily activity level (low, moderate, or high), exercise (no/yes), smoking (no, ex-smoker, or yes), and alcohol drinking (no/yes) were examined. The question assessing daily activity level was “how do you rate your daily activity level?” The answers were divided into low, moderate, and high. Exercising meant more than

once/week (once for > 30 minutes). Alcohol consumption was determined by asking, “How frequently did you drink alcoholic beverages over 1 month in the last 12 months?” A response of “never” was recorded as “no,” and responses from once/month to four times/month were recorded as “yes.” The question for smoking was, “Do you presently smoke?” The answers were divided into yes, ex-smoker, and no.

3. Data analysis

Data analysis was performed using IBM SPSS Statistics software (version 21; IBM Co., Armonk, NY, USA), and all analyses relied on the pooled weights of sampling clusters to yield statistics that were representative of the Australian and Korean adult population. The results are presented as weighted percentages and as adjusted odds ratios (ORs) with 95% confidence intervals (CIs). Chi-square tests were performed to examine differences in SRGH rates according to participants’ characteristics, categorized by gender and age group. Adjusted ORs were estimated using multiple logistic regression models controlling for socioeconomic variables, health behaviors, and health status.

RESULTS

1. Australian and Korean characteristics by gender among the age groups

A total of 9,276 Australians ≥ 20 years and 5,915 Koreans ≥ 20 years were included in this study. The age distribution of Australians was as follows: 48.2% were 20–44, 34.0% were 45–64, and 17.8% were ≥ 65 years. The proportion of women was 50.6%. The age distribution of Koreans was as follows: 50.2% were 20–44, 35.5% were 45–64, and 14.3% were ≥ 65 years. The proportion of men was 49.4% (Tables 1 and 2).

Among Australians, 84.3% of participants reported good health, and 44.3% were classed as “overweight.” Low “daily activity level” represented the highest proportion, at 57.1%. The overall smoking rates were 17.9%, alcohol consumption rates were 19.3%, rates of chronic disease were 31.1%, and 71.6% reported a normal BMI (Tables 1 and 2).

Among Koreans, most participants were living with a spouse, with men aged 45–64 years making up the majority of this group (90.2%). Additionally, 37.7% reported good health, 44.9% were in classed as being “overweight,” and 51.3% reported a “low daily activity level.” The overall smoking rates were 26%, alcohol consumption rates were 58.2%, rates of chronic disease were 25.4%, and about 62% reported a normal BMI. Attainment of a higher educational level and SRGH rates decreased as age increased in both countries (Tables 1 and 2).

Table 1. Characteristics of Australians by gender among age groups, Australian data 2011 (%)

| Characteristic | Men (n = 4,580, 49.4%) | | | Women (n = 4,696, 50.6%) | | | Total (n = 9,276) | p-value (by sex) | p-value (by age group) |
|----------------------------------|-------------------------------|-------------------------------|----------------------------|-------------------------------|-------------------------------|----------------------------|----------------------|---------------------|------------------------------|
| | 20-44 y (n = 2,249, 49.1%) | 45-64 y (n = 1,555, 34.0%) | ≥ 65 y (n = 776, 16.9%) | 20-44 y (n = 2,223, 47.3%) | 45-64 y (n = 1,600, 34.1%) | ≥ 65 y (n = 872, 18.6%) | | | |
| Marital status (n = 9,276) | <i>p</i> < 0.001 | | | | | | | | |
| Living with spouse | 49.9 | 73.0 | 76.7 | 53.8 | 69.3 | 54.2 | 60.7 | 0.002 | < 0.001 |
| Not living with spouse | 50.1 | 27.0 | 23.3 | 46.2 | 30.7 | 45.8 | 39.3 | | |
| Occupation (n = 9,276) | <i>p</i> < 0.001 | | | | | | | | |
| Employed | 88.7 | 80.6 | 17.0 | 72.8 | 70.4 | 9.8 | 67.0 | < 0.001 | < 0.001 |
| Unemployed & others | 11.3 | 19.4 | 83.0 | 27.2 | 29.6 | 90.2 | 33.0 | | |
| Income (n = 8,091) | <i>p</i> < 0.001 | | | | | | | | |
| Low | 15.2 | 20.5 | 57.3 | 22.0 | 24.2 | 67.7 | 27.7 | < 0.001 | < 0.001 |
| Middle low | 20.6 | 16.6 | 22.8 | 21.4 | 20.8 | 16.1 | 19.9 | | |
| Middle high | 38.8 | 33.8 | 12.9 | 33.6 | 32.8 | 10.9 | 30.9 | | |
| High | 25.4 | 29.1 | 7.1 | 23.0 | 22.2 | 5.4 | 21.5 | | |
| Education attainment (n = 9,276) | <i>p</i> < 0.001 | | | | | | | | |
| Below 9 y | 3.3 | 14.9 | 39.7 | 2.8 | 13.3 | 43.0 | 13.6 | < 0.001 | < 0.001 |
| 10-12 y | 57.1 | 53.0 | 39.3 | 49.5 | 50.3 | 36.4 | 50.0 | | |
| College or higher | 39.6 | 32.1 | 21.0 | 47.7 | 36.4 | 20.6 | 36.4 | | |
| Self-assessed health (n = 9,276) | <i>p</i> < 0.001 | | | | | | | | |
| Bad | 1.8 | 4.6 | 9.3 | 2.4 | 5.1 | 7.5 | 4.1 | 0.261 | < 0.001 |
| Moderate | 9.2 | 13.4 | 17.8 | 7.7 | 10.7 | 20.2 | 11.6 | | |
| Good | 89.0 | 82.0 | 72.9 | 89.9 | 84.2 | 72.3 | 84.3 | | |
| Perceived body image (n = 9,115) | <i>p</i> < 0.001 | | | | | | | | |
| Acceptable weight | 57.4 | 45.0 | 54.6 | 50.6 | 39.7 | 50.9 | 50.6 | < 0.001 | < 0.001 |
| Underweight | 6.8 | 3.8 | 5.4 | 3.1 | 2.5 | 5.6 | 4.5 | | |
| Overweight | 35.8 | 51.2 | 37.8 | 40.8 | 57.5 | 43.5 | 44.9 | | |

Table 1. Continued

| Characteristic | Men (n = 4,580, 49.4%) | | Women (n = 4,696, 50.6%) | | | Total (n = 9,276) | p-value (by sex) | p-value (by age group) |
|----------------------------------|-------------------------------|-------------------------------|----------------------------|-------------------------------|-------------------------------|----------------------|---------------------|------------------------------|
| | 20-44 y (n = 2,249, 49.1%) | 45-64 y (n = 1,555, 34.0%) | ≥ 65 y (n = 776, 16.9%) | 20-44 y (n = 2,223, 47.3%) | 45-64 y (n = 1,600, 34.1%) | | | |
| Daily activity level (n = 9,161) | <i>p</i> < 0.001 | | <i>p</i> < 0.001 | | | | | |
| Low | 47.7 | 56.3 | 63.5 | 56.0 | 59.8 | 57.1 | < 0.001 | < 0.001 |
| Moderate | 25.2 | 29.6 | 31.2 | 30.5 | 28.3 | 28.2 | | |
| High | 26.1 | 14.1 | 5.3 | 13.5 | 11.9 | 14.7 | | |
| Exercise (n = 9,276) | <i>p</i> < 0.001 | | <i>p</i> < 0.001 | | | | | |
| No | 16.9 | 23.1 | 28.3 | 15.1 | 22.0 | 20.8 | 0.408 | < 0.001 |
| Yes | 83.1 | 76.9 | 71.7 | 84.9 | 78.0 | 79.2 | | |
| Smoking (n = 9,276) | <i>p</i> < 0.001 | | <i>p</i> < 0.001 | | | | | |
| No | 50.7 | 38.6 | 33.5 | 58.1 | 51.4 | 50.3 | < 0.001 | < 0.001 |
| Ex-smoker | 26.0 | 40.4 | 56.4 | 22.0 | 33.4 | 31.8 | | |
| Yes | 23.3 | 21.0 | 10.0 | 19.9 | 15.2 | 17.9 | | |
| Alcohol drinking (n = 9,276) | <i>p</i> < 0.001 | | <i>p</i> < 0.001 | | | | | |
| No | 82.2 | 73.4 | 69.9 | 87.8 | 81.6 | 80.7 | < 0.001 | < 0.001 |
| Yes | 17.8 | 26.6 | 30.1 | 12.2 | 18.4 | 19.3 | | |
| Chronic disease (n = 9,276) | <i>p</i> < 0.001 | | <i>p</i> < 0.001 | | | | | |
| No | 86.9 | 58.0 | 29.4 | 88.3 | 64.3 | 68.9 | 0.002 | < 0.001 |
| Yes | 13.1 | 42.0 | 70.6 | 11.7 | 35.7 | 31.1 | | |
| Body mass index (n = 7,924) | <i>p</i> < 0.001 | | <i>p</i> < 0.001 | | | | | |
| Underweight | 1.8 | 0.6 | 0.1 | 3.3 | 1.1 | 1.7 | < 0.001 | < 0.001 |
| Normal | 78.4 | 65.3 | 69.7 | 74.7 | 65.9 | 71.6 | | |
| Obese | 19.8 | 34.1 | 30.2 | 22.0 | 3.0 | 26.7 | | |

Table 2. Characteristics of Koreans by gender among age groups, Korean data 2011

| Characteristic | Men (n = 2,920, 49.4%) | | | Women (n = 2,995, 50.6%) | | | Total (n = 5,915) | p-value (by sex) | p-value (by age groups) |
|------------------------------------|-------------------------------|-------------------------------|----------------------------|-------------------------------|-------------------------------|----------------------------|----------------------|---------------------|-------------------------------|
| | 20-44 y (n = 1,523, 52.1%) | 45-64 y (n = 1,048, 35.9%) | ≥ 65 y (n = 350, 12.0%) | 20-44 y (n = 1,445, 48.2%) | 45-64 y (n = 1,053, 35.2%) | ≥ 65 y (n = 497, 16.6%) | | | |
| Marital status (n = 5,914) | <i>p</i> < 0.001 | | | | | | | | |
| Living with spouse | 52.5 | 90.2 | 91.9 | 66.0 | 87.1 | 46.1 | 70.4 | 0.610 | < 0.001 |
| Not living with spouse | 47.5 | 9.8 | 8.1 | 34.0 | 12.9 | 53.9 | 29.6 | | |
| Labor force status (n = 5,912) | <i>p</i> < 0.001 | | | | | | | | |
| Employed | 81.2 | 85.6 | 45.0 | 52.3 | 58.6 | 32.4 | 64.6 | < 0.001 | < 0.001 |
| Unemployed & others | 18.8 | 14.4 | 55.0 | 47.7 | 41.4 | 67.6 | 35.4 | | |
| Income (n = 5,869) | <i>p</i> < 0.001 | | | | | | | | |
| Low | 5.3 | 12.0 | 50.5 | 8.0 | 13.2 | 57.1 | 15.6 | < 0.001 | < 0.001 |
| Middle low | 31.0 | 25.7 | 27.3 | 30.5 | 28.8 | 22.2 | 28.6 | | |
| Middle high | 35.1 | 29.6 | 12.7 | 35.1 | 26.5 | 12.7 | 29.4 | | |
| High | 28.6 | 32.7 | 9.5 | 26.4 | 31.5 | 8.0 | 26.4 | | |
| Educational attainment (n = 5,913) | <i>p</i> < 0.001 | | | | | | | | |
| Below 9 y | 2.2 | 32.2 | 63.5 | 2.8 | 51.1 | 93.9 | 27.7 | < 0.001 | < 0.001 |
| 10-12 y | 29.9 | 36.5 | 22.7 | 35.6 | 32.8 | 5.1 | 30.4 | | |
| College or higher | 67.9 | 31.3 | 13.8 | 61.6 | 16.1 | 1.0 | 41.9 | | |
| Daily activity level (n = 5,911) | <i>p</i> < 0.001 | | | | | | | | |
| Low | 55.5 | 45.2 | 49.8 | 53.6 | 45.9 | 57.1 | 51.3 | < 0.001 | < 0.001 |
| Moderate | 32.0 | 36.9 | 42.0 | 4.7 | 46.8 | 36.0 | 39.5 | | |
| High | 12.5 | 17.9 | 8.2 | 1.7 | 7.3 | 6.9 | 9.2 | | |
| Exercise (n = 5,915) | <i>p</i> < 0.001 | | | | | | | | |
| No | 46.8 | 39.7 | 50.2 | 46.1 | 42.2 | 65.9 | 46.4 | 0.01 | < 0.001 |
| Yes | 53.2 | 60.3 | 49.8 | 53.9 | 57.8 | 34.1 | 53.6 | | |

Table 2. Continued

| Characteristic | Men (n = 2,920, 49.4%) | | | Women (n = 2,995, 50.6%) | | | Total (n = 5,915) | p-value (by sex) | p-value (by age groups) |
|----------------------------------|-------------------------------|-------------------------------|----------------------------|-------------------------------|-------------------------------|----------------------------|----------------------|---------------------|-------------------------------|
| | 20-44 y (n = 1,523, 52.1%) | 45-64 y (n = 1,048, 35.9%) | ≥ 65 y (n = 350, 12.0%) | 20-44 y (n = 1,445, 48.2%) | 45-64 y (n = 1,053, 35.2%) | ≥ 65 y (n = 497, 16.6%) | | | |
| Smoking (n = 5,913) | <i>p</i> < 0.001 | | | | | | | | |
| No | 24.3 | 13.5 | 13.5 | 81.0 | 93.1 | 90.2 | 53.4 | < 0.001 | < 0.001 |
| Ex-smoker | 23.4 | 42.5 | 60.8 | 10.1 | 3.0 | 5.7 | 20.6 | | |
| Yes | 52.3 | 44.0 | 25.7 | 8.9 | 3.9 | 4.1 | 26.0 | | |
| Alcohol drinking (n = 5,892) | <i>p</i> < 0.001 | | | | | | | | |
| No | 18.1 | 24.8 | 42.4 | 47.2 | 66.0 | 83.2 | 41.8 | < 0.001 | < 0.001 |
| Yes | 81.9 | 75.2 | 57.6 | 52.8 | 34.0 | 16.8 | 58.2 | | |
| Self-assessed health (n = 5,915) | <i>p</i> < 0.001 | | | | | | | | |
| Bad | 9.1 | 16.4 | 23.8 | 12.5 | 19.6 | 40.5 | 16.6 | < 0.001 | < 0.001 |
| Moderate | 49.0 | 46.1 | 43.6 | 51.8 | 47.8 | 38.3 | 47.7 | | |
| Good | 41.9 | 37.5 | 32.6 | 35.7 | 32.6 | 21.2 | 35.7 | | |
| Perceived body image (n = 5,913) | <i>p</i> < 0.001 | | | | | | | | |
| Acceptable weight | 31.6 | 43.0 | 46.4 | 38.6 | 37.2 | 45.7 | 38.4 | < 0.001 | < 0.001 |
| Underweight | 22.5 | 19.3 | 28.5 | 13.2 | 10.9 | 27.2 | 18.3 | | |
| Overweight | 45.9 | 37.7 | 25.1 | 48.2 | 51.9 | 27.1 | 43.3 | | |
| Chronic diseases (n = 5,914) | <i>p</i> < 0.001 | | | | | | | | |
| No | 91.6 | 63.8 | 37.1 | 96.3 | 65.6 | 27.4 | 74.6 | 0.34 | < 0.001 |
| Yes | 8.4 | 36.2 | 62.9 | 3.7 | 34.4 | 72.6 | 25.4 | | |
| Body mass index (n = 5,978) | <i>p</i> < 0.001 | | | | | | | | |
| Underweight | 2.9 | 2.2 | 5.7 | 11.4 | 1.8 | 4.5 | 5.0 | < 0.001 | < 0.001 |
| Normal | 57.8 | 62.1 | 66.4 | 67.0 | 61.6 | 60.6 | 62.2 | | |
| Obese | 39.3 | 35.7 | 27.9 | 21.6 | 36.6 | 34.9 | 32.8 | | |

Table 3. Self-rated good health by gender among age groups, Korean data 2011 and Australian data 2011 (%)

| Variable | Australian men | | | Australian women | | | Korean men | | | Korean women | | |
|------------------------|----------------|-------------|-------------|------------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|-------------|
| | 20-44 y | 45-64 y | ≥ 65 y | 20-44 y | 45-64 y | ≥ 65 y | 20-44 y | 45-64 y | ≥ 65 y | 20-44 y | 45-64 y | ≥ 65 y |
| Marital status | $p = 0.002$ | $p < 0.001$ | $p = 0.504$ | $p = 0.001$ | $p < 0.001$ | $p = 0.058$ | $p < 0.001$ | $p = 0.004$ | $p = 0.528$ | $p = 0.562$ | $p = 0.534$ | $p = 0.153$ |
| Living with spouse | 86.9 | 74.5 | 70.7 | 87.5 | 79.0 | 69.2 | 47.9 | 24.3 | 39.3 | 36.8 | 32.6 | 23.9 |
| Not living with spouse | 91.0 | 84.8 | 73.5 | 92.0 | 85.5 | 75.0 | 36.4 | 39.0 | 32.0 | 35.2 | 32.6 | 18.3 |
| Labor force status | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p = 0.093$ | $p = 0.006$ | $p < 0.001$ | $p = 0.567$ | $p = 0.272$ | $p = 0.423$ | $p = 0.350$ |
| Employed | 73.6 | 59.3 | 69.7 | 84.4 | 68.6 | 71.4 | 40.1 | 40.6 | 34.4 | 37.1 | 33.5 | 23.6 |
| Unemployed & others | 90.9 | 87.8 | 87.9 | 91.9 | 90.8 | 80.0 | 49.1 | 19.9 | 31.1 | 34.2 | 31.0 | 19.9 |
| Income | $p = 0.002$ | $p < 0.001$ | $p = 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p = 0.008$ | $p = 0.000$ | $p = 0.563$ | $p = 0.001$ | $p < 0.001$ | $p = 0.003$ |
| Low | 83.0 | 61.2 | 68.6 | 81.6 | 66.0 | 67.3 | 35.4 | 20.0 | 29.7 | 21.7 | 22.3 | 18.1 |
| Middle low | 88.6 | 82.8 | 74.4 | 90.8 | 81.9 | 79.8 | 36.5 | 36.7 | 32.6 | 32.4 | 27.2 | 17.4 |
| Middle high | 90.0 | 86.6 | 78.9 | 92.6 | 91.0 | 77.8 | 43.4 | 33.9 | 40.9 | 40.4 | 36.1 | 30.6 |
| High | 91.6 | 90.4 | 93.9 | 94.6 | 95.7 | 92.5 | 46.9 | 49.1 | 33.3 | 37.9 | 39.2 | 40.0 |
| Education attainment | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p = 0.003$ | $p < 0.001$ | $p = 0.132$ | $p = 0.254$ | $p < 0.001$ | $p = 0.221$ |
| Below 9 y | 74.3 | 65.5 | 64.9 | 63.9 | 69.0 | 64.9 | 23.5 | 28.4 | 31.1 | 23.8 | 24.8 | 20.3 |
| 10-12 y | 87.1 | 81.9 | 77.0 | 89.1 | 84.5 | 79.6 | 37.3 | 35.3 | 29.1 | 35.6 | 38.8 | 32.0 |
| College or higher | 92.9 | 90.0 | 80.4 | 92.3 | 89.5 | 74.9 | 44.5 | 49.7 | 44.9 | 36.3 | 44.4 | 40.0 |
| Daily activity level | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p = 0.157$ | $p = 0.003$ | $p = 0.388$ | $p = 0.983$ | $p = 0.360$ | $p = 0.621$ |
| Low | 84.8 | 75.8 | 66.1 | 87.4 | 80.8 | 67.0 | 39.9 | 39.6 | 28.7 | 35.7 | 30.4 | 19.8 |
| Moderate | 90.6 | 87.6 | 83.0 | 90.8 | 85.6 | 84.8 | 43.3 | 31.3 | 35.6 | 35.8 | 34.7 | 21.9 |
| High | 95.7 | 96.3 | 90.0 | 97.3 | 96.8 | 96.6 | 46.8 | 45.2 | 35.7 | 37.5 | 31.6 | 26.5 |
| Exercise | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p = 0.001$ | 0 = 0.542 | $p < 0.001$ | $p = 0.037$ | $p = 0.984$ |
| No | 81.8 | 69.4 | 59.5 | 80.6 | 77.8 | 55.6 | 36.7 | 31.4 | 34.1 | 29.8 | 29.1 | 21.1 |
| Yes | 90.4 | 85.8 | 78.1 | 91.6 | 86.1 | 80.3 | 46.4 | 41.6 | 31.0 | 40.7 | 35.1 | 21.1 |
| Smoking | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p < 0.001$ | $p = 0.811$ | $p < 0.001$ | $p = 0.002$ | $p = 0.076$ | $p < 0.001$ | $p = 0.095$ | $p = 0.094$ |
| Yes | 93.5 | 89.2 | 80.8 | 93.3 | 86.6 | 71.8 | 33.2 | 31.9 | 25.6 | 15.5 | 17.1 | 40.8 |
| Ex-smoker | 78.1 | 66.9 | 56.4 | 77.1 | 75.7 | 76.1 | 44.9 | 40.4 | 32.9 | 35.6 | 35.5 | 24.1 |
| No | 89.9 | 83.0 | 71.0 | 92.6 | 84.5 | 72.8 | 57.3 | 46.5 | 44.7 | 38.0 | 33.1 | 20.1 |
| Alcohol drinking | $p = 0.012$ | $p = 0.011$ | $p = 0.013$ | $p = 0.927$ | $p = 0.002$ | $p < 0.001$ | $p = 0.944$ | $p = 0.996$ | $p = 0.229$ | $p = 0.620$ | $p = 0.249$ | $p = 0.013$ |
| No | 87.7 | 77.8 | 72.1 | 89.3 | 82.8 | 67.9 | 42.0 | 37.3 | 29.1 | 36.5 | 31.3 | 19.1 |
| Yes | 91.1 | 87.3 | 73.9 | 92.0 | 88.8 | 83.1 | 41.0 | 37.3 | 35.1 | 35.2 | 34.8 | 31.3 |

Table 3. Continued

| Variable | Australian men | | | Australian women | | | Korean men | | | Korean women | | |
|--------------------------|----------------|-----------|-----------|------------------|-----------|-----------|------------|-----------|-----------|--------------|-----------|-----------|
| | 20-44 yr | 45-64 y | ≥ 65 y | 20-44 y | 45-64 y | ≥ 65 y | 20-44 y | 45-64 y | ≥ 65 y | 20-44 y | 45-64 y | ≥ 65 y |
| Self-perceived body mass | p < 0.001 | p < 0.001 | p < 0.001 | p < 0.001 | p < 0.001 | p < 0.014 | p = 0.001 | p = 0.120 | p = 0.085 | p < 0.001 | p = 0.271 | p = 0.260 |
| Acceptable weight | 92.1 | 86.1 | 76.2 | 95.2 | 90.5 | 76.9 | 48.4 | 41.0 | 38.0 | 43.0 | 35.5 | 19.4 |
| Underweight | 85.6 | 61.0 | 38.1 | 78.6 | 72.5 | 62.5 | 42.1 | 35.5 | 25.0 | 30.9 | 31.6 | 19.3 |
| Overweight | 84.6 | 80.0 | 76.2 | 83.6 | 80.8 | 69.4 | 37.2 | 34.5 | 31.0 | 31.3 | 30.6 | 26.1 |
| Chronic diseases | p < 0.001 | p < 0.001 | p < 0.001 | p < 0.001 | p < 0.001 | p < 0.001 | p < 0.001 | p < 0.001 | p = 0.182 | p = 0.007 | p < 0.001 | p = 0.152 |
| No | 90.8 | 86.8 | 81.2 | 92.0 | 90.1 | 84.9 | 43.6 | 43.1 | 36.9 | 36.4 | 38.1 | 25.5 |
| Yes | 76.5 | 75.5 | 69.3 | 74.5 | 73.6 | 65.2 | 22.8 | 27.7 | 30.0 | 18.5 | 22.1 | 19.7 |
| Body mass index | p < 0.001 | p < 0.001 | p = 0.192 | p < 0.001 | p < 0.001 | p = 0.015 | p = 0.251 | p = 0.096 | p = 0.081 | p = 0.097 | p = 0.014 | p = 0.168 |
| Underweight | 91.9 | 37.5 | 0.0 | 83.3 | 85.7 | 92.3 | 36.4 | 21.7 | 10.0 | 31.9 | 5.3 | 34.8 |
| Normal | 92.0 | 85.0 | 75.7 | 93.0 | 88.4 | 76.2 | 43.5 | 39.7 | 34.5 | 37.4 | 34.7 | 19.3 |
| Obese | 81.4 | 80.7 | 77.0 | 78.6 | 78.3 | 67.2 | 39.6 | 35.1 | 32.7 | 31.5 | 30.5 | 23.1 |

2. SRGH according to participant characteristics by gender among age groups

The SRGH rates of many of the characteristics of Australians significantly differed by gender among the age groups, except those ≥ 65 years for marital status, labor force status (women), smoking (women), and BMI (men) (Table 3).

The SRGH rates of many of the characteristics of Koreans were also significantly different among men 20-44 and 45-64 years old, except daily activity level (only among men 20-44 years old), self-perceived body mass (only among men 45-64 years old), alcohol consumption, and BMI. Korean women ≥ 65 years had significantly different SRGH rates only for income and alcohol consumption. No differences were observed in the characteristics of Korean men ≥ 65 years (Table 3).

3. Multiple logistic regression analysis: influence of SRGH factors among Australians and Koreans (Tables 4 and 5)

1) Influence of socioeconomic characteristics

Among Australians, men aged 20-44 years were positively affected by living with a spouse (OR, 1.60; 95% CI, 1.11-2.29), and women were not affected by marital status. Employment and a higher education level were strongly associated with SRGH in men aged 20-44 and 45-64 years. The effect of being employed was strong among men aged 45-64 (OR, 3.34; 95% CI, 2.18-5.14), among men ≥ 65 (OR, 2.36; 95% CI, 1.17-4.75), and among women 45-64 years (OR, 1.97; 95% CI, 1.30-2.99). The SRGH in women was only associated with employment among the 45-64 year old group. The effect of "high" income was strong among women aged over 65 years (OR, 5.18; 95% CI, 1.42-18.86).

Among Koreans, men aged 20-44 years were negatively affected by living with a spouse (OR, 0.75; 95% CI, 0.59-0.96), but SRGH was not associated with marital status in women. An association between being employed and SRGH was not observed among men ≥ 65 years. SRGH in women was not associated with employment. SRGH was positively associated with income among women 20-44 and ≥ 65 years old. Education levels were positively associated with SRGH among men 45-64 and ≥ 65 years old.

2) Influence of health behaviors

Among Australians, a high level of activity had a positive effect on SRGH among both men and women in the 20-44- and ≥ 65-year-old groups. As for smoking, men in all age groups and women aged 20-44 years showed significant ORs, and this effect was much stronger among men ≥ 65 and women 20-44 years old. Abstaining from alcohol consumption had a negative effect on SRGH in men aged 20-44 and women ≥ 65 years.

Table 4. Odds ratios for self-rated good health with 95% confidence interval among Australians, Australian data 2011

| Variable | Australian men | | | Australian women | | |
|--|-------------------|-------------------|--------------------|-------------------|-------------------|--------------------|
| | 20-44 y | 45-64 y | Over 65 y | 20-44 y | 45-64 y | Over 65 y |
| Marital status (reference: not living with spouse) | | | | | | |
| Living with spouse | 1.60 (1.11-2.29)* | 1.37 (0.93-2.01) | 0.82 (0.50-1.35) | 1.37 (0.93-2.01) | 1.41 (0.96-2.07) | 1.11 (0.75-1.64) |
| Labor force status (reference: unemployed & others) | | | | | | |
| Employed | 2.33 (1.37-3.97)* | 3.34 (2.18-5.14)* | 2.36 (1.17-4.75)* | 1.38 (0.90-2.13) | 1.97 (1.30-2.99)* | 1.01 (0.49-2.11) |
| Income (reference: low) | | | | | | |
| Middle low | 1.12 (0.64-0.98) | 1.56 (0.94-2.60) | 0.99 (0.59-1.67) | 1.34 (0.79-2.28) | 1.79 (1.11-2.88)* | 1.82 (1.02-3.25)* |
| Middle high | 0.87 (0.51-1.47) | 1.74 (1.08-2.82)* | 0.59 (0.30-1.17) | 1.84 (1.08-3.15)* | 2.78 (1.66-4.66)* | 1.65 (0.78-3.48) |
| High | 0.94 (0.51-1.72) | 2.26 (1.28-3.99)* | 1.49 (0.41-5.35) | 1.59 (0.85-2.97) | 4.11 (1.96-8.61)* | 5.18 (1.42-18.86)* |
| Education (reference: below 9 years) | | | | | | |
| 10-12 y | 2.36 (1.15-4.87)* | 1.28 (0.83-1.99) | 1.70 (1.07-2.69) | 3.10 (1.45-6.63)* | 1.76 (1.10-2.81)* | 1.51 (0.97-2.34) |
| College or higher | 2.51 (1.16-5.44)* | 1.99 (1.16-2.42)* | 1.76 (0.92-3.35) | 1.93 (0.86-4.33) | 1.83 (1.05-3.19)* | 0.95 (0.54-1.66) |
| Daily activity level (reference: low) | | | | | | |
| Moderate | 1.36 (0.89-2.14) | 1.43 (0.92-2.25) | 1.87 (1.13-3.12)* | 0.97 (0.62-1.51) | 1.39 (0.88-2.18) | 1.47 (0.86-2.51) |
| High | 1.95 (1.14-3.33)* | 5.20 (2.03-13.36) | 3.94 (0.92-16.80) | 3.21 (1.25-8.25)* | 2.46 (0.98-6.16) | 7.60 (1.04-55.8)* |
| Exercise (reference: no) | | | | | | |
| Yes | 1.58 (1.01-2.46)* | 1.47 (0.97-2.23) | 1.19 (0.72-1.96) | 1.94 (1.20-3.14)* | 1.32 (0.85-2.05) | 1.57 (1.01-2.45)* |
| Smoking (reference: yes) | | | | | | |
| Ex-smoker | 2.12 (1.40-3.21)* | 1.52 (1.01-2.29)* | 2.16 (1.15-4.05)* | 3.23 (1.99-5.26)* | 1.36 (0.84-2.20) | 1.01 (0.44-2.31) |
| No | 3.28 (2.25-4.76)* | 2.56 (1.63-4.01)* | 4.96 (2.43-10.13)* | 3.36 (2.27-4.96)* | 1.55 (0.99-2.42) | 1.07 (0.49-2.36) |
| Alcohol drinking (reference: drinking) | | | | | | |
| No | 0.60 (0.37-0.96)* | 0.76 (0.51-1.15) | 0.70 (0.44-1.11) | 1.26 (0.72-2.20) | 0.73 (0.44-1.22) | 0.58 (0.34-0.98)* |
| Perceived body image (reference: obese) | | | | | | |
| Acceptable weight | 1.16 (0.76-1.74) | 1.48 (0.96-2.29) | 1.08 (0.68-1.72) | 2.31 (1.41-3.78)* | 1.47 (0.93-2.31) | 1.36 (0.84-2.18) |
| Underweight | 0.71 (0.36-1.39) | 0.75 (0.33-1.74) | 0.27 (0.09-0.75) | 0.31 (0.13-0.74) | 0.57 (0.19-1.75) | 0.67 (0.27-1.69) |
| Chronic diseases (reference: yes) | | | | | | |
| No | 3.22 (2.14-4.84)* | 2.08 (1.45-2.98)* | 2.16 (1.30-3.60)* | 4.55 (3.00-6.90)* | 2.27 (1.57-3.28)* | 2.65 (1.68-4.18)* |
| Body mass index (reference: obese) | | | | | | |
| Normal | 2.44 (1.60-3.74)* | 1.15 (0.75-1.75) | 0.94 (0.57-1.57) | 2.24 (1.43-3.53)* | 1.30 (0.84-1.99) | 1.01 (0.62-1.66) |

Values are presented as odds ratio (95% confidence interval).

**p* < 0.05; odds ratios were adjusted for socioeconomic variables, health behaviors, and health status.

Table 5. Odds ratios for self-rated good health with 95% confidence interval among Koreans, Korean data 2011

| Variable | Korean men | | | Korean women | | |
|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | 20-44 y | 45-64 y | Over 65 y | 20-44 y | 45-64 y | Over 65 y |
| Marital status (reference: not living spouse) | 0.75 (0.59-0.96)* | 1.62 (0.97-2.73) | 0.84 (0.34-2.04) | 0.90 (0.68-1.20) | 0.79 (0.52-1.19) | 0.64 (0.40-1.05) |
| Labor force status (reference: unemployed & others) | 0.81 (0.59-1.10) | 1.70 (1.07-2.68)* | 1.13 (0.68-1.89) | 1.07 (0.85-1.36) | 1.03 (0.76-1.38) | 1.29 (0.76-2.20) |
| Income (reference: low) | 1.01 (0.60-1.72) | 1.64 (0.96-2.82) | 0.95 (0.53-1.70) | 1.66 (0.99-2.76) | 1.25 (0.76-2.06) | 0.98 (0.53-1.80) |
| | 1.35 (0.80-2.27) | 1.31 (0.78-2.27) | 1.30 (0.62-2.71) | 2.14 (1.30-3.55)* | 1.51 (0.91-2.51) | 1.98 (1.04-3.80)* |
| Education (reference: below 9 years) | 1.56 (0.92-2.65) | 2.50 (1.44-4.35)* | 0.95 (0.40-2.26) | 1.89 (1.13-3.18)* | 1.54 (0.92-2.58) | 3.52 (1.67-7.44)* |
| | 1.88 (0.80-4.45) | 1.15 (0.82-1.63) | 1.03 (0.55-1.92) | 1.17 (0.54-2.55) | 1.82 (1.32-2.52)* | 1.71 (0.66-4.46) |
| College or higher | 1.92 (0.82-4.53) | 1.81 (1.24-2.64)* | 2.23 (1.07-4.63)* | 0.98 (0.45-2.16) | 2.10 (1.39-3.17)* | 1.83 (0.27-12.38) |
| Daily activity level (reference: low) | 1.21 (0.94-1.56) | 0.60 (0.44-0.82)* | 1.28 (0.77-2.12) | 0.89 (0.70-1.14) | 1.31 (0.97-1.76) | 1.12 (0.67-1.86) |
| | 1.65 (1.16-2.35)* | 1.40 (0.95-2.08) | 1.64 (0.66-4.06) | 1.08 (0.45-2.63) | 1.26 (0.72-2.21) | 1.17 (0.44-3.09) |
| Exercise (reference: no) | 1.32 (1.06-1.65)* | 1.39 (1.04-1.85)* | 0.72 (0.44-1.19) | 1.61 (1.28-2.04)* | 1.05 (0.79-1.40) | 0.83 (0.50-1.38) |
| Smoking (reference: yes) | 1.65 (1.25-2.16)* | 1.39 (1.03-1.88)* | 1.55 (0.85-2.84) | 3.17 (1.72-5.83)* | 2.71 (0.87-8.37) | 0.46 (0.12-1.82) |
| No | 2.37 (1.80-3.12)* | 1.55 (1.02-2.36)* | 2.67 (1.19-6.01)* | 3.59 (2.14-6.03)* | 2.33 (0.99-5.49) | 0.40 (0.14-1.14) |
| Alcohol drinking (reference: drinking) | 0.91 (0.68-1.21) | 0.96 (0.70-1.33) | 0.78 (0.48-1.27) | 1.01 (0.80-1.28) | 0.85 (0.64-1.13) | 0.53 (0.30-0.94)* |
| Perceived body image (reference: obese) | 1.78 (1.27-2.48)* | 1.27 (0.87-1.86) | 1.26 (0.62-2.58) | 1.75 (1.33-2.31)* | 1.34 (0.95-1.89) | 0.74 (0.39-1.37) |
| Underweight | 1.38 (0.94-2.02) | 0.99 (0.62-1.60) | 0.64 (0.27-1.49) | 1.00 (0.68-1.48) | 1.30 (0.79-2.15) | 0.72 (0.34-1.52) |
| Chronic disease (reference: yes) | 1.90 (1.21-2.98)* | 1.76 (1.31-2.37)* | 1.46 (0.88-2.44) | 2.77 (1.35-5.69)* | 1.91 (1.40-2.60)* | 1.50 (0.89-2.49) |
| Body mass index (reference: obese) | 0.73 (0.52-1.01) | 1.19 (0.81-1.74) | 0.99 (0.50-1.94) | 0.88 (0.63-1.23) | 0.79 (0.56-1.12) | 0.86 (0.47-1.57) |

Values are presented as odds ratio (95% confidence interval).

**p* < 0.05; odds ratios were adjusted for socioeconomic variables, health behaviors, and health status.

Among Koreans, daily activity level had no effect on SRGH among women. A large positive effect of not smoking on SRGH was observed, except among women aged over 45, and this effect was much stronger in women 20–44 years old. Only among women aged ≥ 65 years did abstaining from alcohol consumption show a negative effect on SRGH.

3) Influence of subjective and objective health condition

Among Australians, acceptable weight had a positive effect on SRGH among women aged 20–44 years. Chronic disease strongly affected SRGH among all age groups. The effect was the strongest in men and women aged 20–44 years. An influence of BMI on SRGH was observed among people of both genders aged 20–44 years.

Among Koreans, acceptable weight had a positive effect on SRGH among those aged 20–44 years in both genders. Among people over 65 years old, chronic disease had no association with SRGH. No effect of BMI on SRGH was observed among Koreans.

DISCUSSION

This comparative study of Australians and Koreans investigated the extent to which certain factors influenced SRGH by gender among age subgroups; ultimately, it could have implications for improving people's health. SRGH differed significantly according to the participant characteristics by gender among the age groups in both countries, with socioeconomic factors having especially varied influences among adults aged 20–44 years. These differences are evidence of epidemiology being social in nature, as differences were detected across factors within each country, which might be a result of the different social environments. Living with a spouse only influenced SRGH in men 20–44 years old in both countries, negatively for Korean men and positively for Australian men. In this same age group, SRGH was positively influenced by employment and higher education level in Australian men, but not among Korean men; among women, income, but not education level, affected SRGH in Korea, whereas in Australia, women were more influenced by education than by income. Lack of chronic disease had a strong influence on SRGH in both countries and was influential in all Australians and Koreans except those ≥ 65 years old. The effect was strongest among Australian aged 20–44 than Korean aged 20–44 years.

Living with a spouse negatively affected SRGH in Korean men aged 20–44 years, whereas this effect was positive among Australian men of the same age; no association was found in women living in either country. This finding indicates that living with a spouse is perceived as burdensome to Korean men aged

20–44 years because they have to support their families. In addition, for this age group, unemployment, irregular work, and low-quality work have been shown to be significant social problems [9]. Moreover, marriage had no benefit in terms of SRGH in women. That is, the protective effect of living with a spouse may disappear due to increases in female employment and the child-rearing burden traditionally placed on women [3,5]. Nevertheless, it has been previously thought that marriage had beneficial effects on overall health, and that healthier individuals are more likely to marry in the first place and then stay married' [6,23].

The influence of being employed and its association with education and the different effects of employment and education may be related to differences in the social environments of the two countries. Similarly, education influenced SRGH in participants 45–64 years old in both countries. Australia has a well-established welfare system; thus, adults ≥ 65 years old can live well regardless of education level, whereas only 37.6% of elderly Korean participants are covered by public pensions [24]. In addition, about 30% of Australians have higher education level of education; about 70% of Australians have vocational qualifications. Thus, attaining a higher level of education could result in more options in the 20–44 and 45–64 year groups, resulting in a positive effect on SRGH. In contrast, Korean society has been changing rapidly, and the level of educational attainment has been increasing quickly [6,24], so the 20–44-year age group did not derive much positive effect from their competitive and unsatisfying employment, even though they attained higher education. However, in the 45–64-year subgroup, attaining a higher level of education could lead to attainment of a higher income because of an enhanced ability to compete for better jobs [24,25]. The influence of satisfying employment should be also investigated in future work [26].

The effect of income on SRGH was greater among women than among men in both countries, although we found no effect of marital status or employment on SRGH in most women. Previous studies have reported similar results. Lantz et al [27] found that income is strongly associated with mortality, and the association was stronger in women than men. Jeon and Lee [3] showed that only income influences depression and suicidal ideation in elderly Korean women. Kim et al [20] indicated that differences in the effects of these factors on SRGH could be due to the economic conditions of the countries or cultural differences. Bobak et al [28] reported that the decreased availability of food, clothing, and/or heating was associated with poor health, although perceived control over these things relieved poor health. The Australian Institute of Health and Welfare confirmed that 46% of health gaps originate from social determinants (31%) and interactions between social determinants and behavioral health

risk factors. Of the social determinants, household income, highest school level completed, and employment status have the largest impact on the health gap because higher levels of income and education are associated with better health, which has been called the 'social gradient of health' [14].

Fewer factors were associated with SRGH in participants ≥ 65 years than in other age groups in both countries, as natural aging is the most influential factor [29,30]. Smoking by men and alcohol consumption by women were the most influential in the ≥ 65 -year old subgroup. Lee et al [5] found that alcohol consumption was the only factor that positively affected SRGH in an elderly population of Koreans. Victor [31] reported that later life is a time of universal ill health that obscures differences that were apparent at earlier ages, and that the elderly population may be a homogeneous social group. Consequently, health differences based on socioeconomic factors are difficult to verify in elderly people [32]. Smoking and alcohol consumption in the elderly population may be representative health behaviors exhibiting a strong influence on SRGH because older age is commonly associated with lower socioeconomic conditions. Moreover, the finding that chronic disease had little effect on SRGH in Koreans ≥ 65 years old was unexpected, as chronic disease is typically a very influential factor for self-rated health [18]. Jeon et al [33] found no influence of physical illness on depression or suicidal ideation in Korean women ≥ 65 years old. This issue should be confirmed in further studies.

The effect of not smoking on SRGH was stronger among Australian men than in Korean men, and similar patterns were observed for alcohol consumption in women ≥ 65 years old in both countries. This result is similar to a previous study that showed that not smoking positively affected health behaviors in men, and that alcohol consumption had a positive effect in women [5]. Daily activity level did not influence SRGH in Korean women, which may be related to employment rates. About 50% of the Korean women in this study were employed and about 50% also listed their activity level as 'low'. The reason for a lack of observed influence of daily activity level may be that women's daily activity levels were low in general, or that the influence of daily activity level only emerges as a long-term effect.

Acceptable body image influenced SRGH only in participants 20–44 years old in both countries, suggesting that the younger generation thought that a good body image reflected good health. This effect was not confirmed in Australian men aged 20–44 years, although the influence of BMI on SRGH was observed in Australians of this age. Subjective body image had an effect on SRGH among Koreans aged 20–44 years, whereas BMI as the objective measure did not. In contrast, the effect of chronic disease on SRGH among the 20–44-year age group was larger than that

among participants ≥ 65 years. The rates of chronic disease were usually generally low in the younger age groups; however, morbidities had greater effects in these age groups because of their higher levels of social activity.

Alcohol consumption rates in Koreans were higher than those of Australians in both men and women. The reason for this may be related to Korean culture, in which people enjoy dining together after work and drinking alcoholic beverages, with alcohol consumption being widely accepted in many places, even late into the night. In addition, even though the rate of alcohol consumption was much higher than among Australians, the rates of chronic disease and the rate of high BMI were higher among Australians than Koreans. This may be related to differences in diet; Korean diets are mainly based on vegetables and rice. In future studies, this factor should be considered.

Several limitations should be considered when interpreting our results. First, our study was a secondary cross-sectional analysis of data. Therefore, it precludes any inferences, as a mixture of causal effects is possible. A prospective study is needed to confirm the effects of the factors investigated here. Furthermore, we were only able to choose existing variables in two data sets and were not able to revise the variables in detail. However, we did confirm that the effects of the examined factors differed by social environment, gender, and age group. Second, we focused on socioeconomic factors, a few health behaviors, and health status, but we did not include factors related to broad societal features. However, we discussed the results based on their relationship with the social environment in each country. Third, we compared health status with self-rated health using a single question and were limited to only some health outcomes. A single-question health measurement probably has limited reliability, but is a valid predictor of morbidity and mortality [18]. Single-item measures offer a practical instrument for assessments in large prospective epidemiological studies that lack space for longer instruments [34]. Fourth, there were some limitations related to the selection of variables because the range of variables was slightly different for each country. The Korean self-rating scale included categories for bad and very bad health, whereas the 5-level Australian self-rating scale included only bad; consequently, Koreans could report much lower rates of SRGH. Thus, the rating differences between the two countries should be further assessed to determine whether the results represent a real difference. Despite these limitations, our results identified the different effects of known worldwide factors associated with SRGH within each society. Therefore, this comparative study highlights how any approach for promoting the health of population groups must consider the importance of social environments and associated factors within gender and age groups, and their influence on self-rated health.

In conclusion, our study shows that SRGH differed significantly according to the participant characteristics between genders among the age groups in both countries. These differences were detected across factors within each country, which might be a result of the different social environments. Broad features of society should be considered when discussing health and differences in associated factors and their influences. For focused public health interventions of population groups, it is also necessary to consider gender and age groups within social environments.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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