Impact of Traits and Quality of Life on Longevity Among Those Aged 95 to 108

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Abstract

Background

The crucial differences in longevity related to quality of life and specific traits in the oldest old need to be investigated from a socioecological perspective because their impacts may differ in the oldest-old adults. This entailed estimating the impacts of quality of life and personal traits on the longevity of the oldest old in South Korea from a socioecological perspective.

Methods

The data were obtained from interviews with 170 South Koreans aged 95 to 108 from June 2017 to February 2020. Specifically, we interviewed 130 residents aged 100 to 108 and 40 aged 95 to 99 across 36 provinces in South Korea. This study incorporated an analytical model to observe the effects that were distributed across individuals, societies, and countries from a socioecological perspective. The factor analyses of the interview responses revealed significant correlations and hierarchical models.

Results

Seven factors were identified as major to quality of life and traits, and five in particular, industriousness, physical labour, weight 60kg, friends, meat intake, affected their longevity. In addition, fewer feelings of depression or anxiety and higher life satisfaction and living standards also influenced the longevity.

Conclusions

The quality of life and traits of South Korea's oldest old appear to have a decisive latent impact on longevity factors. We identified seven crucial determinants of longevity in the oldest old: industriousness, labour, weight, friends, and meat intake, fewer feelings of depression or anxiety, and higher life satisfaction. Thus, those who seek longevity might emulate these traits of the oldest old.

Background

The proportion of persons aged 95 to 108 has been increasing over the past several decades [1, 2, 3]. However, although the life spans of the oldest old have been prolonged, it is important to determine the different socioecological longevity factors that enhance their quality of life. Recent researchers have evaluated the impacts of social factors on the oldest old [4, 5, 6, 7], finding that social factors for the oldest old may be affected by government expenditures on health, standards of living, sanitation facilities, and gender inequality [3, 6, 7]. However, researchers have not analysed the quality of life and traits of the oldest old from a socioecological perspective, including traits such as industrious personalities, past jobs, meat intake, weight, and friends in addition to depression and anxiety, social relationships, and life satisfaction. Differences in quality of life and personal characteristics could affect the longevity of the oldest old. In recent decades, although the longevity gap in quality of life among the oldest old has decreased, there are possibly still disparities among persons who constitute the oldest old

in South Korea. Therefore, it is necessary to study and understand the effects of the quality of life and the personal traits of the oldest old to determine factors in their longevity from a socioecological perspective.

With regard to this socioecological perspective, on a personal level, factors that contribute to industriousness, meat intake, and weight among the aged could be explored, and the sociological and social environment aspects to be investigated could include friends, depression and anxiety, lifetime work, and life satisfaction. Based on these elements, researchers could examine the impacts of different longevity factors on the quality of life and traits of the oldest old, which are modifiable longevity factors. Despite limited knowledge on the underlying determinants of longevity among the oldest old, researchers are aware that their longevity is influenced by their personal and social environments as well as by public policy from a socioecological perspective [7, 8].

A few studies have shown that factors such as personality and industriousness influence the quality of health care among the oldest old [9, 10, 11, 12], but the role of these factors on this population's traits from a socioecological perspective is unclear. Investigators have also reported that the lives of the oldest old are affected by their friends and social relationships [4, 13, 14, 15], but the associations of these factors with quality of life have yet to be sufficiently investigated in the oldest old. It is also not known whether these factors apply to the oldest old living in South Korea.

The quality of life and traits of the oldest old could reveal multifactorial quantitative traits [3, 4, 5, 16]. Their longevity is affected by at least a 100-year life history of physical and mental as well as personal and social activity. Longevity among the aged is characterized by the preservation of individual functional capacity and social well-being in active social environments [3, 6, 17]. In short, their longevity could involve interactions of personal traits, social environment, and public policy factors from a socioecological perspective [7, 8].

Even if longevity factors correlated with the traits of the oldest old, the impacts of these factors on this population are unclear. However, the characteristic indicators of the oldest old including personality [10], friends, and social relationships [4, 14] could be measured, and measures of these factors are important for assessing longevity in the social environment [18] from a socioecological perspective. Measuring longevity factors in the oldest old could use indicators of physical functioning such as weight [19, 20], as well as social relationships with friends [4, 13], and life satisfaction could be measured with past jobs [21].

A Japanese study of the oldest old reported that their activities of daily living were preserved based on adequate cognitive and psychosocial status [19], and other researchers reported on cognitive functioning and physical performance, health behaviours and diseases [20]. Other investigators evaluated the predictors of loneliness in the oldest old and found that social support correlated negatively with loneliness in the US sample but positively in Sweden [14]; furthermore, the oldest old in South Korea reported maintaining social relationships with family and friends [4]. Oldest old in Australia reported high quality of life and relatively non-existent anxiety and depression [13], whereas Chinese oldest old reported little social contact and associated cognitive impairment [22]. However, Italian aged showed lower anxiety

and depression scores than those for younger groups, and the oldest old showed greater satisfaction with life and with their social and family relations [15]. In the Georgia study, life satisfaction in the oldest old depended on negative emotions; positive emotionality appears to influence life satisfaction in this population influenced by subjective evaluations of health status and social security [23]. In an actual case study, the number of oldest old in Ontario had increased the most over the last 15 years [24], and Okinawans exhibited the maximum longevity worldwide [25]. Among Portuguese oldest old, health status and loneliness contributed to clinically significant anxiety [26].

The crucial differences in longevity related to quality of life and traits in the oldest old are unclear in South Korea, and we need to investigate these factors from a socioecological perspective because their impacts may differ in the oldest-old adults. We hypothesized that factors influence longevity in the oldest old, and thus, the objective of this study was to determine the quality of life and traits associated with longevity among persons aged 95 to 108 in South Korea.

Methods

The framework on the impact of longevity factors

The framework of this study depicts the impact of longevity on the oldest old aged 95 to 108 from a socioecological perspective. For the study, we hypothesized a systemic structure based on input as a socioecological perspective and progress as the quality of life and traits, to predict the output as impact longevity of persons aged 95 to 108. Hence, for the study, we evaluated the impacts of the quality of life and characteristics of the oldest old, those born no later than 1923, on longevity from a socioecological perspective (Figure 1). We analysed these factors using Pearson's correlation coefficients and multiple linear regression models.

Selection of the city and rural areas

For this study, we selected the urban and rural areas where many centenarians lived according to the Census of Korea Statistics. However, under the Personal Information Act of South Korea, government officials could not provide personal information about centenarians. In particular, we could not identify centenarians in large cities with dense populations without personal information, and thus we excluded the populations of Korea's six metropolitan cities, Seoul, Busan, Incheon, Busan, Gwangju, and Daegu. Rather, we interviewed centenarians in 36 urban and rural provincial areas selected from a total of 140 areas in South Korea. We sent official letters to the selected counties, Si and Gun, to confirm the presences of centenarians in the villages. Subsequently, we visited the villages with long-living centenarians and conducted in-depth interviews with the oldest old aged 95 to 108.

Interviews of 170 (aged 95 to 108)

We received permission to publish the personal data of the centenarians described here under approval

number WKIRB-201710-SB-78. To collect the data for the analysis, two researchers visited the centenarians and conducted 30-minute interviews using a researcher-designed questionnaire. Specifically, we interviewed 130 residents aged 100 to 108 and 40 aged 95 to 99 across 36 provinces in South Korea from June 2017 to February 2020.

The survival period

The total population of South Korea was 51,629,512 in 2018. The population aged between 95 and 99 years was 36,839, and 4,249 Koreans were centenarians; thus, the number of centenarians was 8.229 people per 100,000 in South Korea [27]. While it took 100 years to become a centenarian, the number of centenarians has gradually increased in some counties. The migrant population aged below 100 years was hardly a challenge in South Korea [6, 28]. For this study, the oldest old were aged 108 years, reflecting birth in 1910.

Survey questions on traits

We measured the traits of the oldest old (aged 95 to 108) using measures that other researchers used in studies of centenarians [15]. The questionnaire content included the following 5 parameters: employment, meat intake, weight, number of friends, and industriousness (Additional file 1).

Survey questions on quality of life

The question on quality of life in the oldest old (aged 95 to 108) also came from centenarian studies [15, 29, 30]. The quality of life questionnaire explored including depression and anxiety, and life satisfaction that reconstitutes the centenarian subject profile. The quality of life survey items were as follows: feelings of depression or anxiety, and life satisfaction and standard of living (Appendix 1). These factors scored on a scale of 1, not at all; 2, a little; 3, somewhat; 4, quite a lot; and 5, much. The instrument displayed adequate psychometric properties partly based on comprehensively validated scales [15, 29].

Time series of data

The time series of the living period used to measure the changes in traits of the oldest old was the past 95 to 108 years as follows: Data from 1910 to 2018 included age, number of friends, lifetime job, and industriousness, and the 2018 data were weight and frequency of meat intake in one month. However, we did not separately measure the changes in the quality of life of the oldest old; we considered the items used in the time series based on 2018 data to be associated with quality of life.

Friends are individuals with whom people have bonds of mutual warmth, typically exclusive of family relations, and we asked respondents how many friends they have had in their lives from 1918 to 2018? Lifetime work refers to paid regular employment for one's life, and we asked if respondents had performed mental or physical labor for their full lives? Weight is a body's relative mass or a person's heaviness, and we asked if participants had weighted less than 60kg in 2018? Industriousness refers to

being hard-working, and we asked respondents if they had been industrious over their full lives from 1918 to 2018? We also asked participants about their meat intake for this study, specifically how many times per month they had eaten meat in 2018? Finally, we assessed the participants' feelings of depression or anxiety and asked about their life satisfaction and standards of living during 2018.

Models

To examine the impacts of life factors among the oldest old from a socioecological perspective, we developed models to estimate the quality of life and traits of the oldest old that correlated with each of the five variables: (1) industriousness (IN), (2) weight less than 60kg (W60), (3) meat intake at least once a month (MILOM), (4) number of friends (NF) (5) physical labour as a lifetime job (LJ). To predict the impact of quality of life factors in the oldest old, we measured two variables to indicate quality of life: (1) feelings of depression or anxiety (FDA) (2) life satisfaction and standard of living (LSSL).

To reflect the socioecological perspective, we designed the model for this study with the following variables: (1) PL, personal level; (2) SE, social environment and (3) PP, public policy. We incorporated these variables into an analytical model to observe their effects when they were integrated into individuals, societies, and countries from a socioecological perspective as follows: (1) PS: personal level (+) social environment; (2) SP: social environment (+) public policy; (3) PP: personal level (+) public policy; and (4) PSP: personal level (+) social environment (+) public policy.

Hypothesis

These variables reflected the impact of longevity factors on the aged 95 to 108. We hypothesized based on earlier models that incorporated these variables that higher industriousness, more friends, lower weight, and a history of more physical labour would affect the longevity of the aged 95 to 108. In addition, the quality of life models suggested that fewer feelings of depression or anxiety and greater life satisfaction contributed to longevity among the oldest old aged 95 to 108.

Statistical analysis

We measured the associations between variables and the impacts on the oldest old aged 95 to 108 using Pearson correlation coefficients and multiple regression models. We also used pairwise Pearson correlations to determine whether variables independently and significantly correlated with the quality of life and traits of the oldest old. We used multiple linear regression models to predict the quality of life and traits of the oldest old in the final analysis, and we used scatter plots to ascertain whether the correlation coefficients were the correct tools to summarize the relationships [8, 31].

Results

Description of traits

We used descriptive statistics to analyse the traits of 170 of the oldest old in South Korea across 36 provinces (Table 1). The oldest old for our study ranged from 95 to 108 years of age with a mean age of 100 years. By gender, there were 35 males compared with 135 females, and by body weight, 155 study participants (91.2%) weighed less than 60 kg. The number of friends ranged from 0 to 8, with a mean of 1.59 friends. For lifetime employment, a majority of the oldest old, 149 (87.6%), had engaged in physical labour over their lifetimes. Across the provinces, the number of individuals who consumed meat each month ranged from 0 to 5, with a mean intake of 1.1. One hundred fifty-two (89.4%) of the oldest old in this study were industrious.

Description of quality of life

We compiled descriptive statistics for quality of life among 170 of the oldest old (aged 95 to 108) persons across 36 provinces in South Korea (Table 1) using data obtained from a survey we designed. The survey used questions based on quality of life assessments of self-perceived functioning and well-being in centenarians [15, 30]. All surveys were completed without omissions through our interviews with the respondents, and the rankings for each item ranged from 1, not at all, to 5, substantial; we tallied the ranks for all items to determine each study subject's score. On the life satisfaction and standard of living scale we used to determine the quality of life among the oldest old in this study, our interviewees showed a mean score of 4.02, with the lowest score (mean, 1.74) for the feelings of depression or anxiety scale.

Impacts of traits and quality of life on those aged 95 to 108

We conducted multiple linear regression analysis to determine the impacts of the traits and quality of life of the elderly aged 95 to 108, as shown in Table 2, 3, 4, and 5. Pearson's correlation coefficient between participant's age and total number of friends throughout life was 0.432 for NF. We also identified significant positive correlations between living to be among the oldest old (age 95 to 108) and having consumed meat each month. In addition, the LSSL was 0.404, the correlation coefficient between aging and life satisfaction and current standard of living. We found significant negative correlations the FDA but significant positive correlations with the LSSL in quality of life (Table 2).

The regression analysis revealed the predictors of traits for the oldest old (aged 95 to 108). The strongest predictors of the multiple regression models are shown in Tables 3 and 4. Higher age predicted higher IN, W60 and MILOM at a personal level, (Table 3). Further, it predicted higher IN, W60, MILOM, NF, LJ, LSSL, and lower FDA ($R^2 = 0.462$, $P < 0.001$; Table 5). In short, there were associations between older age and weighing less than 60 kg, having multiple friends, being more industrious, meat intake at least once a month, and having engaged in physical labour occupations during their lifetime employment. The quality of life in those aged 95 to 108 also appeared to be determined by higher life satisfaction and standard of living and fewer feelings of depression or anxiety.

Discussion

A framework of the impact of the oldest old could identify the quality of life and traits of individuals born in 1910 to 1923 and living to become aged 95 to 108 in 2018. For this study, we investigated the impacts of factors associated with the quality of life and traits of the oldest old based on data obtained from interviews with 170 aged persons across 36 provinces in South Korea from June 2017 to February 2020. In addition to examining the impact of the oldest old, we developed models to estimate the quality of life and traits of the oldest old involving each variable from a socioecological perspective.

Industriousness

Industriousness indirectly reflects personality in persons aged 95 to 108 [32, 33], and it has been necessary for longevity in personal models. This study showed a significant correlation between industriousness and longevity (Table 2), a finding that suggests that hard-working people live happily: The higher the endeavour, the more joy. Kern and Friedman [34] reported that centenarians were industrious, and even in individuals aged over 100 years, an entrepreneurial frame of mind engaged in business activities is the hall-mark of an industrious person [35].

A joyful life contributes to greater diligence in aged persons' lives and further work, and it is possible that. Industriousness provides effects of exercise and joy. Diligence includes physical activity, which can be a longevity factor associated with health and joyfulness, and joyfulness suggests great happiness. Endorphins produced by induced joy and happiness in turn contribute to health and longevity [36]. It is by these means that industriousness might contribute to a happy life as a longevity factors.

Friends

Number of friends reflects the social relationships and, indirectly, standard of living of the oldest old aged 95 to 108 [4, 6, 7, 37, 38, 39]. Table 2 indicates that number of friends played a significant role in reflecting the social relationships among the oldest old, and the oldest of the participants had many friends (Table 3). Social relationships can also moderate risk of mortality [37].

As friends are longevity factors for the oldest old, social support is a good predictor of loneliness among them [14]; human relationships are associated with beneficial effects on mental health and successful aging [4, 6, 8]. The oldest old nearly always have few friends, particularly if they also have low standards of living, and the low standard of living associated with living alone and having fewer friends requires social support to counteract loneliness.

Lifetime job

During lifetime employment, farming as jobs contributed to longevity among the oldest old (Table 3). The physical activity of farming has been related to health and longevity [40], and promoting physical activity among the oldest old is effective for their health [41]. Exercise protects against coronary heart disease (CHD), and postal workers are known to have less CHD than less active government workers [42]. Additionally, exercise protects against heart disease and averts premature mortality [42]. Farming was the main profession of rural South Korea, and in this study, 149 of the 170 oldest old aged 95 to 108 had

engaged in the physical jobs of farming (Table 1). That such a high percentage, 87.6%, had engaged in physical labour occupations showed that most of the oldest old had not inherited wealth [43]. Meanwhile, because men between the ages of 27 and 30 years were needed in the South Korean War (1950 to 1953), many who would have been among the oldest old had died, whereas female workers were likely to live close to 100 years of age. Thus, for us to live longer, we should avoid excessively physical occupations but enjoy light physical jobs like farming.

Meat intake

In this study, meat intake was more frequent than at least once a month among the oldest old (Table 3). In a previous study, the oldest old preferred meat, fish, cereals, and soft foods [44]. Although it was a health issue, appropriate meat intake by the oldest-old aged was beneficial. Further, vegetarians among the oldest old are who were light eaters manifested significant longevity compared with those who consumed small quantities of meat and bean paste soup every day [4]. On Okinawa Island, higher daily intake of green and yellow vegetables and meat contributed to longevity [45]. However, red meat contains high levels of methionine, and higher intake of animal protein may promote diseases [46]. Thus, balanced nutrition and proper protein intake are essential, and consumption of white meat about once a month is desirable, similar to the consumption among the oldest old aged 95 to 108 in this study. It is possible that such meat intake contributes to becoming one of the oldest old.

Feelings of depression or anxiety

Fewer feelings of depression or anxiety contributed to longevity in the oldest old [4, 47, 48]. In this study, even among the oldest old, higher age was associated with less depression or anxiety (Table 4). High quality of life is associated with less depression in the oldest old [47], and most of the oldest old exhibit little if any anxiety and depression and high quality of life [13].

Simultaneously, the oldest old may eliminate their chances of depression by active self-care and social support. Better health among the oldest-old may translate to higher-quality social relationships. Self-care is the basis of physical health and social relationships, and adequate physical health, social relationships, and social support can contribute to self-care. The oldest old manifest less depression when they received social support [48]. Therefore, adequate self-care and social support among the oldest old contribute to less depression and anxiety in this population.

Satisfaction with life

Life satisfaction among the oldest old indirectly reflects their quality of life [32, 48]. It is necessary to determine the impacts of longevity factors included in public policy models to determine which are significant contributors to higher satisfaction with life among the oldest old (Table 4). Such information can help determine whether public policy can improve their lives.

In this study of the oldest old aged 95 to 108, higher life satisfaction reduced depression and contributed to successful aging. Additionally, well-preserved cognitive function lowers lower anxiety and depression

[15, 49], as was seen in the Georgia centenarians cohort study [47]. The aged also exhibited lower levels of depression when social support and social relationships were available [48]. According to study results, most of the oldest old are highly satisfied with their overall quality of life [50, 51, 52], and they maintained longevity with more positive attitudes and greater life satisfaction [32]. Therefore, satisfaction with life among the oldest-old is associated with the absence of depression but accompanied by social support and family relations.

In brief, longevity in the oldest old aged 95 to 108 is associated with freedom from anxiety and depression and higher quality of life. Thus, extending longevity entails that we first ensure continuous social support to limit depression or anxiety and improve the quality of life.

Limitations

The primary limitation of this study relates to the scale of the interviews we could conduct with the oldest old to measure their quality of life and traits. Specifically, owing to the privacy laws in Korea, we could interview aged Koreans in only 36 provincial areas across the country; we could not obtain personal information so that we could locate elderly persons in metropolitan areas in Korea. However, the data we could collect and the resulting statistics offer valuable information highlighting the longevity indicators of the oldest old among South Koreans.

Conclusions

The quality of life and traits of South Korea's oldest old appear to have a decisive latent impact on longevity factors. In the course of this study, we identified seven crucial determinants of longevity in the oldest old: industriousness, labour, weight, friends, meat intake, fewer feelings of depression or anxiety, and higher life satisfaction/quality of life. Thus, those who seek longevity might emulate these traits of the oldest old.

Abbreviations

IN: Industriousness

W60: Weight 60

MILOM: Meat intake at least once a month

NF: Number of friends

LJ: Physical labour

FDA: Feelings of depression or anxiety

LSSL: Life satisfaction and standard of living

PL: Personal level

SE: Social environment

PP: Public policy

Declarations

Availability of data and materials

The datasets and any materials used and/or analysed during the current study will be available from the corresponding author on reasonable request.

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Contributions

JK, YC, and GK contributed to the study design; data acquisition, analysis, and interpretation; and manuscript preparation. The authors read and approved the final manuscript.

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Ethics declarations

Ethics approval and consent to participate

This study was conducted with the approval of the Wonkwang University Ethics Committee (WKIRB-201710-SB-78). All participants gave written informed consent prior to completing the study.

Consent for publication

Not applicable.

Competing interests

The authors have no conflicts of interest to declare.

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Tables

Due to technical limitations, table 1 to 5 is only available as a download in the Supplemental Files section.

Figures

Figure 1

Conceptual framework of the socioecological perspective for the oldest old aged 95 to 108

Supplementary Files

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