

## Effects of Household Composition on Health-Related Quality of Life among the Japanese Middle-Aged and Elderly: Analysis from a Gender Perspective

Takashi Kawano<sup>1, \*</sup>, Goro Moriki<sup>1</sup>, Shinya Bono<sup>1</sup>, Nobuyuki Kaji<sup>1</sup> and Hungu Jung<sup>2</sup>

<sup>1</sup>Hiroshima Bunka Gakuen University, Hiroshima, Japan

<sup>2</sup>Hiroshima Bunka Gakuen Two-Year College, Hiroshima, Japan

**Abstract** To elucidate the social characteristics of eligible elderly people for community-based integrated support, we analysed the effects of gender, age, household composition, employment status, and community involvement on health-related quality of life (HRQOL) among the middle-aged and elderly. We gave a questionnaire to 1020 middle-aged and elderly people in *the city of A*, Hiroshima in cooperation with the local residents' associations (982 responded, the respond rate: 96.3%). 720 were accepted as subjects of this study. HRQOL scores were evaluated by the Japanese Medical Outcomes Study 36-Item Short-Form Health Survey Version II. Stepwise multiple regression analysis with HRQOL scores as a dependent variable, while controlling for age, household composition, employment status, exercise habits and community involvement, revealed that household composition is a significant predictor of physical component summary (PCS) and role/social component summary (RCS). Furthermore, one factorial analysis of variance was performed to evaluate HRQOL scores by each type of household composition, indicating that PCS and RCS of middle-aged and elderly female single-person households were significantly lower than middle-aged and elderly female in the other household types and male. Consequently, our study demonstrates that household composition is an effective social factor for screening of the target elderly of community-based integrated support, and the necessity to consider social support which meets the needs of elderly female who live alone.

**Key words:** living alone, the elderly, female, social isolation, health-related quality of life, community-based integrated support

### I. Introduction

According to the latest World Health Organization report (2018), the average life expectancy of Japanese women is 86.99 years, and that of men is 80.75 years, whereas the average healthy life expectancy of women is 76.9 years and that of men is 72.6 years. Japan has one of the high-

est overall life expectancies among nations, but in terms of quality of life (QOL), self-rated health status of Japan is known to be relatively low amongst the developed countries (OECD, 2016). Self-rated health has been shown to serve as an effective predictor of mortality rate and for the necessity of healthcare. DeSalvo et al. (2005) argues that people who answered 'poor' for self-rated health have a risk of mortality twice greater than those who chose 'excellent'.

QOL is an ambiguous concept. It can be distinguished in two categories; *health-related QOL (HRQOL)* includes physical, psychological,

\*Correspondence address: Hiroshima Bunka Gakuen University, 3-3-20 Heiseigahama, Sakacho, Aki-gun, Hiroshima, 731-4312, Japan.

E-mail: kawano@hbg.ac.jp

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social, spiritual state, role function and overall well-being; and *non-health-related QOL (NHRQOL)* includes environment, economy and politics (Doi, 2004).

Several studies on HRQOL among the elderly have suggested that not only intervention of physical activity improves their QOL, but also establishing regular exercise increases preventive effects. That is, regular physical activities prevent chronic diseases, decrease mortality rate, and have positive effects on QOL (Paffenbarger et al., 1986; Stiggebout et al., 2004). It also ameliorates depression, and regains strength and abilities to perform daily living (Asai et al., 2001). Furthermore, establishing regular exercise enhances physical function and self-rated health even for frail elderly people (Chou et al., 2012), and prevents from developing disorders induced by aging and disease (Tak et al., 2013)

In reality, however, there are elderly people who do not participate in physical exercise, and lack social relationships in addition to their poor health condition. Thus, studies have been conducted to reveal social factors by analysing NHRQOL among the elderly with health risks in terms of prevention of diseases and disorders. House et al. (1988) focus on social relationships as the dependent variable to determine the linkage with health. Furthermore, Gouda et al. (2012) discuss the characteristics of people who are isolated from the society, which are such as advanced age, low socioeconomic status, poor self-rated health, and lack of moral support. Steptoe et al. (2013) distinguish loneliness from social isolation, pointing out that although both factors are closely associated with the deterioration in QOL and increase in mortality rate, the influences of loneliness are limited, but social isolation should be the target to be reduced. However, since social isolation is a difficult measure to quantify including NHRQOL, intervention programmes with no evaluation built into at inception are flawed with issues of reliability, adequacy and practicality (Findlay, 2003).

For these studies on QOL among the elderly, the key issue, both traditional and contemporary,

is the problem of health and social isolation among the elderly who live by themselves. In Japan, significant changes in household composition have taken place in the last 30 years, in which the proportion of single-person households increased from 10.7 to 26.3% between 1980 and 2015. According to the Cabinet Office, Government of Japan (2017), as focused on households of older adults, 1 in 5 elder female and 7 elder male of over 65 years of age live alone in Japan. It is highlighted that the elderly who live alone may not receive social support, aggravate their economic state, and increase propensity to frail condition and dementia (Bilotta et al., 2010; Arslantas et al., 2015). They are perceived as at high risk in need of social support not only in the medical field but also in the field of social work.

Household composition is a social factor whose information can be obtained relatively easily, compared to other factors, concerning community-based integrated support, which is developed by a public-private partnership. Studies on social work generally focus on the interactions between individuals and their surrounding environments, and tend to treat household composition as a subject of studies on NHRQOL. However, issues of social work studies such as reliability remain a challenge in the development of its unique measurement indices (Kubota et al., 2006). Support for elderly people's sustainable community life is an important issue not only in community partnerships but also in social work (McCallion et al., 2016). In complex and individualized community life support, a thorough biopsychosocial assessment is a prerequisite for social work intervention (Mcinnis-Dittrich, 2016). Therefore, the use of HRQOL, which is established as a reliable measurement, is of a great significance for community-based integrated support, where a partnership of various professions is required.

Previous studies on the relationships between household composition in Japan and HRQOL have focused specifically on single-person households, but they were without a comparison

of gender (Matsumoto et al., 2001; Akamine et al., 2006) or focused solely on female (Omori, 2007). Considering that women have longer life expectancy and the number of women who remain unmarried has increased, the period that they live alone gets longer, which potentially affect their HRQOL. However, to our knowledge, no studies have investigated the gender differences in single-person households with the comprehensive measurement of HRQOL.

To elucidate social characteristics of the eligible older adults for social support, this study explores how household composition and gender differences affect the HRQOL among the elderly.

## II. Methods

### 1. Participants

We gave a questionnaire to the middle-aged and the elderly who live in *the city of A*, Hiroshima. The briefing was held for the chairmen of the residents' association from each district of the city. 10 copies of questionnaire were distributed to each 102 chairman who gave consent to their cooperation in our research. We requested each chairman to distribute the questionnaire to 10 people of the middle-aged and elderly in their

district. As a result, 982 out of 1020 people in total responded (the response rate: 96.3%). 262 were excluded from the study, who did not fill in more than one question. Consequently, 720 people were accepted as subjects for this study (Table 1).

### 2. Surveyed items

The survey items of our questionnaire are gender, age, household composition, employment status and health-related quality of life (HRQOL). The response choices for household composition are 1) single-person household, 2) household of a married couple, and 3) other household type. We employed the Japanese Medical Outcomes Study 36-Item Short-Form Health Survey Version II (SF-36) to analyse HRQOL, which is widely used for analyses of health of the elderly. SF-36 consists of 36 items that measure the HRQOL during the four-week period prior to the application of the questionnaire, by means of eight scales or dimensions.

Physical functioning (PF)

Role-physical (RP)

Limitations caused by physical problems and bodily pain (BP)

Table 1 General Characteristics of Participants

	Total (N = 720)	Male (N = 198)	Female (N = 522)
Age (years)	68.8 ± 0.3	68.2 ± 0.7	69.1 ± 0.4
Household composition			
Single-person	154 (21%)	16 (8%)	138 (26%)
Married couple	317 (44%)	108 (55%)	209 (40%)
Other	249 (35%)	74 (37%)	175 (34%)
Employment status			
Unemployed	437 (61%)	97 (49%)	340 (65%)
Employed	283 (39%)	101 (51%)	182 (35%)
Exercise habit			
No	403 (56%)	106 (54%)	297 (57%)
Yes	317 (44%)	92 (46%)	225 (43%)
Community involvement			
No	286 (40%)	90 (45%)	196 (38%)
Yes	434 (60%)	108 (55%)	326 (62%)

Data are expressed as *Mean* ± *SE* values.

Social functioning (SF)  
 General health perceptions (GH)  
 Vitality (VT)  
 Role-emotional (RE)  
 Limitations caused by emotional problems and  
 mental health (MH)

Each scale measured by this instrument has a transformed score ranging from 0 to 100, where higher figures denote a better health-related quality of life. Three standardised summary scores can also be calculated from the subscales, allowing further analysis: physical component summary (PCS); mental component summary (MCS); and role/social component summary (RCS). We requested to register for use of SF-36 and obtained the license from the iHope International which hold its license.

### 3. Statistical analysis

Each subscale and summary score of SF-36 were calculated based on the Japanese standard values (Fukuhara, 2004) to determine a mean value and standard error. To investigate factors affecting HRQOL scores (PF, RP, BP, SF, GH, VT, RE, MH, PCS, MCS, and RCS), we carried out stepwise multiple regression analysis. The model used HRQOL scores as the dependent variable, while controlling for age, household composition, employment status, exercise habits, and community involvement. Furthermore, one factorial analysis of variance (ANOVA) was performed to evaluate mean differences in HRQOL scores of which household composition was a significant predictor across the three groups of households; single-resident household, household of a married couple, and the other household types. Subsequently, the Bonferroni correction was applied as post hoc test. For the analysis,  $p < 0.05$  was considered statistically significant. All data were evaluated with SPSS version 24.0.

### 4. Ethical approval

This study was designed in compliance with the ethical guidelines for social welfare research

of the Society. Furthermore, it was approved by the Research Ethics Committee of Hiroshima Bunka Gakuen University.

## III. Results

Table 2 demonstrates HRQOL scores of which household composition was a significant predictor from the results of stepwise multiple regression analysis, extracting PF, RP, RE, PCS and RCS. Furthermore, the results showed that age was the most significant influential factor for these HRQOL scores. Older years of age were significantly associated with a greater decline in HRQOL. As seen in Table 2, we extracted exercise habits as a predictor of HRQOL scores except for RCS, indicating that exercise habits increased HRQOL scores. It demonstrated that household composition had a similar influence on HRQOL to exercise habits for PF, RP, and RE. Furthermore, RCS was closely associated with only age and household composition.

Our results from the stepwise regression analysis showed that household composition affected PF, RP, RE, PCS, and RCS, we, therefore, analysed HRQOL within each household structure. Figure 1 compares the mean differences of HRQOL scores across the three groups (single-resident household, household of a married couple, and other household types). The dotted line on the value 50 of HRQOL scores indicates the standard value for the Japanese. Single-resident households were significantly lower in PF, RP, RE, PCS and RCS, compared to households of a married couple and the other types of household. The analysis also showed a significant difference between people in single-person households and households of a married couple in VT. Whereas, there was no significant differences between households of a married couples and the other households.

198 men and 522 women in single-person households were participated in this study. In order to reveal differences between men and women, we analysed PF, RP, RE, PCS and RCS scores by gender. Figure 2 shows a comparison

Table 2 The Results of Multiple Regression Analysis in Which HRQOL as the Dependent Variable, Age, Household Composition, Employment Status, Exercise Habits, and Community Involvement as the Independent Variables

	PF			RP			RE		
	B	$\beta$	t	B	$\beta$	t	B	$\beta$	t
Age	-0.548	-0.392	-11.537***	-0.431	-0.346	-8.709***	-0.419	-0.354	-10.207***
Exercise habits	3.983	0.156	4.703***	2.800	0.102	2.941**	3.715	0.142	4.102***
Household composition	3.771	0.122	3.600***	2.065	0.091	2.672**	2.394	0.111	3.269**
				habits			Exercise habits		
				employment status					
Multiple correlation coefficient ( $R^2$ )			0.458 (0.210)			0.428 (0.184)			0.420 (0.177)
F (p value)			63.344 (0.000)***			40.198 (0.000)***			51.246 (0.000)***

	PCS			RCS		
	B	$\beta$	t	B	$\beta$	t
Age	-0.471	-0.361	-10.301***	-0.346	-0.306	-8.556***
Exercise habits	3.231	0.136	3.961***	2.997	0.120	3.361**
Household composition	1.991	0.069	1.974*			
Multiple correlation coefficient ( $R^2$ )			0.401 (0.161)			0.351 (0.123)
F (p value)			45.747 (0.000)***			50.354 (0.000)***

\*\*\*:  $p < .001$ , \*\*:  $p < .01$ , \*:  $p < .05$ 

PF: Physical functioning, RP: Role physical, RE: Role emotional, MH: Mental health, PCS: Physical component summary, RCS: Role/Social component summary.

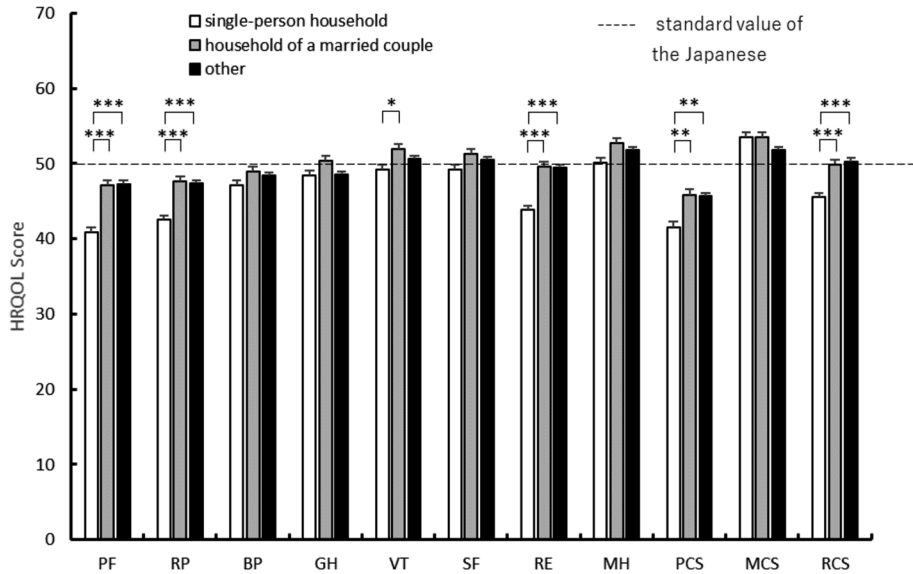


Figure 1 HRQOL Scores Compared by Household Composition Respectively (N= 720)

Data are expressed as Mean ± SE values, \*\*\*: p<.001, \*\*: p<.01, \*: p<.05.

PF: Physical functioning, RP: Role physical, BP: Bodily pain, GH: General health, VT: Vitality, SF: Social functioning, RE: Role emotional, MH: Mental health, PCS: Physical component summary, MCS: Mental component summary, RCS: Role/Social component summary.

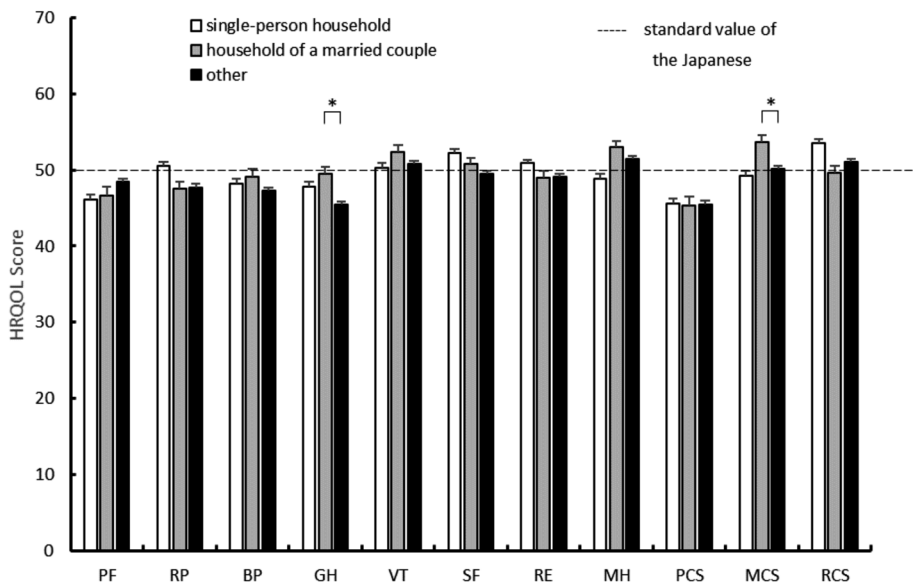


Figure 2 HRQOL Scores Compared by Household Composition Respectively (Male, N= 198)

Data are expressed as Mean ± SE values, \*: p<.05.

PF: Physical functioning, RP: Role physical, BP: Bodily pain, GH: General health, VT: Vitality, SF: Social functioning, RE: Role emotional, MH: Mental health, PCS: Physical component summary, MCS: Mental component summary, RCS: Role/Social component summary.

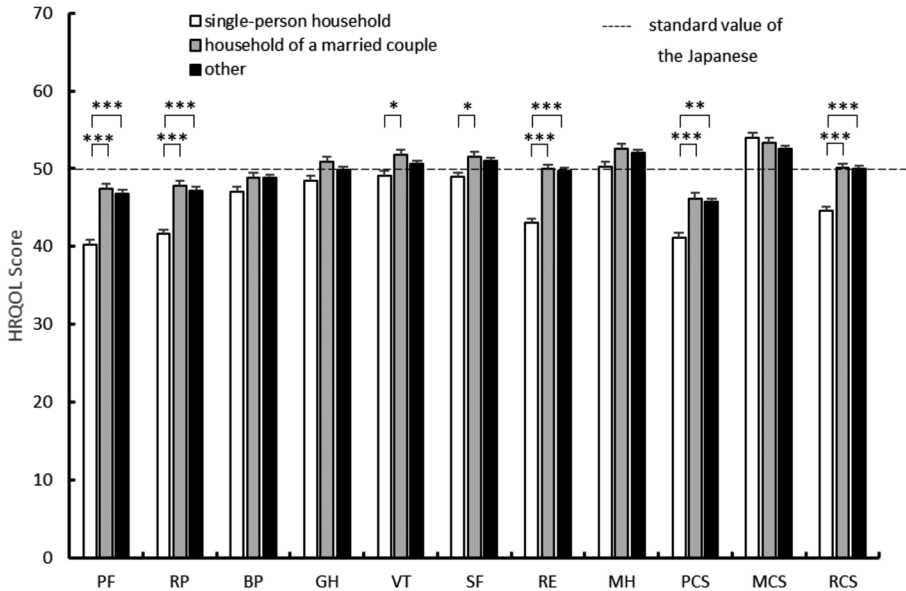


Figure 3 HRQOL Scores Compared by Household Composition Respectively (Female,  $N=522$ )

Data are expressed as  $Mean \pm SE$  values, \*\*\*:  $p < .001$ , \*\*:  $p < .01$ , \*:  $p < .05$ .

PF: Physical functioning, RP: Role physical, BP: Bodily pain, GH: General health, VT: Vitality, SF: Social functioning, RE: Role emotional, MH: Mental health, PCS: Physical component summary, MCS: Mental component summary, RCS: Role/Social component summary.

of mean differences in the HRQOL scores across the three groups for male participants ( $N=198$ , age:  $68.2 \pm 0.7$  years). There was a significant difference between households of only a couple and the other households in GH and MCS scales, but not between single-person households and the other two groups. The analysis also demonstrated no significant differences across the three groups in the other HRQOL scales.

Figure 3 compares the differences of the mean scores of HRQOL across the three groups of the female subjects ( $N=522$ , age:  $69.1 \pm 0.4$  years). PF, RP, RE, PCS and RCS scales were considerably lower in the single-resident households than the comparison groups. The mean scores indicated significant differences in VT and SF shown only between single-resident households and the households of a married couple. Consequently, HRQOL scores among women in single-person households were considerably lower than women in the other households. Additionally, the scores of single-person households of women were

remarkably lower than those of men.

#### IV. Discussion

##### 1. Household composition and social isolation

To elucidate the social characteristics of eligible people for community-based integrated support, we analysed how household composition influenced HRQOL among older adults. Our analysis demonstrates that, the PF, RP, RE, PCS and RCS scores are significantly low in the single-person household group. This finding corroborates a previous study highlighting that HRQOL among elderly single-person households remains poor compared to the elderly in other household types (Akamine et al., 2006; You et al., 2006).

Bilotta et al. (2010) discuss the causes negatively affecting QOL among the elderly one-person households. They are less likely to receive social care, socially and economically frail, and at risk of developing depression and dementia

without being examined by a specialist. Kubo et al. (2004) also report the characteristics of the elderly who live alone comparing to the elderly in other household types, that they do not involve in community activities, are likely to stay home, and their physical functions are significantly low. Furthermore, the elderly living alone in rural areas score significantly low in QOL compared to those who live in urban areas, which offer more social interactions. (Savikko et al., 2005; Lin PC et al., 2008). Consequently, the findings of this study support Bilotta et al. (2010) and Arslantas et al. (2015) who express that the elderly who live alone are considered to carry high risks.

Meanwhile, several studies have used social isolation as a social risk factor, which is a more comprehensive concept than household composition, to explore how a sense of loneliness and a presence or absence of social interactions affect the issues of ADL, self-rated health, chronic diseases, and depression of the elderly (Lund et al., 2010; Saito et al., 2010; Kimberley et al., 2018). In this study trend, Holt-Lunstad et al. (2010) suggest to utilize the concept of social isolation as a complex measure, since the influence of household composition is limited for meta analysis to investigate the association between social isolation and mortality risk.

In Japan, Shimada et al. (2014) report that the percentage of social isolation emerging from single-resident households is 31%, while from households consisted of two or more people is 24.1% in Japan, demonstrating that the likelihood of social isolation in Japan is higher than the West countries. Furthermore, previous studies have focused on the East Asia conducted by Okamoto (2000) and You et al. (2006) illustrate that physical interactions such as living together and having conversations with family increase HRQOL. Kobayashi et al. (2011) suggest in their study on lifestyles of Japanese elderly people that when the two social factors of single-person household and social isolation overlap, the specific risks become greater: the difficulties in receiving support privately; nowhere to consult

with; no knowledge of community-based integrated support centre; increased propensity to depression; and a feeling of insecurity for the future. According to the study on the Japanese Long-Term Care Insurance System using the data of invoice conducted by Lin HR et al. (2017), although taking simply a single-person household as a social factor is not a risk factor leading to an increase in the levels of nursing care, the single-person household factor for women with dementia elevates the level of long-term nursing care needs.

The analyses from the previous and present studies demonstrate that since household composition is a survey item influenced socially and culturally, it is conceivable that household composition is an effective social factor for screening of eligible people for social support in Japan.

## **2. HRQOL among elderly female single-person households**

Our study has shown that HRQOL was significantly worse among elderly women than elderly men. This finding provides an evidence to support the previous studies indicating the low HRQOL among elderly female as a social problem (Rahman et al., 2000; Orfila et al., 2006; Van Minh et al., 2010; Nguyen et al., 2018). In addition to the gender differences, these studies explore other factors which decrease HRQOL, such as chronic diseases, depression, low levels of income and education. Furthermore, Guallar-Castillón et al. (2005) claim that lifestyle, obesity, and lower levels of schooling are the factors may explain a substantial part of the differences between women and men in certain HRQOL dimensions, suggesting that these factors are potentially improved by intervention.

One of the key findings of this study reveals that PCS and RCS scores among elder women living alone, in particular, have been shown to be significantly lower. This result, highlighting that the two factors of advanced age and single-person household are closely associated with an increase in health risk among women, is an important perspective to explore methods of



intervention. Taniguchi et al. (2013) argue that self-rated health and the amount of physical activity (the frequency of going outdoors) increase PCS scores, whereas chronic diseases and lack of mutual assistance with neighbours are closely associated with a decrease in PCS. PCS is a summary score calculated from PF, BP, GH and RP, focused on physical functions. Therefore, it is necessary to investigate methods of intervention in terms of the amount of physical activity and exercise intensity. Brown et al. (2000) suggest that light and moderate intensity of physical exercise is closely associated with HRQOL scores with positive effects on women at any age. Furthermore, Battaglia et al. (2016) conducted a study an 8-week adapted physical activity (APA) intervention programme to elderly female's physical abilities, resulting in a significant improvement in PF, BP, MH, PCS and MCS. Egami et al. (2009) also demonstrate that the group over 60 years of age who take regular exercise maintains satisfactory scores in PF and BP, arguing that exercise habits affect significantly. Comparing HRQOL among elderly women who performed high-intensity exercise and those who had always been sedentary have reported, it was concluded that high-intensity exercise reduced happiness among older women (Lee et al., 2003). Consequently, it is suggested that a balance between exercise intensity and happiness should be taken into consideration.

RCS is a summary score calculated from RP, SF and RE, focused on social functions. Therefore, it is essential to consider methods of intervention from the following points of view: social relationships; morale; independence of action; and self-esteem. Gallegos-Carrillo et al. (2009) carried out a study on the relationship between components of social networks and HRQOL among Mexican older adults with depressive symptoms, demonstrating that relationships with close relatives are positively associated with PF, BP, and SF, and networks with friends generate a positive impact on PF and RP. Furthermore, Onishi et al. (2006) report that the findings from an experiment of recreational activity interventions

reveal a close relationship between the activity of small group and the morale and satisfaction scores. Additionally, the results of multiple regression analysis show that happiness is closely associated with joy of exercise, modest registration fee, and enjoyment of watching TV. Yoshii et al. (2005) conducted a follow up research on the association between social relationships and long-term nursing-care, and suggest that the active involvement of older adults in helping other elder people who need care potentially decreases risks of developing long-term nursing care. Furthermore, Takehara et al. (2009) suggest that housework is a beneficial way to enrich individual lives and maintain a certain amount of physical activity. Consequently, based on these analyses, it is of critical importance to establish social support which meets the needs of the elderly in home care, day care, and preventive care. Majority of elderly need community-based services to continue living in their own homes and communities (Lehning, 2018). Especially, social workers in community-based integrated care centers are expected to develop that service and community.

### 3. Limitation

However, there is a limitation to our study. We did not include survey items relating to factors which may affect HRQOL among elderly single-person households, such as educational level, income status and social capital. Consequently, however, this study yielded the strong link between HRQOL among elderly women and single-person households by narrowing the survey items. We are planning further study to examine NHRQOL focusing on other factors, such as social capital.

Community-based integrated support is required to tackle to develop a community which allows all the local residents to live for a very long time. Social workers are mediators connecting different professions in the community development. In terms of preventive care, investigating evidence-based social support with the use of HRQOL, like our study, is of great significance.

## V. Conclusion

Our study has analysed household composition, which affects HRQOL among the elderly, and underscored the following: 1) HRQOL scores among elderly single-resident households are significantly lower than elderly households of a married couple and the other household types; 2) HRQOL scores of elderly female are considerably worse than elderly male; 3) Elderly women who live alone have a tendency to experience a decline in physical and social functions; 4) Single-resident households are closely associated with social isolation, which pose high risks; 5) Interventions of physical exercise and recreational support adapted to the physical functions and psychological state of elderly female single-person households may lead to improve their HRQOL.

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