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Examining the Relationship Between Preference for Solitude and Subjective Well-Being Among Japanese Older Adults

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Abstract

Background and Objectives: Focusing on the fact that older adults with positive emotions tend to spend time alone, this study aimed to examine the relationship between preference for solitude and subjective well-being among older adults. In Study 1, we developed a revised version of the Preference for Solitude Scale with a 3-factor structure, unlike the single-factor structure of the original scale. In Study 2, we examined the relationship between preference for solitude and subjective well-being using the revised scale.
Research Design and Methods: We conducted an Internet survey with 210 older adults in Study 1 to develop a revised Japanese scale. In Study 2, to address the possible research method bias in Study 1, we conducted a mail survey with 276 older adults. We examined the replicability of Study 1, confirming metric invariance through multigroup analysis and hypothesis model through path analysis.
Results: The results of the path analysis indicated that "Productivity during solitude" (Factor 3) was positively related with positive affect and life satisfaction, and "Enjoyment of solitude" (Factor 2) was negatively related with negative affect. However, the results of the mediation analysis suggested that preference for solitude was also related to loneliness, and the indirect effect of preference for solitude on well-being was negative.
Discussion and Implications: "Enjoyment of solitude" and "Productivity during solitude" were related to maintaining subjective well-being among older adults, although the effects were marginal. The impact of preference for solitude was mixed in enhancing and decreasing subjective well-being.

Translational Significance: Some older adults adapt to declining the amount of social interaction with age and maintain their subjective well-being. The psychological process is unclear because people who preferred solitude tend to feel loneliness. To understand how older adults maintain their subjective well-being, confirming the relationship between preference for solitude, loneliness, and subjective well-being was necessary. The results indicated that older adults who enjoy solitude and are productive when alone tend to maintain subjective well-being. These results provide important implications for developing intervention programs for the social integration of older adults, while considering their individual preferences of spending time alone.

The amount of social interaction declines with age, and older adults spend less time with others (Carstensen, 2001) and less time active in their personal networks (Cornwell, 2015) than younger people. Because age negatively correlates with social interaction, the time spent alone increases with age (Larson, 1990). There are two different dimensions in this phenomenon: an older adult prefers to spend time alone, and an older adult's social activities decline owing to decreasing physical function or social resources. Therefore, the former approach with the viewpoint of investigating the association of decreasing social interaction with age is important to understand what lifestyle is preferred by older adults.

Interestingly, while the amount of time spent alone increases with age (Larson, 1990), some older adults adapt to this phenomenon in order to maintain their subjective well-being (SWB). A meta-analysis by Pinquart and Sörensen (2001) reported that loneliness was not related to age, while some studies found that loneliness scores among older adults were not higher than those of younger adults (Yang & Victor, 2011). Social psychology studies have shown that maintaining good social relationships is an important contributor to improving SWB (Kahn et al., 2003). Multiple social interactions enhance SWB (Hobfoll, 2002); however, maintaining the quality of social interactions is important among older adults (Pinquart & Sörensen, 2001). Therefore, older adults need to adapt to enhance the quality of their social relationships and optimize fewer social interactions. In this study, we focused on individual differences in the interpretation of solitude, which refers to the time spent alone, in order to understand how older adults overcome declining social relationships.

The life-span theory of control (Heckhausen & Schulz, 1993, 1995) suggests that older adults select certain goals, strive to attain those goals, and manage the consequences of failure and loss with age using two strategies: primary control strategies and secondary control strategies. Primary control strategies refer to individuals' attempts to change the external world to fit their personal needs and desires. By contrast, secondary control strategies target individuals' inner world, involving their own efforts to influence their motivation, emotions, and mental representations. In later life, secondary control strategies are necessary to compensate for limitations in resources (e.g., declining social relationships and losing one's social role) that enable the use of primary control strategies (Heckhausen & Schulz, 1993, 1995). Some older adults tend to use secondary control strategies, recognizing the merits of solitude for adapting to the social limitations that come with age (Toyoshima & Sato, 2018).

Preference for Solitude and SWB

As previously mentioned, older adults face the predicament of how to spend their time alone, which increases with age. Some studies have discussed the positive aspects of solitude, even though social interaction is generally considered important for enhancing SWB. Solitude refers to the time spent alone and differs from loneliness, which is a subjective experience felt alongside discomfort (Peplau & Perlman, 1982).

Burger (1995) suggested that individual differences in preference for solitude determine whether one can spend time alone without feeling any negative emotions. A preference for solitude does not imply that an individual dislikes social interaction or has a low level of social skills. Although a greater preference for solitude is reportedly associated with higher levels of loneliness and lower levels of extraversion, preferring solitude does not correlate with social anxiety (Burger, 1995). There is apparently no difference in social interaction between people who have higher or lower scores on preference for solitude (Burger, 1995). People who have a higher preference for solitude tend to enjoy solitary activity, consequently feeling more positive emotions, in comparison to those who have a lower preference for solitude (Leary et al., 2003). Therefore, preference for solitude is a parameter that assesses an individual's tendency to enjoy spending time alone, which is in turn related to the positive aspect of solitude.

Even though time spent alone increases with age, older adults do not report higher levels of loneliness relative to younger adults. Older adults experience solitude more positively than younger generations, which is indicated by a less pronounced decrease in their levels of positive affect and low levels of negative affect when alone (Chui et al., 2014; Pauly et al., 2017). Burger (1995) thus indicated the possibility that preference for solitude affects the relationship between social interaction and SWB among older adults. Toyoshima and Sato (2018) suggested that spending time alone related to SWB among older adults who rated themselves higher in terms of preference for solitude. There is a possibility that preference for solitude is a psychological factor that enhances older adults' SWB.

Preference for solitude is a factor explaining how aging individuals maintain their SWB even as their social interaction decreases; however, the results of previous studies on the same topic are not consistent. Some studies reported that preference for solitude did not correlate with life satisfaction (Long et al., 2003; Waskowic & Cramer, 1999), while Toyoshima and Sato (2018) reported that preference for solitude was negatively associated with positive affect. A reason for this could be that preference for solitude is positively associated with loneliness, which is a hindrance for SWB because it is related to passivity in social interaction (Burger, 1995). Loneliness is caused by a lack of social relationships, which is a subjective experience felt alongside discomfort (Peplau & Perlman, 1982), having a negative impact on physical and mental health (Cacioppo

et al., 2000). Loneliness is considered an inhibitor of SWB (Windle & Woods, 2004) and is related to experience feeling negative affect when people spent time alone (Averill & Sundararajan, 2014). On the other hand, preference for solitude does not necessarily imply a morbid condition resulting from loneliness (Hoppmann et al., 2021), even though it has something in common with loneliness and a possible bidirectional relationship with SWB. To assess whether preference for solitude is related to SWB among older adults, additional studies are needed to delve into the factors within preference for solitude that determine SWB, and whether loneliness mediates this relationship.

Preference for Solitude Scale

The Preference for Solitude Scale was developed by Burger (1995) to assess whether a person prefers to spend time alone, focusing on the positive aspect of solitude. This scale includes 12 items and a single-factor structure. Solitude includes positive aspects related to creative activity and maintaining privacy, in addition to negative aspects regarding feelings of loneliness (Long et al., 2003). Spending time alone is categorized in two ways: whether a person feels related to others or not—"Relational" and "Nonrelational"—with the latter type connecting to the feeling of isolation or loneliness (Averill & Sundararajan, 2014). Studies showed that a person who reported a higher preference for solitude did not tend to be "Nonrelational" when they isolated objectively and found value in solitude (Long & Averill, 2003). Therefore, solitude includes multiple dimensions, some of which are related to positive emotions; however, a single-factor structure is not enough to examine the differences in these dimensions.

Cramer and Lake (1998) reexamined the factor structure of preference for solitude and suggested that a three-factor structure (Factor 1: Need for solitude, Factor 2: Enjoyment of solitude, and Factor 3: Productivity of solitude) is better than a single factor. Factor 3 implies the extent to which a person values solitude and deems it necessary to concentrate on creative activity, being negatively related with loneliness and positively related with self-esteem.

Cultural Background

Many Asian countries have distinct conceptions of individuality that emphasize harmonious interdependence with others (Markus & Kitayama, 1991). Solitude facilitates self-reflection and escape from social regulation pressures (Long & Averill, 2003). Jiang et al. (2019) discussed that solitude may be preferred in East Asian countries to a greater extent than in North America. Older adults of East Asian heritage experienced more positive and less negative affect when alone than their Caucasian counterparts (Jiang et al., 2019). Therefore, it is possible that Japanese older adults prefer solitude, and the effect of preference for solitude is reproduced in the Japanese sample.

To examine the relationship between preference for solitude and SWB, using three factors of the scale should be appropriate. However, Cramer and Lake (1998) divided the original 12 items into three factors, with Factors 1 and 3 including only two items. The number of items in each factor was therefore unbalanced. The results of factor analysis by a previous study using the Japanese translated scale reported that a single-factor structure is better than three factors and did not support the three-factor structure model (Toyoshima, 2021).

Purpose of This Study

This study aimed to examine the association between preference for solitude and SWB using three factors of a revised version of the Preference for Solitude Scale among older adults. In Study 1, we developed a revised Japanese version of the Preference for Solitude Scale. The original scale has a single-factor structure, while the revised scale includes additional items and examines associations with demographic variables (gender and residential status) to provide the basic characteristics of the three factors. In Study 2, we examined the hypothesis that preference for solitude is related to SWB by analyzing the associations between preference for solitude, loneliness, and SWB using the revised scale. To understand the relationship between preference for solitude and SWB, we examined the indirect effect of loneliness using three factors. Understanding which factors have positive effects on SWB would provide important implications for developing intervention programs for the social integration of older adults who are passive to social activities.

Study 1

Research Design and Methods

Participants and procedure
We conducted an Internet survey with 210 older adults (aged 65–80 years, 101 men, 109 women) in Japan in November 2019, through Cross Marketing Inc., an online research company in Japan. A priori power analysis performed with G*Power 3.1.9.7 for analysis of variance (ANOVA; df = 1, group = 4) indicated that the minimum sample size was 210 for an error probability of .05, statistical power of .95, and medium effect size (f = 0.25). Thus, the sample size of Study 1 was adequate for the present study. The participants were financially compensated by the web system for completing the survey (100 Japanese Yen, i.e., approximately 1 USD). This survey was approved by the Osaka University Research Ethics Committee. The participants provided their typed informed consent to participate in this study on the webpage.

Measures
Preference for solitude. We used the Japanese version of the Preference for Solitude Scale (Toyoshima & Sato, 2018).

Toyoshima (2021) reported that items equating solitude with autonomy and the ability to cope on one's own do not relate to negative affect. We included five additional items in Factors 1 and 3 (Table 1; Factor 1: Items 15 and 17; Factor 3: Items 13, 14, and 16). In Factor 1, we added items that assess whether the participant values solitude as a break (e.g., Item 15: When I want to change my mood, I usually spend time alone). In Factor 2, we added items that determine whether the participant tends to choose to spend time alone for autonomy (e.g., Item 14: When I want to concentrate on a task, I prefer to work in a quiet place where there are not a lot of people). Factor 1 included four items ("a. I often have a strong desire to get away by myself" and "b. I rarely have a strong desire to get away by myself"); Factor 2 included eight items ("a. I enjoy being around people" and "b. I enjoy being by myself"); and Factor 3 included five items ("a. When I have to spend a lot of time alone, I find the time boring and unpleasant" and "b. When I have to spend a lot of time alone, I find the time productive and pleasant").

Loneliness. To measure loneliness, we used the UCLA Loneliness Scale (Russell, 1996). This scale consists of 20 items in total (e.g., "How often do you feel you have a lot in common with the people around you?" and "How often do you feel alone?"). Participants rated each item in terms of how often it is true, on a 4-point scale (1 = often, 2 = sometimes, 3 = rarely, and 4 = never). The scores were reversed such that higher scores indicated greater loneliness. The Japanese version of the scale has demonstrated high internal consistency and validity (Toyoshima & Sato, 2018).

Social interaction. The participants reported the number of days in a week that they interacted with friends.

Subjective health status. Subjective health status was rated using a scale ranging from 1 (*extremely healthy*) to 5 (*extremely poor*).

General characteristics. We assessed the following characteristics: gender (1 = men, 2 = women), education, marital status, and family income. The participants indicated their marital status as married, separated, divorced, or never married, and their education years. Participants rated their family income on a 6-point scale (1 = under 990,000 yen [approximately $10,000], 2 = 1,000,000–2,990,000 yen, 3 = 3,000,000–4,990,000 yen, 4 = 5,000,000–6,990,000 yen, 5 = 7,000,000–9,990,000 yen, and 6 = 10,000,000 yen or more).

Data analysis
Analyses were performed using R 19.0 for Windows (Ihaka & Gentleman, 1996) and M plus7 (Muthén & Muthén, Los Angeles, CA). To assess goodness of fit, we used the following criteria: a comparative fit index (CFI) >.9 (Bentler & Bonnet, 1980) and root mean square error of approximation (RMSEA) <.10 (Browne & Cudeck, 1993).

Results

Table 2 contains the participant demographic variables of Studies 1 and 2. The Kuder–Richardson 20 (KR 20) of all items was 0.81, demonstrating the reliability of the scale; KR 20 usually tests the internal consistency of measurements with dichotomous choices. KR 20 values ≥0.9 are considered excellent, values between 0.8 and 0.89 are good, and values below 0.6 are poor or unacceptable (George & Mallery, 2009).

Exploratory factor analysis
The results of exploratory factor analysis using Oblimin algorithms showed that the three-factor model (χ^2 (45) = 89.69, *n.s.*, RMSEA = .03, CFI = .99) provided a better fit to the data than the one-factor model (χ^2 (16) = 182.66, *p* < .001, RMSEA = .06, CFI = .92, model compared with two-factor model, *p* < .001) and two-factor model (χ^2 (31) = 122.66, *p* < .05, RMSEA = .04, CFI = .97, model compared with the three-factor model, *p* < .05). There was no significant difference between the goodness of fit of the three-factor model and that of the four-factor model (χ^2 (58) = 67.93, *n.s.*, RMSEA = .02, CFI = .99). Therefore, the three-factor model was appropriate, and we adopted a three-factor structure of preference for solitude

Table 1. Additional Items in the Revised Preference for Solitude Scale

No.		Items
13	a	I usually work alone when I want to be creative.
	b	I usually work with others when I want to be creative.
14	a	When I want to concentrate on a task, I prefer to work in a quiet place where there are not a lot of people.
	b	When I want to concentrate on a task, I prefer to work in a lively place where there are a lot of people.
15	a	When I want to change my mood, I usually spend time alone.
	b	When I want to change my mood, I usually contact others.
16	a	Working alone leads to good progress when performing a difficult task.
	b	Working with others leads to good progress when performing a heavy task.
17	a	When I feel low, I want to spent time alone in my room.
	b	When I feel low, I want someone to cheer me up.

Table 2. Demographic Variables in Studies 1 and 2 (*N* = 486)

Variables	Study 1 (Internet) *n* = 210	Study 2 (Mail) *n* = 276
Marital status, *n* (%)		
Married	154 (73%)	207 (75%)
Separated	3 (1%)	1 (0%)
Divorced	19 (9%)	43 (16%)
Widowed	15 (7%)	16 (6%)
Never been married	19 (9%)	6 (2%)
Living with child(ren), *n* (%)		
Yes	64 (30%)	86 (31%)
No	146 (70%)	187 (68%)
Years of schooling		
Mean	14.3	13.3
Standard deviation	2.84	2.52
Family income, *n* (%)		
Less than US$10,000	7 (3%)	12 (4%)
US$10,000–US$29,999	68 (32%)	83 (30%)
US$30,000–US$49,999	67 (32%)	96 (35%)
US$50,000–US$69,999	29 (14%)	51 (18%)
US$70,000–US$99,999	25 (12%)	20 (7%)
More than US$100,000	14 (7%)	10 (4%)
Residential status, *n* (%)		
Alone	38 (18%)	43 (16%)
Live with family	172 (82%)	232 (84%)

in this study. The factor loadings from Item 5 to multiple factors in the three-factor model were significant, and the factor loading from Factor 1 was negative. Therefore, we excluded Item 5 in the Japanese three-factor version and used a 16-item version in subsequent analysis.

Confirmatory factor analysis

We examined whether the revised Japanese version would have the three-factor structure reported by Cramer and Lake (1998). We compared the fit of a one-factor model with that of a three-factor model. The chi-square difference test indicated that the fit of the three-factor model (χ^2 (101) = 145.98, p < .01; RMSEA = 0.05, CFI = 0.96) was significantly greater than that of the one-factor model (χ^2 (104) = 183.18, p < .001; RMSEA = 0.06, CFI = 0.93; $\Delta\chi^2$ (3) = 37.2, p < .001) (factor loadings of items in the three-factor model are shown in Supplementary Table 1).

Descriptive statistics

Table 3 presents the descriptive statistics of variables separated by gender and living status (living alone or living with family). The results of a two-way ANOVA indicated that the main effects of gender were significant for social contact (F (206,1) = 11.50, p = .000, η^2 = 0.06, 95% confidence interval [0.40 to 1.51]) and loneliness (F (206,1) = 5.78, p = .017, η^2 = 0.03, 95% confidence interval [−5.90 to 0.58]). Women reported higher social interaction scores and lower loneliness scores than men. The main effect of living status was significant for Factor 3 of preference for solitude. Participants who lived alone reported

higher scores on Factor 3 than those who lived with family (F (206,1) = 4.02, p = .031, η^2 = 0.02, 95% confidence interval [0.03 to 0.68]).

Correlations between variables

The correlation coefficient of r between Factor 1 and Factor 2 was 0.51 (p < .01), between Factors 1 and 3 was 0.31 (p < .01), and between Factor 2 and Factor 3 was 0.42 (p < .01). Scores of the three factors were positively correlated with loneliness (Factor 1 = 0.37, p < .01; Factor 2 = 0.42, p < .01; Factor 3 = 0.22, p < .01) and negatively correlated with frequency of meeting friends (Factor 1 = −0.18, p < .01; Factor 2 = −0.35, p < .01; Factor 3 = −0.12, p < .10). Factors 1 and 2 were negatively correlated with subjective health (Factor 1 = −0.18, p < .01; Factor 2 = −0.22, p < .01).

Discussion

The reliability coefficient of the revised Japanese Preference for Solitude Scale with newly added items was the same or higher than that of the original scale (Burger, 1995: 0.73; Cramer & Lake, 1998: 0.74 or 0.75). Hence, the reliability of the revised Japanese version was sufficient. The goodness of fit of all models (CFI and RMSEA) was higher than the criteria. The results of the confirmatory factor analysis indicated that the three-factor model fits better than the one-factor model in this study. Therefore, the revised Japanese version had a three-factor structure, with this study using scores for the three factors of preference for solitude.

Table 3. Descriptive Statistics of Variables and Results of ANOVA (*n* = 210)

| | Living alone | | Living with family | | |
| | Men | Women | Men | Women | |
Variables	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*p*
Subjective health	2.52 (0.88)	2.33 (1.23)	2.59 (0.83)	2.48 (0.79)	
Social interaction	1.73 (1.71)	1.53 (1.59)	2.64 (2.31)	2.74 (2.34)	Gender *p* = .000
Loneliness	46.41 (8.79)	44.67 (10.89)	43.10 (10.87)	42.17 (7.89)	Gender *p* = .017
PSS					
F1: Need for solitude	1.95 (1.31)	1.97 (1.16)	1.73 (1.35)	2.39 (1.23)	n.s.
F2: Enjoyment of solitude	3.97 (1.76)	3.93 (1.67)	3.69 (1.72)	4.13 (1.82)	n.s.
F3: Productivity of solitude	3.31 (1.01)	3.87 (0.35)	3.39 (0.91)	3.61 (0.89)	Living status *p* = .031

Note: ANOVA = analysis of variance; PSS = Preference for Solitude Scale; F1 = Factor 1, F2 = Factor 2, F3 = Factor 3.

We conducted a two-way ANOVA to examine differences in the revised scale scores according to gender and resident status. We found that older adults who lived alone tended to report higher scores on Factor 3, valuing creativity of solitude. Preference for solitude thus reflects a positive aspect of staying alone (Long & Averill, 2003). People who live alone tend to incorporate creative time in order to do things like concentrate on personal work, focusing on the positive aspects of solitude.

We found negative correlations between scores of all factors and social interaction, and a positive correlation between the factors and loneliness, which supports previous studies (Burger, 1995; Cramer & Lake, 1998). These results suggested that there is construct validity of the revised scale; moreover, we conducted an additional survey and examined the final hypothesis model in Study 2 to confirm the validity of the revised Japanese version in postal survey.

Study 2

In Study 1, we conducted an Internet survey and analyzed the data collected; however, there was a possibility of research method bias. Hence, in Study 2, we conducted an additional survey using the mailing method. We examined the replicability of Study 1, confirming metric invariance through multigroup analysis. Next, we conducted a path analysis to examine the theoretical model including three factors of preference for solitude, loneliness, and other psychological variables (subjective health and social interaction) that were related to loneliness and SWB as independent variables.

Research Design and Methods

Participants and procedure
We conducted a postal survey with 276 older adults (aged 65–80 years, 107 men, 169 women) in Japan in February 2020. Nippon Research Center Inc., a research company, conducted the survey. The 434 candidates for participation, who lived in multiple areas of Japan, were extracted from the list of the research company. We sent a letter requesting participation and the questionnaire to the candidates. The participants were financially compensated by the research company for completing the survey (500 Japanese Yen, i.e., approximately 5 USD). In Study 2, we conducted a path analysis using the data set including 486 participants of Studies 1 and 2. In structural equation modeling, the sample size needs to be over 300 (Bentler & Chou, 1987); thus, the sample size of Study 2 was adequate for the present study. The survey was approved by the Osaka University Research Ethics Committee. The participants provided their written informed consent to participate in this study.

Measures
The questionnaire included the same items of Study 1 and scales of SWB.

SWB. Diener et al. (1995) suggested that SWB comprises two elements: affect (positive and negative) and life satisfaction. To measure SWB, we used both an affective well-being scale and a life satisfaction scale. We used the concise affective well-being scale of Nakahara (2001), which was developed to compare the affective well-being of younger and older adults. This scale comprises three positive and three negative affect items, each of which is assessed on a 5-point scale (1 = never, 2 = occasionally, 3 = sometimes, 4 = most of the time, and 5 = all of the time). These items assessed the participants' affective status for 2 weeks.

To measure life satisfaction, we used the Satisfaction with Life Scale (SWLS; Diener et al., 1985). The SWLS comprises five items, such as "In most ways my life is close to my ideal," each of which is assessed on a 7-point scale (1 = strongly disagree to 7 = strongly agree). The Japanese version of the scale has demonstrated high internal consistency and validity (Sumino, 1994).

Data analysis
Analyses were performed using the same software and protocol as in Study 1. We examined whether the Japanese

revised version would have the same factor structure for the two data sets by conducting a multiple-group analysis (Oort, 1998). We compared the model parameters (e.g., factor loadings) from the three-factor model for the two groups (Internet survey and mail survey). The fit of a model wherein the factor loadings were allowed to vary for two groups (free factor loading model) was compared to the fit of a model wherein the factor loadings were constrained to be equal for the two groups (fixed factor loading model).

Next, we conducted a path analysis to examine the relationship between factors of preference for solitude, loneliness, and SWB. The theoretical model is shown in Figure 1. We analyzed three models wherein the outcome (SWB) was measured for three variables (positive affect, negative affect, and life satisfaction). Moreover, because loneliness is considered an inhibitor of SWB (Windle & Woods, 2004), we added loneliness as a mediation path to assess its effect on SWB. The analysis model included control variables that assessed general characteristics (age, gender, marital status, education, family income, residential status, and whether participants belonged to the internet survey or mail survey). Control variables were connected through paths from all independent variables and outcomes. We dichotomized marital status into two categories: married (1. married or separated) and unmarried (0. divorced, widowed, or never been married), because relatively few participants reported that they were separated, divorced, or widowed. We examined the final model in the path analysis with deleted paths that were not significant.

Results

Multigroup analysis

The goodness of fit of the three-factor model in the data for the mail survey was higher than the criteria (χ^2 (101) = 206.34, p < .001; RMSEA = .06, CFI = .92).

The goodness-of-fit statistics for the free factor loading model were χ^2 (218) = 580.46, p < .001, RMSEA = .08,

CFI = .84, wherein the factor loadings were identical for the two groups. The goodness-of-fit statistics for the fixed factor loading model were χ^2 (215) = 543.13, p < .001, RMSEA = .08, CFI = .86. The chi-square difference test indicated that the fit of the fixed factor loading model was significantly greater than that of the free factor loading model ($\Delta\chi^2$ (3) = 37.33, p < .001). Therefore, metric invariance of the revised Japanese version was confirmed. The scale had the same factor structure for the two groups; using the same scores of the Preference for Solitude Scale for participants of the Internet survey and mail survey had sufficient validity.

Path analysis

The goodness-of-fit statistics for the final model in which the outcome was positive affect were χ^2 (3) = 1.10, *n.s.*, RMSEA = .00, CFI = 1.00, for negative affect were χ^2 (2) = 3.23, *n.s.*, RMSEA = .04, CFI = .99, and for life satisfaction were χ^2 (3) = 0.09, *n.s.*, RMSEA = .00, CFI = 1.00. Correlation Coefficients between Preference for solitude and variables are shown in Supplementary Material Table 2. The path coefficients of path analysis in Study 2 are given in Table 4. The path coefficients indicated that three factors of preference for solitude were related to higher levels of loneliness in all models. In the model of positive affect, Factor 3 (Productivity of solitude) had a higher level of positive affect (β = .09, p = .075); in the model of negative affect, Factor 2 (Enjoyment of solitude) had a lower level of negative affect (β = −.12, p < .01); and in the model of life satisfaction, Factor 3 (Productivity of solitude) had a higher level of life satisfaction (β = .09, p = .054).

We conducted a mediation analysis using bootstrapping (1000) to examine the indirect effects of preference for solitude on SWB mediated by loneliness. Factor 3 (Productivity of solitude) had an indirect negative effect on positive affect (95% CI [−0.18 to −0.80]), and Factor 2 (Enjoyment of solitude) had an indirect effect on negative affect, which was significant (95% CI [0.15 to 0.24]).

Discussion

The results of the path analysis suggested that "Enjoyment of solitude" was related to negative affect. Although the path coefficients were marginally significant, we found that "Productivity during solitude" was related to positive affect and life satisfaction. However, the results of the mediation analysis suggested that preference for solitude was also related to loneliness and the indirect effect of preference for solitude on well-being was negative. The impact of preference for solitude was mixed, in that it was involved in enhancing as well as decreasing SWB. While some studies reported that preference for solitude enhanced SWB and was positively associated with loneliness (Cramer and Lake (1998); Toyoshima & Sato, 2018), some studies did not find an effect of preference for solitude on SWB (Long et al., 2003; Waskowic & Cramer, 1999); these findings
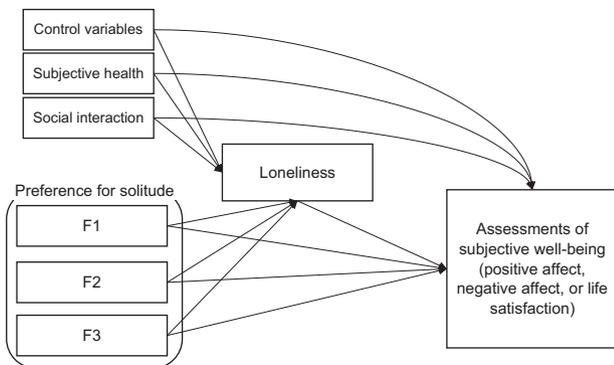

Figure 1. The analytical model for path analysis in Study 2. *Notes:* F1 = Factor 1, F2 = Factor 2, F3 = Factor 3. In an analysis of this study, three models were examined for the outcome of subjective well-being, with the variables being "positive affect," "negative affect," and "life satisfaction."

Table 4. Standardized Path Coefficients of the Results of the Final Model (*N* = 486)

Path			Positive affect	Negative affect	Life satisfaction
Subjective health	→	Loneliness	−.09†	−.17**	−.16**
Social interaction	→	Loneliness	−.44**	−.48**	−.44**
F1: Need for solitude	→	Loneliness	.33**	.32**	.33**
F2: Enjoyment of solitude	→	Loneliness	.45**	.49**	.44**
F3: Productivity of solitude	→	Loneliness	.24**	.19**	.22**
Subjective health	→	SWB	.23**	−.10*	.12*
Social interaction	→	SWB		−.01*	
F1: Need for solitude	→	SWB			
F2: Enjoyment of solitude	→	SWB		−.12**	
F3: Productivity of solitude	→	SWB	.09†		.09†
Loneliness	→	SWB	−.53**	.40**	−.52**

Notes: F1 = Factor 1; F2 = Factor 2; F3 = Factor 3; SWB = outcome of the model (positive affect, negative affect, and life satisfaction). The empty cells indicate that the paths were not significant and were deleted in the final model.
**$p < .01$, *$p < .05$, †$p < .10$.

make psychological concepts of preference for solitude unclear. From the results of this study, personal preferences included enjoyment of solitude, and evaluation of the productivity of solitude enhanced SWB; however, these effects were lower than the correlation of loneliness with a preference for solitude.

Cramer and Lake (1998) reported that evaluation of the productivity of solitude (Factor 3) was related to positive emotion, suggesting that this factor was connected to the positive aspects of solitude. The coefficients of the direct path from Factor 3 to positive affect and life satisfaction were positive in this study. This factor has a different character from the other two factors, and the positive aspect of solitude includes some people valuing the productivity or creativity of solitude, as discussed by Burger (1995). The concept of Factor 3 comes closest to one's "Ability of staying alone" (Long & Averill, 2003).

Enjoyment of solitude (Factor 2), which is related to a lower level of negative affect, includes the largest number of items from the original scale and corresponds to the original concept of the Preference for Solitude Scale (Burger, 1995). This factor was negatively associated with social interaction; however, it was related to negative affect in the path analysis. These results indicated that a person enjoying solitude did not tend to feel negative emotion associated with spending time alone, although they were passive in social interaction. However, it could also indicate a reverse causal relationship such that people with fewer social interactions tend to accept their social circumstances and find ways to enjoy their time alone.

General Discussion and Implications

This study examined the relationships between preference for solitude, loneliness, and SWB using a revised scale with a three-factor structure, because the results of some previous studies using the original scale were incoherent (Long et al., 2003; Waskowic & Cramer, 1999) and the effect of preference for solitude was unclear. Our

findings showed that enjoyment of solitude was related to negative affect, which was in line with the results of Burger (1995) and Toyoshima and Sato (2018). Valuing the productivity of solitude was related with positive affect and life satisfaction, although the effects were marginal. In later life, secondary control strategies that target individuals' inner world and involve their efforts in influencing their own emotions are necessary to compensate for limitations in social relationships (Heckhausen et al., 2010). The results of this study indicated that focusing on the productivity of solitude related to SWB among Japanese older adults.

According to our study, Factor 3 (productivity of solitude) was related to positive emotion. Factor 3 referred to a person valuing solitude and deeming it necessary to concentrate on creative activity, and the correlations between Factor 3 and social interactions were lower (range of *r*: −.02 to −.19) compared with other factors (range of *r*: −.16 to −.40). Waskowic and Cramer(1999) did not report a relationship between preference for solitude and SWB; our findings indicated that the indirect effects of preference for solitude via loneliness were negative on SWB. Therefore, the negative correlations between preference for solitude and SWB included the effects of loneliness.

We developed the revised version of the Preference for Solitude Scale, and Factor 3 was positively correlated with loneliness, which did not support the results of Cramer and Lake (1998). The absence of negative correlations between Factor 3 of the revised version and loneliness is attributable to the phrasing of the additional items. These items implied that a person needed solitude at times, when trying to concentrate on a task. The phrasing did not include positive meanings such as creativity and joy. Moreover, it is possible that cultural differences affected the results. Japanese people have previously reported higher levels of shyness than have Americans (Sato et al., 2018). The image of solitude could have been different for the participants of this study compared to those of Cramer and Lake (1998).

Applied Perspective of This Study

The results from this study provide an applied perspective on the creation of social interventions for older adults. Social interactions enhance SWB among older adults, and there are numerous interventions that encourage older adults to maintain social activity. However, some older adults are passive in terms of participating in social interventions. Controversy exists over whether it is necessary for older adults who do not prefer to participate, to join such social groups. Solitude caused by personal preference enhances SWB slightly; however, it is related to higher level of loneliness. It is important to further explore different ways of encouraging older adults to enhance their quality of time spent alone in the face of declining social relationships. The results of this study contribute to an understanding that some older adults who maintain SWB prefer to spend time alone, focusing on enjoyment and productivity related to solitude, which is in turn associated with SWB.

Limitations

This study has several limitations that should be noted. First, this study was cross-sectional and could not determine the causal relationships between the variables. In the hypothesis model of the path analysis, demographic variables (gender, residential status, and family income) were included as control variables. To test the confounding possibility of these variables, we tested the model without including them. Because the positive/negative values were similar with or without the variables, we concluded that the impact of demographic variables was weak in this study. It would be necessary to examine causal relationships using indicators of secondary strategies, as in the life-span theory (Heckhausen & Schulz, 1993, 1995).

Second, the measures used in this study were self-reported. It would be better to investigate the validity of the findings using more objective measures, such as measurements of social interaction reported by family members and portable devices.

Third, the participants who lived alone had higher scores on Factor 3 than those who lived with family; however, the theoretical model of the path analysis could not examine the difference resulting from residential status. The surveys were not designed to examine the impact of living alone, and the sample size was biased. Residential status was included as a control variable, and these effects may have been controlled. However, it is possible that the effect of preference for solitude is different between people who live alone and those who live with their families.

Finally, the participants of this study were Japanese older adults, and it is possible that the results of this study were influenced by Japanese or East Asian cultural backgrounds. Many Asian countries have distinct conceptions of individuality that emphasize harmonious interdependence with others (Markus & Kitayama, 1991). Because East Asian cultural backgrounds had more positive and less negative affective responses to being alone than did Caucasians (Jiang et al., 2019), it is possible that the positive effect of preference for solitude is reproduced in our Japanese sample. It is therefore necessary to examine whether the results of this study can be replicated for other countries.

Conclusions

This study confirmed a three-factor model of preference for solitude. The Preference for Solitude Scale included three dimensions: "Need for solitude," "Enjoyment of solitude," and "Productivity during solitude." "Enjoyment of solitude" and "Productivity during solitude" were related to maintenance of SWB among older adults, although the effects were marginal. The impact of preference for solitude was mixed in that it was involved in enhancing and decreasing SWB. This study demonstrates the relationship between preference for solitude and SWB, focusing on the impact of enjoyment and productivity of solitude on SWB.

Supplementary Material

Supplementary data are available at *Innovation in Aging* online.

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Conflict of Interest

The authors declare no conflicts of interest associated with this manuscript.

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