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"Does Participation in Community Activities Increase One's Subjective Well-Being?: Quantitative Analysis Considering Causality and External Effect in Japan"

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Does Participation in Community Activities Increase One's Subjective Well-Being?: Quantitative Analysis Considering Causality and External Effect in Japan

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Abstract

In recent years, interest in community activities has been growing. This study examines the causal relationship between community activity participation and subjective well-being, using data from a nationwide online questionnaire survey. The results show that participation in community activities increases the subjective well-being of individuals, and that it would also increase the well-being of non-participants through improvements of the local living environment and the propagation of the sense of well-being. These results support the significance of policy initiatives to community activities and indicate that such policies could be evaluated in terms of well-being.

Keywords: community activity, subjective well-being, endogeneity, instrumental variable methods

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1. Introduction

The growing global interest in well-being has led to a need to clarify the issue of what factors and policies increase well-being. At the initiative of former French President Nicolas Sarkozy, the Commission on the Measurement of Economic Performance and Social Progress, led by Joseph Stiglitz, Amartya Sen, and Jean-Paul Fitoussi, challenged to evaluate social well-being other than Gross Domestic Product (GDP). In response, the Organisation for Economic Co-operation and Development (OECD) has been working on a country-by-country index of well-being and has published a report titled "How's Life?". The United Nations Network for Sustainable Development Solutions has also been releasing the "World Happiness Report" since 2012. These trials show that countries or societies experience several challenges to evaluate well-being. If well-being is to be used as goals and policy outcomes, it is important to clarify the causal relationships between various factors and well-being.

In Japan, voluntary community activities have been attracting increasing interest in recent years. These activities range between town development, childcare support, preservation of cultural buildings, street cleaning, and so on, and are expected to contribute to maintaining and revitalizing local communities, alongside supplementing public services that local governments are unable to provide because of severe fiscal constraints. If such activities lead to supplementing public services, revitalizing local communities, and increasing people's well-being, policymakers would pay more attention to policies supporting such activities. Although evaluating the outcomes of these activities is not easy, once the relationship with well-being is shown, it would also be possible to evaluate such policies from the perspective of improving well-being[1].

On the basis of this motivation, this study examines quantitatively whether voluntary community activities by residents affect people's subjective well-being, taking into account causality. This study also examines the external effect of community activities. The result obtained is that participation in community activities increases subjective well-being. Furthermore, community activities have beneficial outcomes for the well-being of non-participants through channels such as improving the community's living environment and propagating the sense of happiness.

As for participation in activities, the relationship with well-being has been pointed out so far (Helliwell and Putnam, 2004; OECD, 2015; Cabinet Office of Japan, 2019). However, if people with a high level of well-being and a relaxed state of mind are more likely to participate, then participation in such activities is a mere result of their level of well-being. That is, volunteer and community activities are more popular in societies with many happy people. As Thoits and Hewiit (2001) pointed

[1] Adler and Seligman (2016) pointed out the importance of using well-being as a measure to assess and design policy and the research is underway to consider life satisfaction in social cost effectiveness analysis (see Fujiwara and Campbell, 2011).

out, volunteer activities can increase the well-being of participants, but there is also a reverse causality between people with high levels of well-being and volunteer activities. Thus, to better understand the impact of voluntary community activities on well-being, the causal relationship must be taken into consideration.

Although many researchers have tried clarifying the causal relationship between volunteer activities and well-being, it is still unclear. Richards et al. (2013) reviewed 7 randomized controlled trial (RCT) studies, 4 non-RCT studies, and 29 cohort data studies. They concluded that the causal relationship between volunteering and well-being was unclear because the relationship was visible in the cohort data studies but was unconfirmed in the experimental studies.

Whillans et al (2016) is one of the existing studies that pointed out the lack of causal relationship. They surveyed a Catholic university in the United States enrolled in the community service learning (CSL) educational program to examine the impact of volunteering on well-being. In the CSL educational program, participation in volunteer activities is included, and those who registered are placed on a waitlist to participate in activities. However, not everyone who registered can participate. They utilized this as a natural experiment and compared the group of students who engaged in volunteer activities (n = 232) versus the group who did not, finding no causal relationship between volunteer activities and well-being[2].

In contrast, several studies show a causal relationship between volunteering and happiness (Meier and Stutzer, 2008; Borgonovi, 2008; Chen et al., 2014; Binder and Freytag, 2013). Recently, Lawton et al. (2020) examined the causal relationship using large panel data based on two surveys of UK households (British Household Panel Survey and Understanding Society). They examined the impact of volunteering on well-being by using the fixed effects and first difference models. The data used are extremely large, with a sample size of over 220,000, and show that participation in volunteer activities has a positive effect on happiness, and that happiness increases as the frequency of participation increases[3].

Mixed results have been obtained depending on the method of analysis and country. This indicates that further verification is needed to clarify the relationship between volunteer activities and subjective well-being. This study contributes by examining the causal effect of participation in voluntary community activities on subjective well-being by exploiting the frequency of participation in community activities by parents and/or grandparents as an instrumental variable, and adding the evidence indicating the external effect of community activities on non-participants.

In the following, Section 2 explains the data and method used. Section 3 presents the results of estimations; Section 4 investigates the external effect of community activities; and Section

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[2] The index of well-being used is a composite index of positive affect, negative affect, and life satisfaction, created from questionnaires conducted at the time of program enrollment and 6 months later.

[3] The index of well-being used is developed from the question about life satisfaction, and is a seven-level variable.

5 concludes.

2. Data and method

2.1. Data

To find more accurate evidence in which causal relationship is taken into account requires conducting an RCT, in which subjects are randomly divided into two or more groups, and comparing the treatment group with intervention and the control group without intervention. For social behaviors such as community and volunteer activities, however, attempting such experiments with a large sample is not easy. Additionally, the effect of such activities may appear after a certain period has passed since the activities are initiated. In such case, it is necessary to conduct experiments over a long period.

Analysis using panel data is a way to deal with causality. Empirical analysis using panel data can address endogeneity caused by factors that are difficult to treat explicitly as variables in estimation, such as individual propensity and temperament. Constructing panel data, however, requires continuous survey of individual participation in activities and well-being. Unfortunately, there are no official statistics in Japan that explicitly investigate the level of well-being, and it is difficult to obtain nationwide panel data on subjective well-being and community or volunteer activities. Furthermore, to the best of the author's knowledge, there are no comparable data that are obtained before and after an event such as a natural disaster that can be used as a natural experiment and contain both subjective well-being and activity participation in Japan.

The data used in this study are obtained from an online questionnaire survey (hereinafter referred to as *questionnaire survey*) conducted in Japan under the research and development project named “An Investigation regarding the Mechanism of Intergenerational Inheritance of Social Capital” supported by the Japan Science and Technology Agency. The survey was conducted in two parts to gather more respondents. The first and second surveys were conducted in March 2017 and July 2017, respectively, for the same respondents of the first survey. The number of respondents to the first and second surveys was 11,371 and 7,498, respectively. The regional distribution of the respondents to the first survey was 36.7% in large cities (23 wards of Tokyo and ordinance-designated cities), 23.0% in medium cities (with a population of ≥100,000), 31.9% in cities (with a population of ≥50,000 and ≤100,000), and 8.4% in other municipalities (with a population of ≤50,000).

The *questionnaire survey* includes several questions about the respondents' attributes such as gender, age, and education, including their level of participation in community activities. Respondents are asked to choose their frequency of participation from the following five levels: “almost every week,” “about two to three days a month,” “about one day a month,” “several times a year,” and “do not participate.”

Current happiness and life satisfaction are used in this study as the index of subjective well-

being. In the *questionnaire survey*, respondents were asked “How happy are you as a whole? If 'very happy' is 10 and 'very unhappy' is 0, what do you think your score would be?” Their answer is used as an indicator of current happiness. As for life satisfaction, the answer to the question “How satisfied are you with your life as a whole? If 'not at all satisfied' is 0 and 'very satisfied' is 10, what do you think your score would be?” is used as an indicator.

Thus, the *questionnaire survey* includes necessary questions for analyzing the relationship between community activities and subjective well-being.

2.2. Preliminary analysis

This subsection confirms the relationship between community activities and subjective well-being. Figure 1 shows the relationship between current happiness and the frequency of participation in community activities, and Figure 2 shows the relationship between life satisfaction and the frequency of participation in community activities. In these figures, the sample is divided into five groups by the frequency of participation in community activities, and the mean values of current happiness and life satisfaction are compared.

For current happiness, the average of the group that does not participate in community activities is approximately 5.5, whereas the average of the group participating several times a year is approximately 6.4, showing a significant difference compared with that of the non-participants. Contrastingly, the averages of the group that participates only a few times a year and the group that participates 1 day a month or 2 or 3 days a month are almost identical and do not show significant differences. However, the average of the group that participates almost every week is approximately 7.0, which shows a significant difference compared with that of the group that participates less frequently.

A similar trend is observed for life satisfaction. The more often participants participate, the higher levels of life satisfaction tends to be, and there is a significant difference between the group that participates several times a year and the group participating 2 or 3 days a month.

Thus, the level of subjective well-being of communal participants is generally higher than that of non-participants, and those who participate on a weekly basis tend to have higher level of subjective well-being. These results, however, may reflect that people with high subjective well-being may be more actively involved in community activities and causality needs to be considered.

2.3. Method for analysis

This study examines the impact of community activities on subjective well-being by estimating the following equation.

$$SWB = \alpha_0 + \alpha_1 \cdot community\_act + \beta_1 \cdot x_1 + \beta_2 \cdot x_2 + \beta_3 \cdot x_3 + \cdots + \beta_n \cdot x_n + \varepsilon$$

…(1)

SWB means subjective well-being, *community_act* is a dummy variable that takes 1 if the person participates in community activities and 0 if not, $x_1 \cdots x_n$ are variables such as personal attributes, and ε is an error term.

According to Dolan et al. (2008), factors that influence subjective well-being include personal attributes (income, age, gender, ethnicity, personality, etc.), social characteristics and circumstances (education, occupation, etc.), daily work and activities (working hours, caring for others, community activities, etc.), individual factors (marriage, having children, and social ties such as meeting family and friends), and socioeconomic environment (income inequality, unemployment rate, climate, and natural environment of the society to which the individual belongs).

On the basis of their discussion, various variables are considered in this study. The personal attributes used as independent variables are gender (dummy variable with a value of 1 for female), age (dummy variable for each age group from 20s to ≥80s), education (dummy variables for less than high school graduate and college graduate and above), employment status, personal relationships (presence of children, presence of spouse, and whether there is someone to rely on), self-reported evaluation of one's overall health status, household income, and household financial assets[4]. To take into account regional factors, regional dummy variables (prefecture dummies) and population size dummies for the municipality (23 wards of Tokyo and ordinance-designated cities, cities with a population of ≥100,000, cities with a population between 50,000 and 100,000, and cities with a population of ≤50,000) are included as independent variables.

In the estimation of equation (1), the ordinary least squares (OLS) method and the instrumental variable method (two-stage least squares method) are used to compare their results. When using the instrumental variable method, it is necessary to find a variable that is correlated with the variable that is considered to be endogenous and is not correlated with the error term.

In this study, parents' and/or grandparents' frequency of participation in community activities when the respondent was a child (*parents_exp*) is used as an instrumental variable. The following equation is estimated in the first stage.

$$community\_act = \gamma_0 + \gamma_1 \cdot parents\_exp + \delta_1 \cdot x_1 + \delta_2 \cdot x_2 + \delta_3 \cdot x_3 + \cdots + \delta_n \cdot x_n + \mu$$

…(2)

How parents and/or grandparents were involved in community activities would affect what

[4] The index of self-reported evaluation of health status is a five-level variable based on the answers to the question "How do you feel about your health at present?". The response to the question has five levels; "healthy," "somewhat healthy," "undecided," "somewhat unhealthy," and "not healthy." To determine if there are people who can be relied upon, the responses to the question "How much do you think you can rely on your neighbors, family members, relatives, friends and acquaintances (outside of the workplace), and coworkers to help you with problems and concerns in your daily life?" are used. On the basis of the answers, a dummy variable takes 1 if respondents answer "much dependable" for any one of them and takes 0 if not.

their children and grandchildren experienced and learned. In families where both parents and grandparents actively participate in community activities, there are more opportunities to be exposed to community activities, and this is thought to increase the awareness of being involved in their community and enhance their motivation to join communal activities. However, how their parents and/or grandparents were involved in community activities in their childhood does not have a direct relationship with their current subjective well-being. This idea causes me to exploit this variable as an instrumental variable.

The *questionnaire survey* includes questions about the respondents' childhood, asking to what extent their parents and grandparents participated in community activities. Respondents were asked to select one of six options: "actively participated," "participated to some extent," "cannot say either way," "did not participate much," "did not participate at all," or "don't know."

In the estimation, "actively participated" is defined as 5, "participated to some extent" as 4, "cannot say either way" as 3, "did not participate much" as 2, and "did not participate at all" as 1[5].

The descriptive statistics of the variables used in our estimation are shown in Table 1.

3. Estimation result and robustness

3.1. Estimation result

The results of estimation by the ordinary least squares are shown in columns 1 and 3 of Table 2, the results of estimation by the two-stage least squares are shown in columns 2 and 4.

The coefficient of the female dummy is significantly positive. The difference in subjective well-being by gender has been pointed out in existing studies (Blanchflower and Oswald, 2000; Alesina et al., 2004; Blanchflower and Oswald, 2008), and our results are consistent with existing findings. As for age, the 60s, 70s, and ≥80s dummies are significantly positive in both cases of current happiness and life satisfaction. For current happiness, the dummy for 30s is significantly positive for estimation using the instrumental variable method, and for life satisfaction, the dummies for 20s and 30s are significantly positive as shown in columns 3 and 4 of Table 2. A U-shaped relationship between age and subjective well-being is pointed out by existing studies (Blanchflower and Oswald, 2008; Blanchflower, 2009), and this study obtains the same result.

Concerning the respondents' relationships with their families and others, the subjective well-being of married people is higher than that of unmarried people, and this tendency is the same even if the respondents have been separated or widowed. In contrast, whether respondents have children is not significant when either current happiness or life satisfaction is used as a dependent variable. Whether respondents have a dependable person is significantly positive at the 1% level in all cases, indicating that the level of subjective well-being is higher when there is a dependable person among

[5] The answer "don't know" is treated as a missing value.

family, friends or neighbors.

The self-reported evaluation of one's overall health status is a 5-point rating of one's current state of health, which is also significantly positive (see columns 1 – 4 of Table 2). It is consistent with existing studies that people who feel they are in good health have higher levels of well-being.

The level of subjective well-being of those who have not graduated from high school is significantly lower compared with that of those who have graduated from high school. However, the coefficient of higher education is not significant, indicating that the level of subjective well-being of those who have graduated from college is not different from that of those who have graduated from high school. Regarding employment status, students, housewives and others have a higher level of well-being compared with regular workers. The level of subjective well-being is lower when annual income is low, and increases with higher annual income. Although the relationship between financial assets and happiness is not as clear as that for annual income, subjective well-being decreases when financial assets are ≤ 2 million yen and increases when financial assets are ≥15 million yen.

For the aforementioned variables, the results are generally similar whether current happiness or life satisfaction is used in the estimations as a dependent variable, and the conclusion does not change depending on the estimation method.

The coefficients of participation in community activities are significantly positive in all cases. As shown in Table 2, however, the coefficients are larger in columns 2 and 4 than in columns 1 and 3. For current happiness, the estimated coefficient using the ordinary least squares method is 0.244, whereas that of the instrumental variable method is 0.869, indicating a large change. This suggests that the effect of participation in community activities on subjective well-being might be underestimated in the ordinary least squares method. This impact is also larger than the effect of higher income, which is the effect of changing the income bracket from 4–6 million yen to ≥ 15 million yen (0.452).

The F-value in the first stage estimation is quite large, and the null hypothesis that participation in community activities is an exogenous variable is rejected at the 1% level of significance in column 2 and at the 10% level of significance in column 4, respectively. These results indicate that the instrumental variable used in these estimations seem to be appropriate.

Thus, participation in community activities increases a person's subjective well-being, and the magnitude of this effect is not small compared with that of an increase in household income. This indicates that communal participation plays an important role in improving individuals' level of well-being.

3.2. Additional verification for robustness

To confirm the robustness of the aforementioned results requires verifying the influence of missing variables and reverse causality of household income.

As stated by Dolan et al. (2008), various variables may have an impact on the level of well-being and individual's personality is included in them. Although it is not easy to consider individual's personality properly as an independent variable, if this factor is correlated with other independent variables and is not considered in estimation, it may cause endogeneity. Therefore, adding such factors in the estimation helps to deal with this problem.

The *questionnaire survey* includes the following questions regarding the respondents' risk attitude and time preference. Regarding risk attitudes, the question is "Suppose you can choose between 'receiving 60,000 yen for sure' or 'drawing a lottery that will give you 120,000 yen if you win, but not if you miss'. The lottery contains three winners out of ten. In this case, would you draw the lottery or not draw the lottery and receive 60,000 yen?." From the answers, dummy variable that takes 1 if the respondent choose that he/she will draw a lottery and takes 0 if not is created. As for time preference, the respondents are asked to answer the question "Which would you choose, to receive 60,000 yen today or to wait until a week later to receive 60,050 yen?." By using the answers, another dummy variable that takes 1 if the respondent answers that he/she will receive 60,000 yen today and takes 0 if not is created. These two dummy variables are added in the estimation.

In addition to these personality-related variables, two other factors are also considered, namely, social capital and the living environment of the area where the respondent resides. Helliwell (2003) and Helliwell and Putnam (2004) have shown that generalized trust in others has a positive effect on life satisfaction and happiness. It is a typical indicator of social capital. In contrast, participation in community activities is also used as a variable for social capital (see Putnam, 2000; Scrivens and Smith, 2013). Therefore, the aforementioned results may be obtained as a proxy variable for social capital. In the *questionnaire survey*, the question "Generally speaking, do you think that most people can be trusted, or that you can't be too careful in dealing with people?," which is used in the World Values Survey, is included. The answer is used as an indicator of generalized trust in the following estimation.

The questions relating to respondents' living environment are also included in the *questionnaire survey*, and respondents are asked to select one of 5 options: "very dissatisfied," "somewhat dissatisfied," "neither dissatisfied nor satisfied," "somewhat not dissatisfied," or "not dissatisfied at all." Because dissatisfaction with the local living environment is thought to have a particular impact on life satisfaction, the responses to the following three items are considered: "lack of liveliness and bustle," "low standard of public safety," and "too much garbage and illegal dumping on the streets."

Table 3 presents the estimation results. As for the added variables, risk attitude is not significant except in column 3 and time preference is not significant in all columns of Table 3. Thus, economic propensity of respondents does not seem to be related to one's well-being. Notably, generalized trust is significant at the 1% level, and the sign of the coefficient is positive. For the

variables related to living environment, the results for the lack of liveliness and bustle and the garbage and illegal dumping on the streets are significant at the 1% level. The value of these variables is larger as the level of dissatisfaction is low, indicating that there is a positive relationship between satisfaction of living environment and subjective well-being, which is considered to be a reasonable result. Concerning public safety, although the coefficient is not significant when life satisfaction is used as dependent variable, the result is significant at the 5% level in the least squares estimation and at the 10% level in the estimation using the instrumental variable method when current happiness is used.

The coefficients of participation in community activities are slightly smaller compared with that shown in table 2, but still significant at the 1% level. These results suggest that the impact of communal participation on subjective well-being is robust and people with high social capital could enhance his/her well-being by participating in community activities.

As for the reverse causality of household income, another approach is attempted. High level of subjective well-being may increase a person's productivity and in turn lead to an increase in his/her income (see Powdthavee, 2010). If this causes the endogeneity problem, a person's own income is mainly affected by the reverse causality.

In the *questionnaire survey*, respondents were also asked about personal income alongside their household income. On the basis of their answers, it is possible to separate the respondent's own income from their household income. By using this result, I attempt to conduct the same regression in table 2 only for those who do not have their own income. Here, household income is a variable that is exogenously determined for the target sample, and thus is less likely to cause endogeneity problem. Furthermore, the income of co-residents might be a candidate as an instrumental variable because it is exogenous and correlated with household income.

The results for those without personal incomes are shown in columns 1 and 3 of Table 4. Columns 2 and 4 of Table 4 show that when co-residents' income is used as an instrumental variable[6]. In both cases, communal participation is significant at the 10%, 5% or 1% level, and the coefficient for income is also significant and positive. In columns 1 and 3 of Table 4, the coefficient for participation is larger than 1, showing quite huge impact on his/her subjective well-being. The reason of this result may be because most of the people with no income are already retired or engaged in housework and participation in community activities is an important means of self-realization and forming outside connections, and it has huge impact on personal well-being.

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[6] In Table 4, in order to treat household income as cardinal numbers in estimation, the log of the median of each income class is used. For example, the value of the income class of 2–4 million is 1.0986 (=ln (3)). However, regarding the income class of ≥ 15 million yen, the median cannot be defined. Regarding the income class of < 2 million, the average income of this class is different from the median based on the 2017 Family Income and Expenditure Survey of Japan. Therefore, average household income of these income classes reported by the 2017 Family Income and Expenditure Survey of Japan is used.

4. External effect of community activities

The aforementioned result indicates that participation in community activities increases the subjective well-being of participants. Inaba et al. (2015) and Aminzadeh et al. (2013) pointed out that the level of neighborhood residents' involvement in community activities has a positive impact on individuals' subjective well-being by using a multi-level analysis approach. This implies that external effects of community activities may exist.

The *questionnaire survey* asks what kind of community activities are being conducted in the area where respondents live, and the option of "no community activities are being conducted or I don't know whether or not community activities are being conducted" is a possible answer. From the answers, it is possible to divide non-participants into those who live in areas where community activities are conducted and those in areas where activities are not conducted (including the cases respondents are not aware of community activities). By using this, a dummy variable can be created in which those who answer "no community activities are conducted or I don't know whether or not community activities are being conducted" are set to 0 and the rest are set to 1. By including this as the explanatory variable, it can be verified whether or not people living in areas with community activities show higher level of well-being.

Table 5 presents the results of estimation. The ordinary least squares method is used in the estimation under the assumption that the endogeneity problem does not arise because all the people included in the sample are non-participants. Columns 2 and 4 of Table 5 show the results when additional independent variables used in Table 3 are included in estimation.

Where current happiness is used as the dependent variable, the coefficient of recognition of community activities is significantly positive at the 1% level, and those who know that community activities are conducted have significantly higher level of current happiness than those who are unaware. As for life satisfaction, however, the results are different. In column 4 of Table 5, where the living environment is considered, recognition of local activities is not significant.

How do community activities increase the subjective well-being of those who are not involved? One possible explanation is that a community's living environment is improved through community activities and this improvement brings about higher well-being. The fact that the dummy variable relating to recognition of community activities is not significant when the variables regarding local living environment are used as independent variables may suggest that the improvement of the living environment around them has a positive impact on their life satisfaction.

Regarding current happiness, however, even taking into account the local living environment, being aware of community activities enhances a person's current happiness. This result may imply the existence of other external effect channels. Fowler and Christakis (2008) show that happiness can propagate to surroundings. On the basis of their discussion, it may be possible that

happiness can be transmitted from happy people to others even if they are not communal participants and that participation enhances the level of communal happiness by improving the local living environment and spreading happiness itself.

These results also indicate that community activities are not mere results of high levels of well-being and support that community activities impact people's well-being.

5. Conclusions

This study estimated the relationship between participation in community activities and subjective well-being by instrumental variable methods using parents' and grandparents' frequency of participation in community activities as instrumental variable. The results show a significant causal relationship between an individual's participation and subjective well-being, indicating that communal participation may increase an individual's level of well-being. Additionally, community activities have external effects; they may also increase the subjective well-being of non-participants through propagating a sense of well-being to others, alongside improving the living environment.

It is becoming more important to make communities better from a perspective of the level of happiness and satisfaction of residents. Clarifying what kind of initiatives increase the level of people's well-being has become an important challenge. The result that participation in community activities increases people's subjective well-being suggests the significance and importance of encouraging participation and supporting community activities as a policy initiative, as there is a growing trend to evaluate the wealth of countries and societies in terms other than economic aspects such as GDP. Furthermore, causal effects of community activities on people's subjective well-being suggest the validity to evaluate policy initiatives that support these activities from the perspective of people's well-being.

On the basis of this study's results, it can be suggested that for those who want to participate in community activities but are unable to do so because of work or family commitments, or for those who have not been able to participate because of a lack of opportunities or unwillingness to dealing with unfamiliar people, it may be possible to increase their subjective well-being by developing their environment that facilitates participation and encouraging them to join.

The analysis is based on an online questionnaire survey and contains several limitations. Endogeneity of participation in community activities is considered, but further verification of validity of the instrumental variable might be needed because the responses to how often parents and/or grandparents participated in community activities are based on subjective memories of respondents. Furthermore, there might be other variables that contain the problem of endogeneity in addition to participation and household income. Although it is not easy to conduct an experimental approach in

the field of community activities, further accumulation of evidence through various methods would be required.

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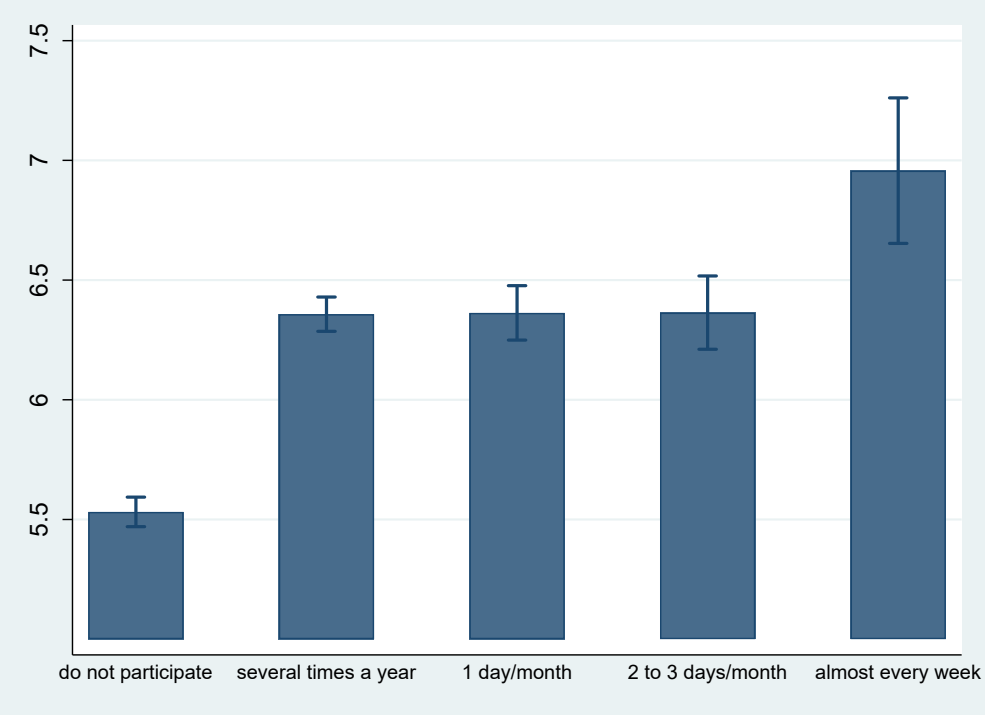
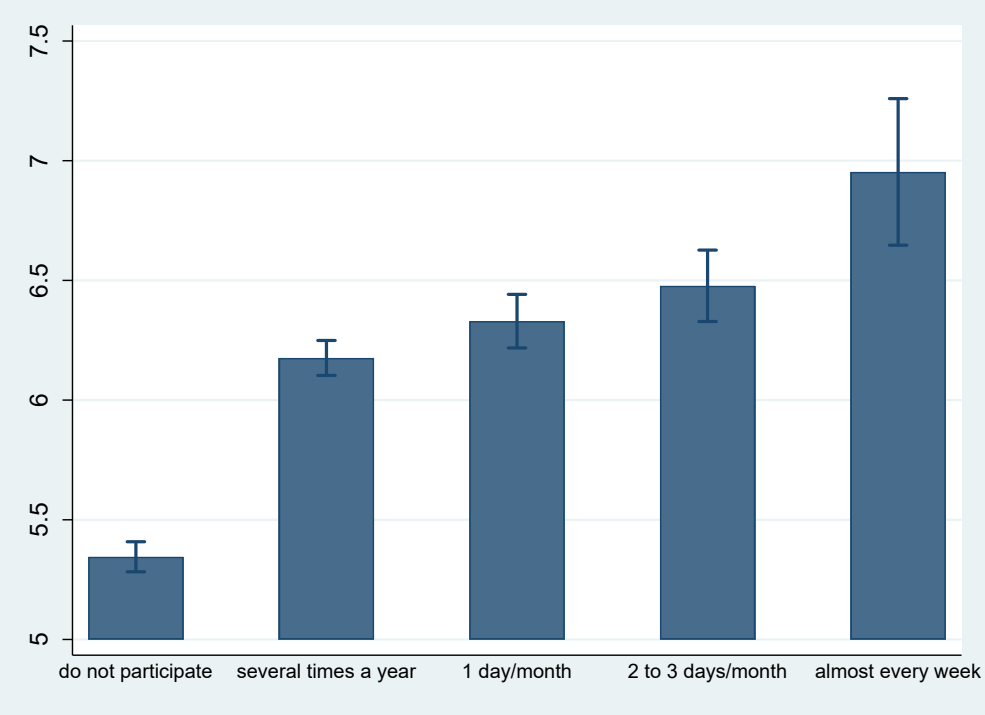


Note: The error bars show a 95% confidence interval for each mean.

Figure 1. Frequency of participation and current happiness



Note: The error bars show a 95% confidence interval for each mean.

Figure 2. Frequency of participation and life satisfaction

Table 1. Descriptive statistics

	Number of obs.	Mean	Std. Dev.	Min	Max
Current happiness	11,371	5.940	2.312	0	10
Life satisfaction	11,371	5.794	2.352	0	10
Community act	11,371	0.477	0.499	0	1
Parents_exp	10,112	3.461	1.110	1	5
Gender(female = 1)	11,371	0.392	0.488	0	1
Age					
20s	11,371	0.044	0.205	0	1
30s	11,371	0.215	0.411	0	1
40s – reference –	11,371	0.190	0.393	0	1
50s	11,371	0.190	0.392	0	1
60s	11,371	0.251	0.434	0	1
70s	11,371	0.096	0.295	0	1
≥ 80s	11,371	0.013	0.113	0	1
Spouse					
Unmarried – reference –	11,371	0.249	0.432	0	1
Married	11,371	0.681	0.466	0	1
Separated	11,371	0.049	0.217	0	1
Widowed	11,371	0.020	0.142	0	1
Children	11,371	0.610	0.488	0	1
Dependable person	7,267	0.350	0.477	0	1
Self-rated health status	11,371	3.606	1.107	1	5
Education					
Less than high school graduate	11,371	0.022	0.147	0	1
High school graduate and other – reference –	11,371	0.461	0.498	0	1
College graduate and above	11,371	0.517	0.500	0	1
Employment status					
Student, housewife, househusband, retired	11,371	0.345	0.476	0	1
Employee – reference –	11,371	0.524	0.499	0	1
Self-employed	11,371	0.071	0.258	0	1
Independent professional	11,371	0.027	0.161	0	1
Worker at Family business	11,371	0.008	0.089	0	1
Other worker (without an employee relationship)	11,371	0.025	0.155	0	1
Household income					
< 2	11,371	0.139	0.346	0	1
2 – 4	11,371	0.256	0.437	0	1
4 – 6 – reference –	11,371	0.244	0.429	0	1
6 – 8	11,371	0.159	0.366	0	1
8 – 10	11,371	0.101	0.302	0	1
10 – 15	11,371	0.075	0.264	0	1
≥ 15	11,371	0.026	0.158	0	1

Household financial assets					
< 2	11,371	0.280	0.449	0	1
2 – 4	11,371	0.152	0.359	0	1
4 – 6 – reference –	11,371	0.121	0.326	0	1
6 – 8	11,371	0.075	0.263	0	1
8 – 10	11,371	0.078	0.268	0	1
10 – 15	11,371	0.079	0.270	0	1
≥ 15	11,371	0.215	0.411	0	1

Table 2. Estimation results

Dependent variable	Current happiness		Life satisfaction	
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)
Community act	0.245 (0.049) ***	0.870 (0.240) ***	0.341 (0.050) ***	0.778 (0.245) ***
Gender (female = 1)	0.288 (0.055) ***	0.309 (0.058) ***	0.346 (0.057) ***	0.344 (0.060) ***
Age				
20s	0.155 (0.141)	0.216 (0.146)	0.363 (0.149) **	0.486 (0.155) ***
30s	0.112 (0.074)	0.132 (0.078) *	0.149 (0.077) *	0.172 (0.081) **
40s – reference –	–	–	–	–
50s	0.108 (0.075)	0.082 (0.079)	0.105 (0.077)	0.084 (0.081)
60s	0.776 (0.075) ***	0.713 (0.080) ***	0.783 (0.076) ***	0.743 (0.082) ***
70s	1.115 (0.098) ***	0.944 (0.114) ***	1.160 (0.098) ***	1.018 (0.115) ***
≥ 80s	1.074 (0.215) ***	0.979 (0.233) ***	1.089 (0.215) ***	0.924 (0.232) ***
Spouse				
Unmarried – reference –	–	–	–	–
Married	0.879 (0.083) ***	0.771 (0.091) ***	0.870 (0.083) ***	0.783 (0.092) ***
Separated	0.311 (0.134) **	0.276 (0.141) *	0.318 (0.135) **	0.262 (0.141) *
Widowed	0.421 (0.202) **	0.451 (0.216) **	0.484 (0.194) **	0.527 (0.207) **
Children	0.002 (0.070)	-0.055 (0.078)	-0.050 (0.069)	-0.077 (0.076)
Dependable person	0.808 (0.049) ***	0.761 (0.054) ***	0.679 (0.051) ***	0.636 (0.055) ***
Self-rated health status	0.645 (0.024) ***	0.626 (0.027) ***	0.624 (0.025) ***	0.612 (0.027) ***
Education				
Less than high school graduate	-0.484 (0.185) ***	-0.476 (0.197) **	-0.271 (0.177)	-0.233 (0.189)
High scool graduate and other – reference –	–	–	–	–
College graduate and above	-0.048 (0.049)	-0.059 (0.052)	0.062 (0.050)	0.062 (0.053)
Employment status				
Student, housewife, househusband, retired	0.121 (0.060) **	0.169 (0.064) ***	0.088 (0.062)	0.154 (0.065) **
Employee – reference –	–	–	–	–
Self-employed	0.069 (0.092)	-0.030 (0.096)	-0.098 (0.099)	-0.159 (0.103)
Independent professional	0.273 (0.151) *	0.323 (0.160) **	0.126 (0.162)	0.150 (0.171)
Worker at family business	-0.291 (0.310)	-0.431 (0.333)	-0.383 (0.294)	-0.523 (0.314) *
Other worker (without an employee relationship)	0.357 (0.168) **	0.480 (0.166) ***	0.065 (0.178)	0.251 (0.179)
Household income				
2 <	-0.353 (0.088) ***	-0.379 (0.094) ***	-0.242 (0.089) ***	-0.301 (0.095) ***
2 – 4	-0.170 (0.066) **	-0.221 (0.070) ***	-0.156 (0.068) **	-0.228 (0.072) ***
4 – 6 – reference –	–	–	–	–
6 – 8	0.065 (0.071)	0.084 (0.074)	0.098 (0.074)	0.109 (0.077)
8 – 10	0.207 (0.087) **	0.194 (0.090) **	0.248 (0.088) ***	0.219 (0.090) **
10 – 15	0.290 (0.090) ***	0.332 (0.096) ***	0.349 (0.094) ***	0.371 (0.099) ***
≥ 15	0.401 (0.155) ***	0.452 (0.160) ***	0.639 (0.150) ***	0.673 (0.155) ***
Household financial assets				
2 <	-0.206 (0.082) **	-0.171 (0.089) *	-0.378 (0.084) ***	-0.353 (0.091) ***
2 – 4	-0.051 (0.087)	-0.066 (0.092)	-0.092 (0.089)	-0.111 (0.093)
4 – 6 – reference –	–	–	–	–
6 – 8	0.108 (0.101)	0.067 (0.107)	0.153 (0.102)	0.120 (0.106)
8 – 10	0.047 (0.102)	0.017 (0.106)	0.044 (0.102)	0.029 (0.106)
10 – 15	0.159 (0.098)	0.121 (0.102)	0.052 (0.105)	0.038 (0.108)
≥ 15	0.330 (0.083) ***	0.279 (0.087) ***	0.296 (0.085) ***	0.248 (0.088) ***
Constatnt	2.039 (0.150) ***	2.043 (0.162) ***	1.941 (0.156) ***	1.970 (0.167) ***
Adj-R^2	0.314	–	0.296	–
First-stage partial R^2	–	0.054	–	0.054
First-stage F statistic	–	394.587	–	394.587
Endogeneity test	–	7.376 (0.007)	–	3.042 (0.081)
Number of obs.	7,267	6,496	7,267	6,496

Notes: Robust standard errors are shown in parentheses.

***, **, and * indicate significance at 1%, 5% and 10% levels, respectively.

The endogeneity test reports the robust score test by Wooldridge (1995). P-values are shown in parenthis.

The results of prefecture dummies and population size dummies are omitted.

Table 3. Estimation results (verification of robustness)

Dependent variable	Current happiness				Life satisfaction			
	OLS		2SLS		OLS		2SLS	
	(1)		(2)		(3)		(4)	
Community act	0.238	(0.048) ***	0.820	(0.247) ***	0.323	(0.050) ***	0.691	(0.252) ***
Gender (female = 1)	0.281	(0.054) ***	0.293	(0.058) ***	0.343	(0.056) ***	0.332	(0.060) ***
Age								
20s	0.191	(0.137)	0.258	(0.142) *	0.379	(0.146) ***	0.509	(0.152) ***
30s	0.118	(0.073)	0.141	(0.076) *	0.149	(0.076) *	0.176	(0.080) **
40s – reference –	–		–		–		–	
50s	0.051	(0.074)	0.035	(0.078)	0.047	(0.077)	0.035	(0.080)
60s	0.675	(0.075) ***	0.636	(0.080) ***	0.688	(0.076) ***	0.670	(0.081) ***
70s	0.950	(0.098) ***	0.817	(0.113) ***	0.998	(0.098) ***	0.893	(0.113) ***
≥ 80s	0.958	(0.219) ***	0.895	(0.238) ***	0.968	(0.215) ***	0.833	(0.233) ***
Spouse								
Unmarried – reference –	–		–		–		–	
Married	0.896	(0.081) ***	0.804	(0.089) ***	0.888	(0.082) ***	0.820	(0.090) ***
Separated	0.322	(0.131) **	0.288	(0.138) **	0.328	(0.132) **	0.278	(0.138) **
Widowed	0.443	(0.194) **	0.471	(0.206) **	0.502	(0.188) ***	0.541	(0.199) ***
Childen	-0.020	(0.068)	-0.074	(0.076)	-0.074	(0.067)	-0.096	(0.074)
Dependable person	0.701	(0.049) ***	0.655	(0.054) ***	0.579	(0.050) ***	0.540	(0.055) ***
Subjective health	0.600	(0.024) ***	0.588	(0.026) ***	0.580	(0.025) ***	0.573	(0.027) ***
Education								
Less than high school graduate	-0.441	(0.185) **	-0.448	(0.197) **	-0.238	(0.175)	-0.208	(0.187)
High scool graduate and other – reference –	–		–		–		–	
College graduate and above	-0.063	(0.048)	-0.074	(0.051)	0.045	(0.049)	0.046	(0.052)
Employment status								
Student, housewife, househusband, etc.	0.096	(0.059)	0.137	(0.063) **	0.066	(0.061)	0.124	(0.064) *
Employee – reference –	–		–		–		–	
Self-employed	0.128	(0.090)	0.031	(0.094)	-0.039	(0.097)	-0.096	(0.101)
Independent professional	0.292	(0.148) **	0.334	(0.157) **	0.149	(0.157)	0.167	(0.166)
Worker at family business	-0.408	(0.303)	-0.536	(0.324) *	-0.486	(0.291) *	-0.610	(0.310) **
Other worker (without an employee relationship)	0.325	(0.168) *	0.425	(0.166) **	0.031	(0.178)	0.197	(0.179)
Household income								
2 <	-0.327	(0.087) ***	-0.361	(0.092) ***	-0.219	(0.088) **	-0.285	(0.093) ***
2 – 4	-0.157	(0.065) **	-0.208	(0.069) ***	-0.140	(0.067) **	-0.211	(0.070) ***
4 – 6 – reference –	–		–		–		–	
6 – 8	0.060	(0.070)	0.079	(0.073)	0.095	(0.073)	0.104	(0.076)
8 – 10	0.195	(0.085) **	0.182	(0.088) **	0.238	(0.087) ***	0.211	(0.089) **
10 – 15	0.263	(0.088) ***	0.309	(0.093) ***	0.320	(0.092) ***	0.347	(0.096) ***
≥ 15	0.391	(0.156) **	0.435	(0.160) ***	0.629	(0.150) ***	0.656	(0.154) ***
Household financial assets								
2 <	-0.184	(0.080) **	-0.149	(0.087) *	-0.350	(0.083) ***	-0.325	(0.089) ***
2 – 4	-0.051	(0.086)	-0.065	(0.090)	-0.090	(0.088)	-0.107	(0.091)
4 – 6 – reference –	–		–		–		–	
6 – 8	0.087	(0.098)	0.053	(0.104)	0.133	(0.100)	0.106	(0.104)
8 – 10	0.046	(0.100)	0.026	(0.103)	0.043	(0.100)	0.041	(0.103)
10 – 15	0.151	(0.097)	0.104	(0.101)	0.050	(0.104)	0.029	(0.107)
≥ 15	0.323	(0.082) ***	0.274	(0.085) ***	0.296	(0.084) ***	0.252	(0.087) ***
Risk attitude	-0.055	(0.069)	-0.119	(0.075)	0.127	(0.068) *	0.079	(0.075)
Time preference	0.027	(0.051)	0.036	(0.054)	-0.006	(0.053)	0.009	(0.055)
Generalized trust	0.092	(0.014) ***	0.076	(0.016) ***	0.093	(0.015) ***	0.085	(0.017) ***
Local living environment								
Lack of liveliness and bustle	0.163	(0.028) ***	0.182	(0.029) ***	0.152	(0.028) ***	0.167	(0.030) ***
Low standard of public safety	0.085	(0.035) **	0.072	(0.037) *	0.048	(0.036)	0.035	(0.038)
Garbage and illegal dumping on the streets	0.121	(0.033) ***	0.124	(0.036) ***	0.157	(0.034) ***	0.157	(0.036) ***
Constant	0.518	(0.188) ***	0.562	(0.199) ***	0.455	(0.194) **	0.497	(0.206) **

Adj-R^2	0.334	—	0.315	—
First-stage partial R^2	—	0.050	—	0.050
First-stage F statistic	—	358.353	—	358.353
Endogeneity test	—	5.885 (0.015)	—	1.936 (0.164)
Number of obs.	7,267	6,496	7,267	6,496

Notes: Robust standard errors are shown in parentheses.
***, **, and * indicate significance at 1%, 5% and 10% level, respectively.
The endogeneity test reports the robust score test by Wooldridge (1995). P-values are shown in parenthis.
The results of prefecture dummies and population size dummies are ommited.

Table 4. Estimation results (endogeneity of household income)

Dependent variable	Current happiness		Life satisfaction	
	2SLS	2SLS	2SLS	2SLS
	(1)	(2)	(3)	(4)
Community act	1.412 (0.721) *	0.884 (0.240) ***	1.731 (0.722) **	0.801 (0.245) ***
ln (Household income)	0.481 (0.135) ***	0.240 (0.071) ***	0.415 (0.131) ***	0.174 (0.071) **
First-stage partial R^2 (parents_exp)	0.062	0.054	0.062	0.054
First-stage partial R^2 (co-resifents' income)	—	0.406	—	0.406
First-stage F statistic (parents_exp)	61.057	198.949	61.057	198.949
First-stage F statistic (co-residents' income)	—	1707.550	—	1707.550
Eendogeneity test	3.223 (0.073)	5.359 (0.005)	4.980 (0.026)	6.745 (0.001)
Number of obs.	814	6,496	814	6,496

Notes: Robust standard errors are shown in parentheses.
***, **, and * indicate significance at 1%, 5% and 10% levels, respectively.
The endogeneity test reports the robust score test by Wooldridge (1995). P-values are shown in parenthis.
The results of other variables are ommited.

Table 5. Estimation results (external effect)

Dependent variable	Current happiness		Life satisfaction	
	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Recognition of community activities	0.317 (0.069) ***	0.259 (0.068) ***	0.142 (0.071) **	0.081 (0.071)
Local living environment				
Lack of liveliness and bustle	—	0.164 (0.041) ***	—	0.132 (0.043) ***
Low standard of public safety	—	0.120 (0.051) **	—	0.074 (0.053)
Garbage and illegal dumping on the streets	—	0.105 (0.050) **	—	0.154 (0.053) ***
Adj-R^2	0.324	0.350	0.287	0.313
Number of obs.	3,743	3,743	3,743	3,743

Notes: Robust standard errors are shown in parentheses.
***, **, and * indicate significance at 1%, 5% and 10% levels, respectively.
The results of other variables are ommited.