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Impacts of two dimensional poverty on daily recreational activities in Japan

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Abstract

Many empirical results of studies suggest that people who actively engage in recreational activities are more likely to show better health status and well-being. Income is also an important factor determining the level of a person's health because lower income often acts as a barrier to access to resources that enhance health. Nevertheless, some recent studies have found that not only low income, but also lack of time used for family life will engender higher risks of illness, partly because the probability of participating in physically active leisure activities such as doing sports decreases.

The present study specifically examines relations between income and time poverty, and daily recreational activities. From the estimation results, we observed that both income and time poverty is highly associated with low frequency of reading for men and women. Both poverty dimensions can be considered to influence reduced well-being through less leisure activity. Policy reforms must be done with the knowledge that labor, time, and resources are all required for individuals to survive, to care for their families and to enhance their well-being.

Keywords: Income poverty, Physical Active Recreational Activity, Physical Stationary Recreational Activity, Time poverty

1. Introduction

Health benefits can be achieved by increasing one's amount of physical activity. Many empirical results of studies suggest that people who actively engage in physical activities are more likely to show better health status and well-being (Bise et al., 2007; Balboa-Castilo et al., 2011; Galan et al., 2013).

Income is also an important factor determining the level of a person's health because lower income often acts as a barrier to access to resources that enhance health. Nevertheless, some recent studies have found that not only low income, but also lack of time used for family life will engender higher risks of illness, partly because the probability of participating in physically active recreational activities such as doing sports

decreases.

For instance, according to current trends in Canada, economic development has caused a decrease in the amount of leisure time of Canadians in general, presenting severe social policy implications (Spinney and Millward, 2010, p.342). Spinney and Millward (2010) report that time poverty is more important than income poverty as a barrier to regular physical activity. Kalenkoski et al. (2013) pointed out similar points. They demonstrated that time-poor individuals are less likely to engage in active travel using American Time Use Survey data.

Ishii and Urakawa (2014) found that in Japan, some household types, especially single parents with children and double-income couples with children, are now confronting a lack of time. Time poverty, a situation in which people can have only insufficient time to engage in child care and housework as well as leisure and other basic activities such as sleeping, might prevent them from participating actively in daily physical activities.

However, few researchers have examined the association of time poverty and physical activity in Japan, although prolonged work of workers has become a central issue from an international standpoint (Wada et al., 2015). The present study specifically examines relations between income and time poverty, and physical activities using the household micro-dataset in Japan. Then this study estimates the effects of multiple poverty dimensions on the degree of daily recreational activities. By setting two dimensions of the poverty line, which consist of income and time, and by considering other socioeconomic factors, we can examine these hypotheses: (1) Income poverty decreases the frequency and intensity of costly daily recreational activities; (2) time poverty decreases the frequency and intensity of time-consuming daily recreational activities.

2. Literature review

In pioneering research into time poverty, Vickery (1977) added the concept of time to the conventional measure of poverty based on money (Ishii and Urakawa, 2014). Since then, not a few researchers have defined and calculated time poverty in various countries: Harvey and Mukhopadhyay (2007) for Canada; Burchardt (2010) for the United Kingdom and Kalenkoski, et al. (2011) for the United States.

Dounthitt (2000) compared alternative approaches to defining time and income poverty and discussed their potential role in antipoverty policies. In the case of Japan, by conducting an estimation of time poverty suggested by Vickery (1977) and Harvey and Mukhopadhyay (2007), Ishii and Urakawa (2014) demonstrated that the Japanese government must increase policy support particularly for families with small children.

However, only a few reports have described investigations of the associations of time poverty and individuals' physical activity or health-related behavior. Spinney and Millward (2010) examined the associations between time and income poverty and participation in structured and unstructured physical activities, but

other socioeconomic factors, such educational background and working conditions were not considered. Indeed, Kalenkoski and Hamrik (2013) estimated the correlation between time poverty and individuals' eating behavior, but the effects of multidimensional poverty were not considered in this study. In addition, longer commutes have been associated with less time spent for exercise and other health-related activities, and have been associated with substitution into lower-intensity exercise (Kalenkoski and Hamrik, 2013).

The concepts of multidimensional poverty have been applied to various fields of studies that examine health outcomes and health-related behaviors. For example, Oshio and Kan (2014) found that multiple dimensions of poverty are more useful to predict individuals' self-reported health using nationwide population survey in Japan. In addition, by application of the four dimensions of income, education, social protection and housing conditions, they suggest that multidimensional poverty affects individuals' smoking behavior.

The present study uses the household micro-datasets in Japan to examine how both income and time poverty affect engagement in physical activity. It analyzes how multidimensional poverty is associated with individuals' health-related behavior in Japan.

3. Analytical framework: two-dimensional poverty line based on income and time

This section explains the analytical framework used for this study with Vickery (1977) and Harvey and Mukhopadhyay (2007) as references: The framework is a two-dimensional poverty line based on income and time. Income poverty and time poverty are defined in the next paragraph.

Figure 1 presents a two-dimensional poverty line based on income and time. The vertical axis represents income and the horizontal axis time. M_0 is the income-poverty line representing the minimum income required. T_1 is the time-poverty line representing the minimum time necessary for household work. T_m , the largest value on the horizontal axis, expresses the available time, which, more specifically, is the value left after subtracting time spent for basic activities (sleeping, eating, taking personal care (excretion, bathing, getting dressed, etc.)) from the 24 hours of the day. The value left after subtracting T_1 from T_m is T_a . If actual working hours T_w (including commuting time) exceed T_a near the origin and encroach on the time-poverty line T_1 , then the household is regarded as time poor. Household work and market labor are assumed to be conducted by adult members of the household. Parameter values are the total time spent by the adults in the household. The values of all parameters, M_0 , T_m , T_1 , and T_a vary depending on the household type. Based on the two axes M_0 and T_1 , the diagram is divisible into four quadrants: the upper right area for "not poor," the lower right area for "income poor but not time poor," the upper left area for "not income poor but time poor," and the lower left area for "income poor and time poor."

Additionally, the area of "not income poor but time poor" is divisible into two types by assuming substitution of time with money such as the purchase of housework services (dining out, using childcare services, etc.). When drawing a curve with the slope of the cost of housework services from point E, at which the

income-poverty line and time-poverty line intersect, the intersection M_1 with the vertical axis is the minimum income necessary for outsourcing all necessary household labor. Households can be categorized into the range above the curve, in which households would not be income poor even if they purchased housework services to cover their time poverty (“not income poor after time adjustment”), and the range below the curve, in which households would be income poor if they purchased housework services (“income poor after time adjustment”).

(i). Setting an income-poverty line

Poverty lines are defined generally in two ways: one is an absolute definition; the other is a relative definition. For the absolute definition, the minimum amount necessary to maintain daily life (income in this case) is measured. The poverty line is determined based on that amount.

For the relative definition, however, the poverty line is determined by comparing households against the distribution of the focused variable (income in this case) in the entire society. The study applies the method generally used to determine a relative income-poverty line and set the poverty line at 50% of the median of the distribution of equivalent disposable income that incorporates the economies of scale based on differences in the number of household members. The equivalent scale is set at 0.5.

(ii). Setting a time-poverty line

Definitions of time vary among studies (Burchardt 2010; Kalenkoski 2011). Studies reported by Vickery (1977) and by Harvey and Mukhopadhyay (2007) and other studies define a time-poverty line (T_1 in Figure 1) as the minimum time necessary for housework. A household that is incapable of securing the minimum time required for housework because of long working hours in the market is considered time poor. The minimum time required for housework in this case means the least time needed for housework without outsourcing household chores such as cooking, washing, shopping (dining out or ordering food delivery, purchasing prepared food, using housework-related services in the market, etc.), and taking care of children, elderly people, or disabled people. Vickery (1977) used a living hour survey of time and defined the minimum time required for housework as the average time spent for housework at households with at least one full-time homemaker. Harvey and Mukhopadhyay (2007) followed this and calculated similar values from the Canadian General Social Survey. The studies used the average value of adults based on the living hour survey for time spent for basic activities (sleeping, eating, personal care (excretion, bathing, getting dressed, etc.)). More specifically, Vickery (1977) used 10.2 hours per day, the average time spent by adults for basic activities, based on the 1966 Michigan Time-use Survey of the United States. Harvey and Mukhopadhyay (2007) used 10.5 hours per day, the average time spent by adults for basic activities calculated from similar survey data of Canada. In addition, both studies considered the minimum necessary leisure time. Vickery (1977) concluded that such time is 10 hours per week. Harvey and Mukhopadhyay (2007) estimated it as 14 hours per week.

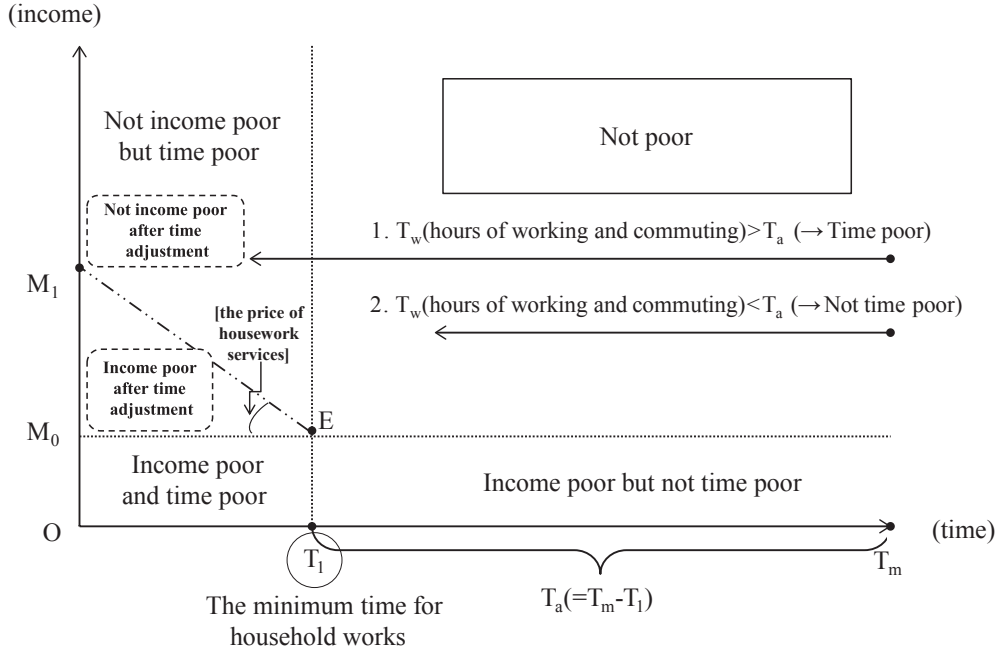


Figure 1: Outline of income poverty and time poverty.

(Note) Added to Ishii and Urakawa (2004).

Burchardt (2008, 2010) also defined time poverty from an absolute perspective. This study determined the minimum time required for basic activities using the values in earlier studies such as those by Vickery (1997), for childcare using the childcare guidelines of the United Kingdom, and those for housework by application of the average time spent for housework by households that did not outsource their housework.

The present study defines a time-poverty line using these studies as a reference. The specific procedure is to ascertain the time spent for basic activities (sleeping, eating, taking personal care (excretion, bathing, getting dressed, etc.)) and minimum time necessary for housework (T_1) using the 2011 Survey on Time Use and Leisure Activities of the Ministry of Internal Affairs and Communications (MIC) of Japan as a reference. The Survey on Time Use and Leisure Activities was conducted by the MIC once every five years to observe the distribution of living hours and major leisure time activities of Japanese people. The 2011 survey included participation by approximately 200,000 members aged 10 and older of approximately 83,000 households.

As the time spent for basic activities, the study used the average time spent in an entire week by men and women, separately, who were aged 20–64 years. The time for basic activities included 7.5 hours per day for men and 7.2 hours per day for women for sleeping, 1.1 hours per day for men and 1.5 hours per day for women for taking personal care, and 1.5 hours per day for men and 1.6 hours per day for women for eating. Following the example of earlier studies, this study further included the minimum leisure time required in

the basic activity time. This was assumed to be one hour per day from Monday through Friday and three hours per day on Saturdays and Sundays.

Because the minimum time required for housework (T_1) represents the least time necessary for housework without outsourcing the series of household chores such as cooking, washing, taking care of children, elderly people, or disabled people, and shopping (dining out or ordering food delivery, purchasing prepared food, using housework-related services in the market economy, etc.), for each household type to be analyzed, the study applied the average time spent for housework at households with at least one adult who did not work outside the home. More specifically, as a reference, the study used the time spent for housework at households with a husband working outside the home and wife not working outside the home for households comprising a married couple and children and households only of a married couple. For one-person households and single-parent households, the study applied the housework time of households without a member working outside the home. The housework activities include housework, nursing care, childcare, and shopping based on the Survey of Time Use and Leisure Activities. The average time spent for housework by men of one-person households is significantly shorter than in other households. Because many men living alone are likely to outsource much of their housework by, for instance, dining outside instead of cooking at home, the minimum housework time required at female one-person households was substituted for that at male one-person households.

Table 1 presents the time spent for basic activities and the minimum time required for housework (T_1) for each household type, as developed using the 2011 Survey on Time Use and Leisure Activities as a reference. As described later, the household types to be analyzed are consistent with those in the 2011 Survey on Time Use and Leisure Activities. The basic activity time and minimum time necessary for housework assumed in this study are smaller than the values used in earlier studies such as those conducted by Vickery (1977) and by Harvey and Mukhopadhyay (2007). The time-poverty line becomes lower for the difference. The likely reason is that, as revealed also by an international comparison made by the OECD (2011), the time spent by Japanese people for leisure and personal care is less than that in other countries. It is noteworthy that this time-poverty line reflects the conditions and customs of Japanese people.

4. Data used and hypotheses

4.1 Data

The survey we conducted was collected from a nationwide internet survey in Japan. It was designed and implemented in 2012 for a research project that investigated the socioeconomic determinants of subjective well-being. It was sponsored by the Japanese Society for the Promotion of Science (JSPS). We sent questionnaires to 8059 randomly selected people who were registered on the members' list of an internet survey institute. We obtained 6491 responses in all (response rate: 80.5%).

Table 1: Minimum time required for basic activities and housework by household types

(hours)	7 days (V) week	Essential time (T_e)			T_m ($V-T_e$) week	Minimum time required for the housework (T_1)					Disposal time T_a (T_m-T_1) week
		week	Leisure (weekday) day	Leisure (weekend) day		Housework day	Nursing/ Caring day	Childcare day	Shopping day	Total week	
Couple with children											
with children who are all older than 6	336	165.5	2.0	6.0	170.5	5.5	0.2	0.4	1.2	50.9	119.6
with one child younger than 6	336	165.5	2.0	6.0	170.5	4.0	0.1	5.0	1.1	71.3	99.2
with two or more children younger than 6	336	165.5	2.0	6.0	170.5	3.7	0.1	6.2	1.0	77.0	93.5
Vickery (1977)	336	162.8	2.0	5.0	173.2	-	-	-	-	62.0	111.2
Hervey et al. (2007)	336	175.0	4.0	4.0	161.0	-	-	-	-	74.6	86.4
Couple without children	336	165.5	2.0	6.0	170.5	4.3	0.1	0.1	1.1	39.4	131.1
Vickery (1977)	336	162.8	2.0	5.0	173.2	-	-	-	-	74.6	86.4
Single parent with children	168	83.2	1.0	3.0	84.8	3.5	0.1	1.1	1.0	39.3	45.5
Vickery (1977)	168	81.4	1.0	2.5	86.6	-	-	-	-	57.0	29.6
Hervey et al. (2007)	168	87.5	2.0	2.0	80.5	-	-	-	-	52.0	28.5
Male one-person household	168	82.3	1.0	3.0	85.7	2.3	0.1	0.0	0.6	21.2	64.5
Female one-person household	168	83.2	1.0	3.0	84.8	2.3	0.1	0.0	0.6	21.2	63.6
Vickery (1977)	168	81.4	1.0	2.5	86.6	-	-	-	-	31.0	55.6
Single person with parents	168	91	1.0	3.0	77	1.3	0.1	0.0	0.2	11.2	65.8

(Source) Survey on Time Use and Leisure Activities, 2011, Vickery (1977), Harvey and Mukhopadhyay (2007). Authors' calculations based on Ishii and Urakawa (2015).

The surveys elicited ample information related to individuals' subjective assessments of their own well-being, personal traits, demographic and socioeconomic status, and the frequency of several types of daily recreational activities. Many of them are useful for examination of the relation between income and time poverty and daily recreational activities.

To ensure that the sample was representative of the actual population, targeted proportions of 15 population groups were constructed, corresponding to a matrix of five age groups (20s, 30s, 40s, 50s, and 60s) and three household income classes (3 million yen or less, 3–6 million yen, and 6 million yen or more) in advance. They are based on two official statistical publications: The *Population Census* and the *Comprehensive Survey of Living Conditions of the People on Health and Welfare*. Samples were collected until the numerical targets were obtained¹⁾.

In the analysis, we drew 20–69 aged samples, and omitted the samples who didn't answer related questions and students. As a result, we use 5872 samples.

1) Yagi et al. (2016) used the same survey for the study on the relations between happiness and employment status.

4.2 Hypothesis

It has been demonstrated that some types of daily recreational activities such as doing sports are positively associated with personal health status. We set the following three hypotheses related to how the existence of income and time poverty affect daily recreational activities. Then we examine their validity.

- (i) Income poverty decreases the frequency and intensity of costly daily recreational activities.
- (ii) Time poverty decreases the frequency and intensity of time-consuming daily recreational activities.
- (iii) Negative effects of multiple poverty situations (income and time poverty) on daily recreational activities surpass the scale of the coefficient of each poverty situation.

4.3 Variables

Explained variable

To examine the validity of the hypotheses presented above, we used replies for the frequency and intensity of daily recreational activities consisting of four items as key dependent variables. We categorized these activities into two types, based mainly on the Saltin–Grimby Physical Activity Level Scale (SGPALS) originally established by Saltin and Grimby (1968). The first category is Physically Active Recreational Activity (PARA). This category mainly includes light, moderate, and vigorous physical activities such as cycling or walking to work, walking with family, gardening, fishing, playing tennis, bowling, swimming, and skiing. The second category is Physically Stationary Recreational Activity (PSRA). This category includes physically inactive and passive recreational activity. Reading, watching television, watching movie, using computers or doing other sedentary activities during leisure time are categorized into this type. This scale has good validity and reliability. It is often used by health science researchers (Aires et al., 2003).

By consideration of these two categories, our analysis uses the following three variables as PARA: doing sports, going to movie theaters, art museums, natural history museums, plays, etc. and gardening. Regarding the variables related to PSRA, we set the following two variables: reading books and watching DVDs or other types of videos.

The concrete contents of questionnaires related to daily recreational activities are the following.

[Question]

“Now we will ask you a question about your hobbies and pastimes. How often in the past year have you engaged in each of the hobbies and pastimes listed below?”

[List]

Doing sports activities, going to movie theaters, art museums, natural history museums, plays, etc. and gardening (PARA)

Reading books, watching DVDs or other types of video, and sleeping (PSRA)

[Alternatives]

(1) A few times a week, (2) Once a week, (3) Once a month,

(4) A few times a year, (5) Hardly ever

(For doing sports activities)

(1) Almost daily, (2) A few times a week, (3) Once a week,

(4) Once a month, (5) Hardly ever

(For going to movie theaters, art museums, natural history museums, plays, etc., gardening, reading books, and watching DVDs or other types of video)

We produced a dummy variable for each activity showing inactive participation (hardly ever). Additionally, we set a dummy variable showing lack of sleep (below 6 hours per day).

Explaining Variable

Regarding key independent variables, as the preceding chapter has defined, dummy variables are made to reflect the situation of two-dimensional poverty (income and time poverty). In addition, dummy variables related to gender, age groups, and socioeconomic factors such as academic background, job status are included in this analysis to control the effects of other important factors, based on the previous studies on socio economic factors of physical activity (Breuer, et al., 2010; Brown and Roberts, 2011).

Table 2 presents basic characteristics of the samples used. The characteristics of the samples in Japan are given by gender. From the poverty category of the table, one can confirm that a certain amount of difference exists related to gender gaps of poverty level. That difference might reflect differences of the labor participation rate and the employment of women in Japan. Regarding the household type, about 70% of respondents were residents of households with a spouse. In addition, age distributions do not differ much among age classes.

These descriptive statistics reflect that 15.7% of individuals in the total sample were categorized as income poor but not time poor. Actually, 17.2% of female respondents were classified as having income poverty, which is higher than that of male respondents (14.7%). However, the results of the ratio of time poor but not income poor shows that men (9.4%) were more likely to be time poor than women (5.9%), perhaps because of their greater full-time labor force participation (54.6%). However, the ratio of women who has not

Table 2: Basic statistics of the samples used

	All (n=5872)		Male (n=3447)		Female (n=2425)	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Mariage						
Married dummy	67.2%	0.47	68.1%	0.47	65.9%	0.47
Widow/divorce dummy	6.5%	0.25	5.2%	0.22	8.4%	0.28
Single dummy	26.3%	0.44	26.7%	0.44	25.7%	0.44
Children						
No child	40.2%	0.49	39.1%	0.49	41.7%	0.49
Having children (less than 6)	11.9%	0.32	10.8%	0.31	13.6%	0.34
Having children (be equal to or more than 6)	47.9%	0.50	47.9%	0.50	50.1%	0.50
Age						
20s dummy	11.7%	0.32	7.1%	0.26	18.1%	0.39
30s dummy	22.8%	0.42	22.4%	0.42	23.3%	0.42
40s dummy	21.1%	0.41	20.9%	0.41	21.2%	0.41
50s dummy	27.6%	0.45	28.0%	0.45	27.1%	0.44
60s dummy	16.8%	0.37	21.6%	0.41	10.2%	0.30
Working conditions						
Full time employed	40.4%	0.49	54.6%	0.50	20.2%	0.41
Part time employed	24.4%	0.43	19.2%	0.39	31.7%	0.47
Self employed	9.0%	0.29	12.6%	0.33	4.0%	0.20
No work	26.2%	0.44	13.6%	0.34	44.0%	0.50
Householders' educational level						
High school graduate	27.5%	0.45	26.3%	0.44	29.2%	0.45
Two-year college and technical school	22.1%	0.42	12.4%	0.33	35.9%	0.48
Four-year college and graduate school	50.3%	0.50	61.2%	0.49	34.8%	0.48
Poverty						
Income poverty (only one dimension)	15.7%	0.36	14.7%	0.35	17.2%	0.38
Time poverty (only one dimension)	8.5%	0.28	9.4%	0.30	5.9%	0.24
Two dimensional poverty	1.1%	0.10	1.1%	0.11	1.0%	0.10
Non poverty	74.7%	0.43	74.8%	0.44	75.9%	0.43
Daily reactional activity (inactive participation)						
Doing sports	47.2%	0.50	41.9%	0.49	54.7%	0.50
Visiting movie theaters, etc.	65.4%	0.48	67.1%	0.47	62.9%	0.48
Gardening	15.4%	0.36	71.1%	0.33	67.8%	0.40
Reading books	16.1%	0.40	12.4%	0.39	19.8%	0.41
Watching DVDs, etc.	33.9%	0.47	32.8%	0.47	35.4%	0.48
Lack of sleep	17.0%	0.38	17.6%	0.38	16.2%	0.37

(Note) All variable are dummy variables.

worked outside was much higher (44%) than the ratio of unemployed men (13.6%). For mixed two-dimensional poverty, no great difference can be found between men and women, only 1.1% of men and 1.0% of women reported both time and income poverty. In addition, women who are inactive in doing sports had a relative frequency of 54.7%, which is higher than men (41.9%). Women with inactivity of reading (19.8%) also reported a higher relative frequency than men (12.4%). However, ratios of men who were lacking sleep (17.6%) showed a higher relative frequency than women who sleep less than 6 hours per day (16.2%).

Table 3 shows income poverty and time poverty rates by household type. In general, income poverty is

Table 3: Poverty rates by household type

		Income poverty (not time poverty)	Time poverty (not income poverty)	Income and time poverty
H-type 1	Couple with children (older than 6)	9.4%	4.4%	0.3%
H-type 2	Couple with children (one child younger than 6)	15.4%	17.9%	1.4%
H-type 3	Couple with children (two or more children younger than 6)	11.6%	19.7%	1.8%
H-type 4	Couple without children	8.6%	3.0%	0.4%
H-type 5	Single parent household	38.2%	24.3%	3.7%
H-type 6	Single household (male)	23.0%	19.6%	2.4%
H-type 7	Single household (female)	30.9%	9.6%	2.0%
H-type 8	Households with unmarried persons living with parents	29.8%	9.0%	2.4%
	All	15.7%	8.5%	1.1%

higher in single-person households and single-parent households. Time poverty tends to be high in the order of single-parent households, couple with children (two or more children younger than 6), and single household (male). This is due to the fact that in these household types, the length of working hours and/or housework hours is high on average. The share of households in both income and time poverty is very low overall, but relatively high among single-parent households.

5. Econometric analysis

5.1 Analytical method

The study estimates normal probit and instrumental variable (IV) probit estimations to examine whether verified hypotheses related to the relation between daily recreational activities and multi-dimensional poverty are valid or not. The IV probit estimation is applied, considering the possibility that participating in sports improves longer-term labor productivity (Hyytinen and Lahtonen, 2013). For the present study, several dummy variables were set as candidates of instrumental variables for the income poverty dummy. These variables were checked using the Wald test to ascertain whether they have satisfactory validity.

The outline for three dummy variables showing instrument variables is the following: (1) linguistic skills, (2) communication skills, and (3) working experience. For linguistic skills and communication skills, the survey presented questions such as “from the items below, please select all things that you already have (including skills)”. We assigned one point for each answer result of linguistic skills and communication skills if respondents responded with them as “things that I already have”. For working experience, the survey presented the question of “how many years have you been working at your current place of employment?”, to which we assigned one point for respondents who answered “worked more than five years in the current workplace”.

5.2 Estimation Results

This section presents the results of empirical analysis of poverty and other socioeconomic effect on leisure daily activities. First, we selected three variables to describe physically active recreational activities (PARA): doing sports, going to movie theaters, art museums, natural history museums, plays, etc. and gardening. Second, we also selected two variables to describe physically stationary recreational activities (PSRA): reading books, and watching DVDs or other types of video.

Respondents were asked about their current condition of doing physical activities on a five-point scale (*a few times a week, once a week, once a month, a few times a year and hardly ever*) for doing sports and, (*almost daily, a few times a week, once a week, once a month, and hardly ever*) for going to movie theaters, art museums, natural history museums, plays, etc., gardening, reading, and watching DVDs. We constructed a binary variable of doing daily recreational activities less, to which we allocated 1 if the respondent answered *hardly ever*.

Thirdly, we considered sleeping less as indicators of health-related activity, and constructed the binary variable. For sleeping, an individual who sleeps fewer than 6 hours was regarded as sleeping less and was allocated to 1 in dummy variable for this indicator.

Table 4 presents results obtained from Probit and /IV probit models to estimate the socioeconomic effects on daily recreational activities. For inactive participation of sports activity, we first observe that, among poverty of three types, one-dimensional income poverty, and two-dimensional poverty (income and time poverty) are highly related with low frequency of doing sports. In addition, people who have low educational background, such as high school graduates and two-year college graduates and technical school graduates, are more likely to exercise less than others. Women also tend to do sports less than men do. From the cross terms of poverty dimension and female dummy, we can confirm that negative impact of two-dimensional poverty on sport participation is higher in the case of male than female.

Regarding the results for going to movie theaters, art museums, natural history museums, plays, etc., we noticed that one-dimensional income poverty positively affects a low frequency of visiting movie theaters, etc. Time poverty that female persons confront has the tendency of causing visiting movie theaters and others less compared to male. This trend was also confirmed in gardening activities. In addition, high educational background has a significant effect on the behavior of movie theaters, art museums, natural history museums, plays, etc.

For reading books, income poverty and two dimensional poverty situation are associated with the less reading activity. We also observed that women, younger Japanese people, and those with low educational level tend to read less than others. In addition, income poverty discouraged leisure activities such as watching movies, and time poverty affected not enough sleep.

Table 4: Probit / IV probit models: Factors on inactive participation of daily recreational activities

	(1)	(2)	(3)	(4)	(5)	(6)
	[PARA]			[PSRA]		
[Inactive participation (hardly ever)]	Doing sport	Visiting movie theaters, etc.	Gardening	Reading books	Watching DVDs, etc.	Lack of sleep
[Male (ref)]						
Female	0.199*** (0.0483)	-0.350*** (0.0496)	-0.309*** (0.0529)	0.103* (0.0553)	0.0145 (0.0497)	0.0744 (0.0569)
[Single (ref)]						
Married	0.00317 (0.0441)	0.220*** (0.0455)	-0.395*** (0.0506)	-0.224*** (0.0478)	0.0299 (0.0453)	-0.0561 (0.0515)
Divorced/Widow	0.191** (0.0775)	0.160** (0.0795)	-0.0186 (0.0856)	0.290*** (0.0820)	0.0337 (0.0787)	0.119 (0.0886)
[20s (ref)]						
30s	0.0858 (0.0629)	0.0690 (0.0649)	-0.131* (0.0762)	-0.290*** (0.0637)	0.00871 (0.0642)	-0.0319 (0.0734)
40s	0.0922 (0.0658)	-0.0134 (0.0679)	-0.283*** (0.0778)	-0.628*** (0.0686)	-0.0757 (0.0674)	0.0979 (0.0762)
50s	0.0164 (0.0650)	-0.173*** (0.0668)	-0.638*** (0.0757)	-1.006*** (0.0703)	0.0254 (0.0663)	0.00849 (0.0762)
60s	-0.267*** (0.0754)	-0.271*** (0.0777)	-1.102*** (0.0852)	-1.166*** (0.0854)	0.0666 (0.0765)	-0.0909 (0.0906)
[No work (ref)]						
Full-time employed	-0.0797 (0.0532)	-0.317*** (0.0551)	0.0154 (0.0575)	-0.220*** (0.0607)	-0.109** (0.0542)	0.343*** (0.0645)
Part-time employed	0.0610 (0.0506)	-0.134** (0.0526)	0.0377 (0.0538)	-0.0443 (0.0567)	-0.000629 (0.0510)	0.228*** (0.0618)
Self employed	-0.0596 (0.0631)	-0.178*** (0.0655)	-0.0265 (0.0663)	-0.138* (0.0746)	-0.103 (0.0643)	-0.0205 (0.0802)
[Four year college and graduate school (ref)]						
High school graduate	0.286*** (0.0407)	0.367*** (0.0428)	0.0419 (0.0439)	0.226*** (0.0468)	0.0258 (0.0415)	-0.0663 (0.0488)
Two college graduate	0.125*** (0.0446)	0.180*** (0.0459)	0.0280 (0.0487)	0.160*** (0.0504)	-0.0394 (0.0459)	-0.00855 (0.0526)
[No poverty (ref)]						
Income poverty (one dimension)	0.257*** (0.0667)	0.255*** (0.0726)	-0.0565 (0.0730)	0.218*** (0.0753)	0.113* (0.0676)	-0.0680 (0.0833)
Time poverty (one dimension)	0.00628 (0.0763)	-0.0173 (0.0774)	-0.101 (0.0856)	0.0685 (0.0852)	0.00364 (0.0787)	0.222*** (0.0826)
Two dimensional poverty	0.610*** (0.212)	0.146 (0.221)	-0.320 (0.226)	0.443** (0.214)	0.322 (0.205)	0.253 (0.228)
Income poverty × Female	0.0283 (0.0953)	0.0688 (0.101)	0.156 (0.105)	0.0466 (0.102)	0.112 (0.0950)	-0.184 (0.119)
Time poverty × Female	0.144 (0.139)	0.371*** (0.143)	0.450*** (0.164)	0.0511 (0.150)	0.0701 (0.143)	-0.235 (0.155)
Two dimensional poverty × Female	-0.694** (0.340)	0.0705 (0.349)	0.386 (0.384)	0.124 (0.344)	-0.509 (0.352)	-0.579 (0.406)
Constant	-0.297*** (0.0792)	0.462*** (0.0822)	1.385*** (0.0919)	-0.0960 (0.0859)	-0.421*** (0.0806)	-1.128*** (0.0955)
Observations	5,872	5,872	5,872	5,872	5,872	5,872

(Note) 1: ***, **, and * are statistically significant at 1%, 5% and 10% level.

2: We applied for instrumental variables (IV) method in the case where doing sports [inactive participation] is the dependent variable. Dummy variables showing linguistic skills, working experiences, communication skills were used as IVs.

6. Conclusion

This analysis specifically examined the association between multidimensional poverty and inactive participation of daily recreational activities, by defining poverty from two dimensions of income and time using a micro dataset of Japan. Many previous studies have pointed out strong relations among the level of income, health condition, and the probability of doing physical activity. However, time, along with money, is a finite resource. It is an important factor affecting the standard of people's life (Ishii and Urakawa, 2014).

Several studies have grasped poverty from two dimensions of income and time and examined their effects on active participation in physical activity in other countries, but no report in the relevant literature has described the use of this approach in Japan. We investigated relations among time, money, and the intensities of daily activities. Furthermore, we considered the effects of other socioeconomic factors.

From the estimation results obtained using econometric models, we first clarified that income poverty is an important factor of low probability of PARA such as doing sport and cultural activities outside the home such as going to movie theaters, art museums, natural history museums, plays, etc. For two dimensional poverty, we observed that it is highly associated with low frequency of doing sport and reading books.

Indeed, we observed different results for women and men by checking the effects of cross terms. For men, individuals who are deprived in one-dimensional income poverty and deprived in two dimensions of poverty tend not to participate in sports. For women, individuals who are deprived on one-dimensional income poverty tend not to engage in doing sport and going to cultural facilities. In addition, the negative impacts of lack of time for going to cultural facilities and gardening activity are larger for female than male.

As a second point, we confirmed that educational background can contribute to doing physically active activities. Results show that people who have a low educational level are less likely to do sports, go to cultural activities outside the home, or read books.

Finally, we describe several policy implications from estimate results obtained through this study. First, government must increase policy support for people who confront difficult circumstances of time poverty and income poverty, such as single parents. As several previous results of studies have suggested, a well-funded public child care system would help alleviate the problem of “time poverty.” In addition, policy reforms must be done with the knowledge that labor, time, and resources are all required for individuals to survive and to care for their families (Spinney and Millward, 2010, Urakawa et al., 2020). Job assistance is one important policy as a measure for income poverty.

Secondly, government should consider enhancing physical education, especially for people who have a low educational background. Kajitani and Kohara (2006) examined the demographic and socioeconomic variables that putatively affect the intensity activities for health investment, using prefectural level data (1981–2001), particularly addressing working men. Results show that high education attainment is positively correlated with the level of sports activity.

Above all, unstructured physical activities require no memberships or special facilities and might be done anytime throughout the day (e.g., walking and hiking). The prevalence of daily recreational activities that require little money and/or schedule commitments to participate should be reinforced. Some physical recreational activities are expected to help people to achieve capabilities directly and indirectly.

Thirdly, daily recreational activities can contribute to long and healthy lives, can provide more opportunities to participate in the life of the community, and can improve the value of effort for people in the workplace. Consequently, enterprises also should consider providing a work environment that considers work-life balance for their workers to improve their access to and participation in appropriate forms of leisure activities.

References

- Aaro, L. E., Winter, T., Laberg, J. C., and Wold, B., (1995). "Health behaviors among adolescents: towards a hypothesis of two dimensions," *Health Education Research*, 10, 83–93.
- Aires, N., Selmer, R. and Thelle, D. (2003). "The validity of self-reported leisure time physical activity, and its relationship to serum cholesterol, blood pressure and body mass index. A population based study of 332,182 men and women aged 40–42 years," *European Journal Epidemiology*, 18(6), 479–485.
- Balboa-Castilo, T., León-Muñoz, L. M., Graciani, A., Rodríguez-Artalejo, F. and Guallar-Castillón, P. (2011). "Longitudinal association of physical activity and sedentary behavior during leisure time with health-related quality of life in community-dwelling older adults," *Health and Quality of Life Outcomes*, 9:47, 1–10.
- Bise, R., Jeffrey, A. and Ronald, C. (2007). "Physical activity level and health-related quality of life in general adult population: A systematic review," *Preventive Medicine*, 45, 401–415.
- Bittman, M. (2002). "Social participation and family welfare: The money and time costs of leisure in Australia," *Social Policy and Administration*, 36, 408–425.
- Breuer, C., Hallmann, K., Wicker, P., and Feiler, S. (2010). "Socio-economic patterns of sport demand and ageing," *European Review of Aging and Physical Activity*, 7(2), 61–70.
- Brown, H. and Roberts, J. (2011). "Exercising choice: The economic determinants of physical activity behavior of an employed population," *Social Science and Medicine*, 73, 383–390.
- Burchardt, T. (2010). "Time, income and substantive freedom: A capability approach," *Time and Society*, 19 (3), 318–344.
- Douthitt, R. A. (2000). "'Time to do the chores?' Factoring home-production needs into measure of poverty," *Journal of Family and Economic Issues*, 21 (1), 7–22.
- Galan, I., Boix, R., Medrano, M. J., Ramos, P., Rivera, F., Pastor-Barriuso, R. and Moreno, C. (2013). "Physical activity and self-reported health status among adolescents: a cross-sectional population-based study,"

- British Medical Journal*, 3, 1–10.
- Gratton, C. and Taylor, P. (2000). *Economics of Sport and Recreation*. London: Spon Press.
- Grossman, M. (1972). “On the concept of health capital and the demand for health,” *Journal of Political Economy*, 80, 223–55.
- Hallmann, K., Wicker, P., Breuer, C., and Schönherr, L. (2012). “Understanding the importance of sport infrastructure for participation in different sports – findings from multilevel modeling,” *European Sport Management Quarterly*, 12(5), 525–544.
- Harvey, A. and Mukhopadhyay, A. K. (2007). “When twenty-four hours is insufficient: Time poverty of working parents,” *Social Indicators Research*, 82, 57–77.
- Huang, H. and Humphreys, B. R. (2012) “Sports participation and happiness: Evidence from US microdata,” *Journal of Economic Psychology*, 33, 776–793.
- Humphreys, B. R. and Ruseski, J. E. (2015). “The economic choice of participation and time spent in physical activity and sport in Canada,” *International of Sports Finance*, 10(2), 138–159.
- Hyytinen, A. and Lahtonen. (2013). “The effect of physical activity on long-term income,” *Social Science & Medicine*, 96, 129–137.
- Ishii, K. and Urakawa, K. (2014). “An empirical analysis of poverty of living hours in Japan,” *Mita Commerce Research*, 57(4), 97–121. (in Japanese)
- Jones, A. M. and Joses, M. K. (1999) “Health knowledge and smoking among South African women,” *Health Economics*, 8, 165–169.
- Kajitani, S. and Kohara, M. (2006), “Leisure time and health investment of working persons,” *Japanese Journal of Labour Studies*, 552, 44–59. (in Japanese)
- Kalenkoski, C. M. and Hamrick, K. S. (2013). “How does time poverty affect behavior? A look at eating and physical activity,” *Applied Economic Perspectives and Policy*, 35(1), 89–105.
- Kalenkoski, C. M., Hamrick, K. S. and Andrews, M. (2011). “Time poverty thresholds and rates for the US population”, *Social Indicators Research*, 104, 129–155.
- McCann, B. (2006). “Making physical activity research relevant to policy makers,” *Journal of Physical Activity and Health*, Suppl 1, S267–S27.
- OECD (2011) *How's life?-Measuring Well-being*, OECD Press.
- Oshio, T. and Kan, M. (2014) “Multidimensional poverty and health: evidence from a nationwide survey in Japan,” *International Journal for Equity in Health*, 13: 128, 1–11.
- Pawlowski, T., and Breuer, C. (2011). “The demand for sport and recreational services: Empirical evidence from Germany,” *European Sport Management Quarterly*, 11(1), 5–34.
- Saltin, B. and Grimby, G. (1968). “Physiological analysis of middle-aged and old former athletes: Comparison with still active athletes of the same ages,” *Circulation*, 38(6), 1104–1115.
- Spinney, J. and Millward, H. (2010). “Time and money: A new look at poverty and the barriers to physical

activity in Canada,” *Social Indicators Research*, 99, 341–356.

Urakawa, K., Wang, W. and Alam, M. (2020) “Empirical Analysis of Time Poverty and Health-Related Activities in Japan,” *Journal of Family and Economic Issues*, 41(3), 520-529.

Vickery, C. (1977). “The Time-Poor: A New Look at Poverty,” *Journal of Human Resources*, 12(1), 27–48.

Wada, k., Eguchi, H., Yoneoka, D., Okahisa, J. and Smith D. R., (2015). “Associations between psychological distress and the most concerning present personal problems among working-age men in Japan,” *BMC Public Health*, 15: 305.

WHO (2005). *Preventing Chronic Diseases: A vital investment*, World Health Organization.

Yagi, T., Urakawa, K. and Yonezaki, K. (2016). “Happiness and Employment Status,” Tachibanaki, T. (ed.), *Advances in Happiness Research: A Comparative Perspective* (Creative Economy), 2016.02, Springer.

Zacharias, A. (2011). “The measurement of time and income poverty,” *Levy Economics Institute of Bard College, Working Paper*, No. 690.

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