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<https://doi.org/10.15017/1498368>

出版情報：経済論究. 150, pp.1-14, 2014-12-19. 九州大学大学院経済学会
バージョン：
権利関係：

The relationship between Self-rated Health and Physical Activities of American workers by gender

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Abstract

Physical activity has long been regarded as an important component of a healthy lifestyle. Recently, this impression has been reinforced by new scientific evidences linking physical activities to a wide array of physical and mental health benefits. Nevertheless, there are little detailed researches examining the association between physical activities and subjective health level by using micro-data. Further study is needed to grasp the relationship between the contents of physical activities and health levels in more detail.

This study focused on the association between self-rated health and physical activities of the employees by gender and age class, and investigated what kind of daily activities significantly affect self-rated health, using individual dataset in the US. Large-sized micro-data taken from a nationwide internet survey of worker in the US (N=1001) was used in this analysis and two types of daily activities are considered; physically inactive and active.

The estimation result shows that in the case of physically inactive activity, viewing arts is highly correlated with high level of self-rated health for men in their twenties. In addition, in the case of physically active activity, doing sport and gambling have the significant impact on the health level for men in their thirties. As for women in their thirties, both reading (physically inactive) and doing sport (physically active) are associated with the high level of self-rated health.

1 . Introduction

Based on the first report of All-Party Parliamentary Commission on Physical Activity published in 2014, United Kingdom saw an epidemic of physical inactivity as a problem.

This report shows that over half of adults in the UK do not meet the guidelines for daily physical activity. And some children do not reach the guideline levels set for young people. Physical inactivity leads to around 37,000 premature deaths a year. A number that is more than all deaths from murder, suicide and accidents combined.

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The cost of the lack of physical activity is twice as high as the cost of absenteeism at work, amounting to approximately £20 billion every year. Direct costs from physical inactivity include the economic loss occurred from the increase in disease such as diabetes, cancer, and heart disease. Indirect costs include numerous lost working days through sickness and subsequent lower productivity levels.

According to the report of the Surgeon General on physical activity and health published by U. S. Department of Health and Human Services in 1996, the US government has focused on the important public health issues and scientists and doctors have known for years that substantial benefits can be gained from regular physical activity.

The expanding evidence on the relationship between physical activity and health has brought important public health challenges. Although the scientific mechanism of physical activity is very complex and still developing, some previous research found strong evidence to indicate that regular physical activity provides clear and substantial health gains.

This report is a passport to good health for all Americans. Its key finding is that people of all ages can improve the quality of their lives through a lifelong practice of moderate physical activity. Namely, people don't have to train for the Boston Marathon to derive real health benefits from physical activity. A regular, preferably daily regimen of at least 30-45 minutes of brisk walking, bicycling, or even working around the house or yard can contribute to reduce people's risks of developing coronary heart disease, hypertension, colon cancer, and diabetes.

Some supports by the government are needed if physical activity is critical in a society as technologically advanced. Most Americans today suffered from the burden of excessive physical labor. Indeed, few occupations today require significant physical activity, and most people use motorized transportation to get to work and to perform routine errands and tasks. Even leisure time is increasingly filled with sedentary behaviors, such as watching television, "surfing" the Internet, and playing video games.

Many Americans might be surprised at the strong evidence linking physical activity to numerous health improvements. According to previous research, regular physical activity greatly reduces the risk of dying from coronary heart disease, the leading cause of death in the United States. Physical activity also reduces the risk of developing diabetes, hypertension, and colon cancer; enhances mental health; fosters healthy muscles, bones and joints; and helps maintain function and preserve independence in older adults.

Furthermore, regular physical activity contribute to reducing risk of cardiovascular disease, coronary heart, selected cancers, and all-cause mortality (Koba. S. et al., 2011). There appears to be linear relation between physical activity and fitness will lead to additional improvements in health status and quality of life (David et al., 2003).

Researchers have also investigated regarding self-reported health and health-related quality of

life in the general adult population (Bise et al., 2007). However, most of researchers only emphasize specific part of health such as mental health, cardiovascular disease, cerebrovascular disease, diabetes, coronary heart, selected cancers, and all-cause mortality. Only few of them observed the association between physical activities including inactive physical activities and self-rated health.

From the above problem consciousness, this study focuses on the relationship between self-rated health and physical activities among the workers in USA by gender and age class, using individual micro-data collected from nationwide internet survey in the US, asking the frequency of daily activities. In the analysis, leisure time physical activities (LTPA) were divided into two categories: physical activity and physical inactivity (Rodger L et al., 2012).

2 . Previous researches

Koba et al. (2011) show that from cohort studies in Japan, daily physical activity contributes to reduce the risk of Coronary Artery Disease (CAD), stroke, Cardiovascular Disease (CVD), and all-cause mortality. Bucksch (2005) also examines the effect of physical activities on all causes mortality for German men.

Association between physical activity and health level among adults and older people in the United State has been examined by researchers. Vallance et al. (2012) for example, they found self-reported physical activity was significantly and positively associated with higher health-rated quality of life scores among older man. Associations were stronger for those achieving a higher volume of PA. Jeffry et al. (2008) showed that more than half of adults 60 or more years of age reported no LTPA and that level of LTPA in the older population vary by demographic and health characteristics.

Lahti et al. (2010) analyzed prospective association between physical activity and physical health functioning of employees in Helsinki city. From the estimation results, their correlation was relatively weak, but high physical activity may help in maintaining good physical health functioning. Vigorous activity is more beneficial than moderate activity.

Mohlala et al. (2012) concluded the both top and middle level managers of selected African countries exhibited low LTPA and high risk for developing coronary heart disease. The relationship between disease-related variables, leisure time physical activity, and mental health status with fatigue severity in patient with spondylarthropathy (SpA) in Canada has been examined by Deborah et al (2004).

Still in Canada, Wang et al. (2012) have found people who were inactive in 2 consecutive cycles after 2 were more than twice as likely to be unhappy as those who remained active both cycles after 2 years. Compared with those who become active, inactive participants who remained

inactive were also more likely to become unhappy.

Physical inactivity is a modifiable risk factor for cardiovascular disease and a widening variety of other chronic disease. Darren et al. (2006) confirm that there is irrefutable evidence of the effectiveness of regular physical activity in the primary and secondary prevention of several chronic diseases (e.g., cardiovascular, diabetes, cancer, hypertension, obesity, depression and osteoporosis) and premature death.

Hyytinen and Lahtonen (2013) examined the long-term income effects of physical activity based on the data of male twins from Finland. This estimation result showed that being physically active has positive impact on the long-term income. They showed the possibility that physical activity would enhance long-term income via the improvement of health and more intense labor market attachment.

3 . Material and methods

3.1. Study sample

Study sample in this analysis was collected by using the Research fund (A) from Ministry of Education, Culture, Science and Technology. The survey was designed and administered between August 20th and 31st, 2012. This is a nationwide internet survey conducted in the United State of America.

Questionnaires had been sent to 1500 randomly selected respondents living in United States who have been registered on the members' list of an internet survey institute. The total number of respondents was 1001 by response rate was 66.7%.

This survey includes several questions such as individuals' perceptions for neighborhood, subjective well-being such as self-rated health, personality traits, and their demographic and socioeconomic statuses.

3.2. Hypothesis

Leisure time physical activities have associated with self-rated health of workers, and they give different impacts among female and male. The scientist and doctors have known for years that substantial benefits can be gained from regular physical activity.

Physically inactive has negative relationship to health status of worker. In UK, physical inactivity gave direct and indirect impact to economic, by spending money to treat diabetes, cancer, heart disease and also lost working day through sickness and subsequent lower productivity.

Good lifestyle of the workers can give positive effect to self-rated health, level of happiness, and income satisfaction. The impact of them is checked base on their gender.

3.3. Variables

Firstly, the level of self-rated health is set as a dependent variable. This variable has been proven to be a reliable indicator of objective health status (Oshio & Urakawa, 2012; Idler & Benyamini, 1997). The content of the question asking self-rated health in the survey is as follows. ‘How do you describe the current state of your health?’ and asked respondents to choose an option on a five-point scale (‘healthy’, ‘somewhat healthy’, ‘average’, ‘somewhat poor’, and ‘poor’). Within the alternatives, healthy and somewhat healthy are categorized as high level of health and a dummy variable was made.

For the independent variables, the author categorized physical activities into two types, based on Saltin Grimby Physical Activity Level Scale (SGPALS). This scale has a good validity and reliability, and is often used by the research in the field of health science. (Aires N, Selmer R, Thelle D, 2003). The first is physically inactive: reading, watching television, watching movie, using computer or doing other sedentary activities during leisure time are categorized into this type.

Another is physically activity including light, moderate, and vigorous physical activity: cycling or walking to work, walking with family, gardening, fishing, playing table tennis, tennis, badminton, calisthenics and similar activities, bowling, running, swimming, orienteering, skiing, soccer, European handball etc. are categorized into this type.

Considering the SGPALS, this analysis used 6 variables of physically inactive; Watching sport, Movie, Viewing art, Enjoying live entertainment (theater and dance performance), Reading and Playing game. For physically active, there were 7 variables: Gambling, Playing a musical instrument; Cooking; Gardening, Creating artwork such as paintings and sculptures, and Doing sports (tennis, swimming, mountain climbing, golf, etc.).

Gender, age, and socioeconomic factors are included in this analysis. Respondents who did not answer the question related to their health status and key variables were omitted. Total number of observations who participated in this empirical analysis was 962, there are 492 for female and 470 for male. The basic characteristic of the sample is illustrated in Table 1.

Logistic analysis is used in order to estimate the association between health levels and daily activities. In the logit model estimation, a binary variable showing high self-rated health is used by setting respondents who answered “Healthy” or “If anything, healthy” as one, and otherwise as zero.

Physically inactive and active activities are set a value of one if these frequencies are higher than average and otherwise set zero. For example, regarding each physically active and inactive activity, respondents who did it more than average are coded as 1 and otherwise 0. Age groups variables (twenties, thirties, forties, and fifties) were set as a dummy variables, based on their ages. The age class of twenties, thirties, forties, and fifties are between 20 and 29, 30 to 39, 40

Table 1
Basic characteristics of the sample

	All	Female	Male
[Dependent variable]			
high level of self-rated health	53.74	52.49	68.03
[Physically inactive activities]			
watching sport	9.04	8.41	9.04
viewing art	7.30	7.14	7.30
enjoying live entertainment	7.82	7.73	7.82
watching movie	10.32	10.79	10.32
reading	11.28	11.84	11.28
playing games	9.21	9.52	9.21
[Physically active activities]			
doing sports	7.30	6.49	7.30
playing instrument	4.21	3.73	4.21
cooking	10.21	11.52	10.21
gardening	8.34	8.49	8.34
creating artwork	4.54	4.79	4.54
writing poetry	4.51	4.49	4.51
gambling	5.93	5.06	5.93
[Age class]			
twenties	19.13	22.15	15.96
thirties	20.27	22.15	18.30
forties	19.85	20.12	19.57
fifties	20.69	21.95	19.36
sixties	20.06	13.62	26.81

-49, and 50 until 59, respectively.

4 . Estimation Results

4.1. Descriptive analysis

Table 2 shows a pairwise correlation matrix among key variables. We can get some points from this table. First, there were positive correlations among self-rated health and several variables of leisure time physical activities (both physically inactive and active). Second, self-rated health is not correlated with some physically inactive activities (reading and playing games) and physically activity (playing instrument, cooking, creating artwork, writing poetry, and gambling). Third, we can confirm that there are close relations among some leisure time physical activities; (a) playing instrument, creating artwork and writing poetry, (b) watching sports and doing sports, (c) enjoying live entertainment and watching movie.

4.2. *t*-test

In order to grasp the association between self-rated health and leisure time physical activity,

Table 2
Pairwise correlation across self-rated health and other variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 high self-rated health	1												
2 watching sport	0.12*	1											
3 viewing art	0.17*	0.38*	1										
4 Enjoying live entertainment	0.17*	0.39*	0.61*	1									
5 watching movie	0.13*	0.27*	0.37*	0.48*	1								
6 reading	0.07	0.14*	0.20*	0.22*	0.22*	1							
7 playing games	0.06	0.13*	0.24*	0.26*	0.26*	0.26*	1						
8 doing sports	0.18*	0.48*	0.46*	0.47*	0.35*	0.16*	0.29	1					
9 playing instrument	0.09	0.29*	0.42*	0.41*	0.27*	0.12*	0.28*	0.42*	1				
10 cooking	0.07	0.11*	0.23*	0.27*	0.24*	0.29*	0.24*	0.21*	0.24*	1			
11 gardening	0.12*	0.23*	0.33*	0.28*	0.19*	0.25*	0.19*	0.36*	0.34*	0.37*	1		
12 creating artwork	0.06	0.21*	0.42*	0.36*	0.22*	0.17*	0.32*	0.38*	0.61*	0.29*	0.40*	1	
13 writing poetry	0.04	0.20*	0.40*	0.34*	0.26*	0.16*	0.30*	0.33*	0.62*	0.23*	0.26*	0.67*	1
14 gambling	0.09	0.32*	0.32*	0.39*	0.23*	0.09	0.29*	0.39*	0.39*	0.17*	0.29*	0.36*	0.34*

t-test is conducted in this analysis. Figure 1 shows the result of t-test for leisure time physical activity by gender. From the table, there was significant correlation between physically inactive (watching sport and reading), physical activity (doing sport and gardening) and self-rated health for female at 1% and 5% level. However, for male, only doing sport and writing poetry had a significant correlation with self-rated health at 5% level.

4.3. Regression analysis

Table 3 represents the association between physical inactive and active activities, and self-rated health by four age levels and both sex. Leisure time physical activity was classified into three level of frequency according to the level of activity per year (1-9, 10-99, and more than 99 days in a year).

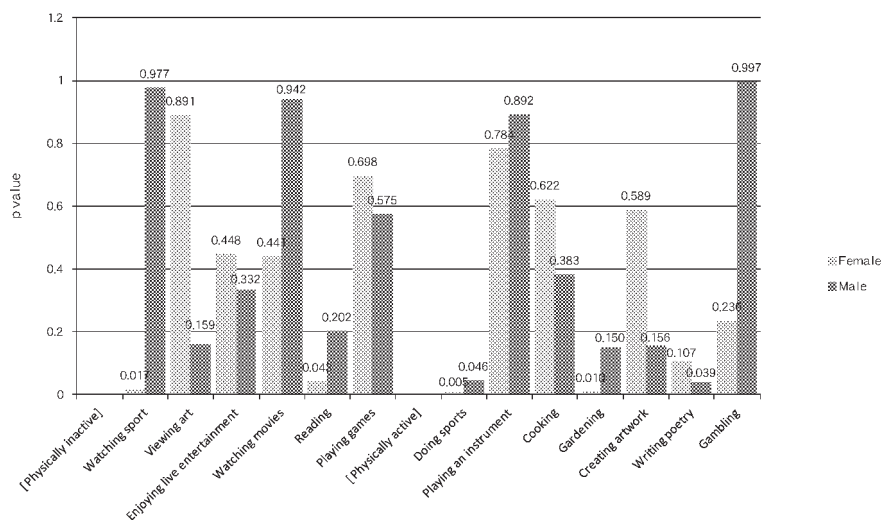
For female, high level of physically inactive (watching sport and reading) contributed to high level of health. Similarly, doing sport, cooking and gardening have the tendency to cause high level of health. However writing poetry had a contrary effect for the health level.

For male, viewing art, enjoying live entertainment and reading gave large impact for self-rated health positively. Basically, almost all activities in physically active had good effect for self-reported health except playing games and gambling. Both of them did not give contribution to high level of health.

Table 4 shows the results of logit estimation on self-rated health by five different age groups. From the Table 4.a focusing on workers in their twenties, we can see positive relation between viewing arts and self-rated health in 5% significant level for male. On the other hand, female indicates no significant correlation between all physical activities and self-rated health.

Table 4.b illustrates the estimation correlation of doing sports regularly for both genders which has age around thirty years old to high level of self-rated health are positive in 10% significant level. Reading also for women associated positively toward SHR. Although for men gambling

Figure 1
t-test for differences in variable



much give negative relation in 5 percent level of significant.

In addition, both female and male which showed on the Table 4.c and 4.d that there is no significant correlation of physically inactive and active to the high of self-rated health level for forties and fifties age group. Table 4.e presents the estimation of reading and gambling for male around sixty years old to high level of SRH has positive correlation with 5 and 10% respectively.

Finally Table 5 represents a comparison summary estimation correlation between high physical activity level and high level of self-rated health of female and male American employees by five different age groups.

5 . Conclusion and discussion

This study analyzed the association between self-rated health and physical activities in USA. Using large-sized individual data in the US, the association of the self-rated health and physical activities by gender, age class and social class are investigated. According to the estimation result, we can confirm that there is a significant correlation between some daily activities and health levels for both male and female.

First, doing sport regularly is one of the important factors on the health level for female and male employees in their thirties.

Second, interestingly, reading and viewing arts which are physical inactivity activities have association with high level of self-rated health for some groups. Reading has the same impact as doing sport for women in their thirties and for male in their sixties. Viewing art is significant-

Table 3
Physical activities in relation with worker age group and high self-rated health for female and male

*Physically inactive	(d/y)	Female						Male					
		n	thirties	n	sixties	n	high srh	n	thirties	n	sixties	n	high srh
Watching sports	1-9	72	66.1	51	76.12	152	48.25	30	34.88	53	42.06	114	57.00
	10-99	31	28.4	8	11.94	67	52.34	33	38.37	33	26.19	77	55.40
	>99	6	5.5	8	11.94	33	67.35	23	26.74	40	31.75	74	56.49
Viewing art	1-9	90	82.57	58	86.57	189	49.22	49	56.98	102	80.95	178	53.45
	10-99	14	12.84	5	7.46	48	61.54	30	34.88	18	14.29	67	62.04
	>99	5	4.59	4	5.97	15	50.00	7	8.14	6	4.76	20	68.97
Enjoying entertainment	1-9	94	86.24	54	80.6	189	49.22	48	55.81	105	83.33	172	53.25
	10-99	13	11.93	11	16.42	53	62.35	32	37.21	18	14.29	79	62.70
	>99	2	1.83	2	2.99	10	43.48	6	6.98	3	2.38	14	66.67
Watching movies	1-9	59	54.13	46	68.66	126	47.37	32	37.21	84	66.67	132	54.55
	10-99	40	36.7	17	25.37	102	58.62	41	47.67	32	25.4	104	58.76
	>99	10	9.17	4	5.97	24	46.15	13	15.12	10	7.94	29	56.86
Reading	1-9	37	33.94	20	29.85	63	44.68	20	23.26	41	32.54	72	52.94
	10-99	39	35.78	13	19.4	75	50.00	37	43.02	33	26.19	98	55.37
	>99	33	30.28	34	50.75	114	56.72	29	33.72	52	41.27	95	60.51
Playing games	1-9	50	45.87	47	70.15	118	49.79	23	26.74	82	65.08	110	51.89
	10-99	39	35.78	10	14.93	83	54.61	39	45.35	28	22.22	95	60.90
	>99	20	18.35	10	14.93	51	49.51	24	27.91	16	12.7	60	58.82
*Physically active													
Doing sports	1-9	74	67.89	55	82.09	162	46.69	42	48.84	95	75.4	138	50.55
	10-99	27	24.77	5	7.46	58	58.00	30	34.88	21	16.67	86	62.77
	>99	8	7.34	7	10.45	32	71.11	14	16.28	10	7.94	41	68.33
Playing an instrument	1-9	96	88.07	65	97.01	217	50.23	55	63.95	114	90.48	202	54.16
	10-99	10	9.17	-	-	21	61.76	25	29.07	8	6.35	47	69.12
	>99	3	2.75	2	2.99	14	53.85	6	6.98	4	3.17	16	55.17
Cooking	1-9	43	39.45	32	47.76	83	50.30	28	32.56	67	53.17	109	52.91
	10-99	31	28.44	9	13.43	85	50.60	38	44.19	34	26.98	90	58.44
	>99	35	32.11	26	38.81	84	52.83	20	23.26	25	19.84	66	60.00
Gardening	1-9	66	60.55	38	56.72	124	45.42	41	47.67	78	61.9	135	52.94
	10-99	34	31.19	17	25.37	85	55.19	37	43.02	31	24.6	91	58.71
	>99	9	8.26	12	17.91	43	66.15	8	9.3	17	13.49	39	65.00
Creating artwork	1-9	88	80.73	61	91.04	203	51.01	56	65.12	116	92.06	205	54.38
	10-99	16	14.68	3	4.48	38	54.29	25	29.07	5	3.97	45	62.50
	>99	5	4.59	3	4.48	11	45.83	5	5.81	5	3.97	15	71.43
Writing poetry	1-9	85	77.98	61	91.04	211	52.49	50	58.14	119	94.44	199	54.52
	10-99	20	18.35	3	4.48	33	49.25	25	29.07	4	3.17	43	58.11
	>99	4	3.67	3	4.48	8	34.78	11	12.79	3	2.38	23	74.19
gambling	1-9	91	83.49	55	82.09	214	51.32	60	69.77	97	76.98	199	58.19
	10-99	13	11.93	6	8.96	29	55.77	14	16.28	21	16.67	44	49.44
	>99	5	4.59	6	8.96	9	39.13	12	13.95	8	6.35	22	56.41

ly positive for younger male employees.

That is not similar with the result of the second report of the all-party commission of UK published in 2014. The report shows that the physical inactivity basically leads to much cost, reflecting the increase in diabetes, cancer, and heart disease in the UK economy. Based on the estimation result of this analysis, we need to consider the mechanism of physical inactivity on health status and medical expenses.

Third, gambling gave different impacts for male in their thirties and sixties. Male workers in their thirties who play gambling suffer from low level of health, while male workers in their sixties get high level of health. We need to investigate main reasons about the difference of impacts on health status.

This study has several limitations. First, the types of physical activities used as independent

Table 4.a
Estimation correlation cross self-rated health and physical activity for twenties between female and male

[Dependet variable]	Female			Male		
	Coef.	z	P> z	Coef.	z	P> z
high self-rated health						
[Physically inactive activities]						
watching sport	0.839	1.030	0.302	0.442	0.440	0.660
viewing art	-0.604	-0.590	0.554	3.941	2.060	0.039
enjoying live entertainment	0.068	0.080	0.939	-0.493	-0.220	0.826
watching movie	0.297	0.400	0.688	-2.822	-1.810	0.070
reading	0.454	0.870	0.386	0.284	0.370	0.709
playing games	-0.483	-0.740	0.461	0.061	0.090	0.931
[Physically active activities]						
doing sports	0.990	1.390	0.164	2.297	1.580	0.114
playing instrument	0.236	0.300	0.763	2.738	1.140	0.254
cooking	-0.933	-1.610	0.108	-0.561	-0.740	0.460
gardening	-0.121	-0.150	0.885	-0.409	-0.280	0.780
creating artwork	0.714	0.460	0.644	15.434	0.010	0.995
writing poetry	0.084	0.070	0.942	1.326	0.690	0.490
gambling	-1.257	-1.110	0.267	-20.582	-0.010	0.993
_cons	0.070	0.250	0.800	0.283	0.740	0.461

Table 4.b
Estimation correlation cross self-rated health and physical activity for terties between female and male

[Dependet variable]	Female			Male		
	Coef.	z	P> z	Coef.	z	P> z
high self-rated health						
[Physically inactive activities]						
watching sport	-0.567	-0.490	0.623	-1.192	-1.540	0.124
viewing art	2.599	1.080	0.279	0.035	0.010	0.992
enjoying live entertainment	-	-	-	4.332	1.100	0.270
watching movie	-0.991	-1.060	0.290	0.395	0.420	0.671
reading	0.984	1.850	0.064	0.332	0.440	0.661
playing games	-0.568	-0.890	0.373	-0.549	-0.700	0.486
[Physically active activities]						
doing sports	2.352	1.700	0.089	2.948	1.800	0.071
playing instrument	-1.168	-0.530	0.598	3.136	1.370	0.169
cooking	0.408	0.740	0.461	0.304	0.340	0.731
gardening	0.920	0.980	0.325	-4.932	-1.400	0.163
creating artwork	-3.408	-1.610	0.108	0.934	0.270	0.785
writing poetry	-	-	-	-1.157	-1.280	0.200
gambling	0.597	0.420	0.677	-3.757	-2.460	0.014
_cons	-0.245	-0.880	0.376	1.322	3.260	0.001

Table 4.c

Estimation correlation cross self-rated health and physical activity for forties between female and male

	Female			Male		
[Dependent variable]	Coef.	z	P> z	Coef.	z	P> z
high self-rated health						
[Physically inactive activities]						
watching sport	1.597	1.330	0.184	0.899	1.430	0.153
viewing art	-	-	-	-0.985	-0.650	0.515
enjoying live entertainment	-	-	-	-	-	-
watching movie	-0.217	-0.280	0.783	-0.040	-0.030	0.978
reading	0.658	1.230	0.220	-0.379	-0.600	0.550
playing games	-0.134	-0.190	0.848	0.761	1.090	0.278
[Physically active activities]						
doing sports	-	-	-	0.958	0.980	0.329
playing instrument	0.587	0.390	0.698	0.000		
cooking	-0.089	-0.160	0.876	-0.540	-0.770	0.442
gardening	0.460	0.500	0.617	0.967	1.060	0.291
creating artwork	-	-	-	-	-	-
writing poetry	-1.843	-1.140	0.252	-	-	-
gambling	-	-	-	0.574	0.440	0.663
_cons	-0.523	-1.680	0.093	-0.111	-0.340	0.732

Table 4.d

Estimation correlation cross self-rated health and physical activity for fifties between female and male

	Female			Male		
[Dependent variable]	Coef.	z	P> z	Coef.	z	P> z
high self-rated health						
[Physically inactive activities]						
watching sport	-0.108	-0.130	0.897	-0.288	-0.510	0.612
viewing art	1.489	1.070	0.283	-	-	-
enjoying live entertainment	-1.698	-1.010	0.314	-	-	-
watching movie	-0.544	-0.590	0.559	-0.382	-0.400	0.689
reading	0.049	0.110	0.916	-0.076	-0.130	0.896
playing games	-0.210	-0.420	0.676	0.635	1.030	0.304
[Physically active activities]						
doing sports	-0.386	-0.340	0.732	0.670	0.580	0.562
playing instrument	1.356	0.890	0.371	0.045	0.030	0.976
cooking	0.577	1.140	0.255	-0.386	-0.630	0.526
gardening	0.954	1.390	0.165	0.747	1.040	0.297
creating artwork	-0.265	-0.240	0.814	-	-	-
writing poetry	-0.909	-0.670	0.501	-	-	-
gambling	1.209	0.740	0.458	1.199	0.960	0.339
_cons	0.076	0.220	0.822	-0.324	-1.000	0.320

Table 4.e
Estimation correlation cross self-rated health and physical activity for sixties between female and male

[Dependet variable]	Female			Male		
	Coef.	z	P> z	Coef.	z	P> z
high self-rated health						
[Physically inactive activities]						
watching sport	0.740	0.670	0.505	-0.632	-1.450	0.146
viewing art	0.593	0.360	0.719	-0.666	-0.680	0.497
enjoying live entertainment	-	-	-	1.695	1.100	0.271
watching movie	-0.031	-0.020	0.985	-0.782	-0.860	0.389
reading	-0.047	-0.080	0.940	0.899	2.170	0.030
playing games	0.349	0.380	0.705	-0.300	-0.490	0.626
[Physically active activities]						
doing sports	0.824	0.880	0.378	-0.726	-0.960	0.339
playing instrument	-	-	-	-1.734	-1.310	0.190
cooking	-0.350	-0.480	0.629	0.335	0.640	0.523
gardening	1.231	1.380	0.168	0.854	1.270	0.204
creating artwork	-	-	-	-0.594	-0.290	0.769
writing poetry	-	-	-	2.183	0.830	0.404
gambling	-1.279	-0.940	0.349	2.001	1.820	0.068
_cons	-0.212	-0.510	0.613	-0.214	-0.710	0.475

Table 5
Comparison summary of estimating correlation among high of physical activity level toward high level of self-rated health between female and male in 5 different age groups

Age groups	High level of physical activity			
	Inactive		Active	
	Female	Male	Female	Male
twenties		(+) Viewing arts**		
thirties	(+) Reading*		(+) Doing sports*	(+) Doing sports* (-) Gambling**
forties				
fifties				
sixties		(+) Reading**		(+) Gambling*

*p<0.10; **p<05; ***p<0,01

variables in this research are still limited in the interest of survey questionnaires. We need to examine the impacts of other types of leisure-time activities such as chatting, browsing in internet, cycling, walking to work, walking with family, skiing on health levels.

Second, the classification of leisure-time activities by SGPALS brings a little confusion for some activities such as gambling and playing games. We should consider how to classify the

daily activities in order to more clearly understand what kind of physical activities have good effects on people's health levels.

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