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Original Article

The Relationship between Household Income and Physical Activity in Korea

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Abstract. [Purpose] Based on the relationship between obesity and physical activity, several recent studies have reported that level of exercise is associated with household income. Hence, the purpose of this study is to explore the relationship between household income and physical activity in Korea. [Subjects and Methods] In 2012, 9,000 Koreans (4,479 men and 4,521 women) aged 10–89 years participated in the Korean Survey of Citizens' Sports Participation project. This survey provided us with information on the amount of physical activity undertaken each week and the household incomes of a nationally representative sample of respondents. The relationship between household income and physical activity was then evaluated by conducting multiple logistic regression analysis after controlling for participant age. [Results] The present findings show a strong relationship between household income and physical activity for Korean men and women. [Conclusion] Further well-designed studies should be performed in order to determine the individual effects of household income on physical activity.
Key words: Household income, Obesity, Physical activity

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INTRODUCTION

According to the World Health Organization, obesity worldwide has nearly doubled since 1980 and over 1.4 billion adults are overweight (with approximately 200 million men and 300 million women obese)[1)]. Because cardiovascular diseases, type 2 diabetes, musculoskeletal disorders, and some cancers are strongly related to obesity, it has thus become a major social and public health problem globally[1)]. This continued rise in obesity rates and persistent disparities among subpopulations have led to renewed calls to eliminate disparities and achieve greater health equality for all[2)].

Many previous studies have reported that socioeconomic factors, such as low household income, are associated with rising obesity[3–5)]. Regular physical activity is widely perceived to be beneficial for reducing obesity rates[6, 7)]. Moreover, physical activity has a positive effect on preventing cardiovascular diseases, metabolic disorders, osteoporosis, and all-cause mortality[8–11)]. Based on this relationship between obesity and physical activity, several recent studies have reported that physical activity is also associated with household income[12–15)]. However, in Korea, no study has yet examined the relationship between household income and physical activity. Hence, the present study bridges this gap in the literature by exploring whether physical activity is related to household income for different age groups of Koreans.

SUBJECTS AND METHODS

Participants: The 9,000 Koreans aged 10–89 years who participated in the Korean Survey of Citizens' Sports Participation, a nationally representative survey conducted by the Korean Ministry of Culture, Sports, and Tourism[16)], were analyzed in the present study. Because this survey did not collect any private information from respondents (e.g., name, social security number, home address, etc.), ethical approval was not required. All study procedures were approved by the Korean Ministry of Culture, Sports, and Tourism. The characteristics of participants are presented in Table 1.

Dependent variables: Physical activity was evaluated for each participant by their responses to the following question: 'Recently, on how many days did you do over 30 minutes of physical activity (or exercise), except walking, in your leisure time?" The response options were [1] none, [2] twice or three times per month, [3] once per week, [4] twice per week, [5] three times per week, [6] four times per week, [7] five times per week, [8] six times per week, and [9] every day. Based on their responses, participants were divided into two subgroups: (i) "none" (reference group) including responses [1] and [2], and (ii) "at least weekly" including responses [3]–[9].

Independent variables: Household income was evaluated based on the answers to the following question: "What is your average monthly household income?" The response options were [1] under 1,000,000 won (USD estimate, 1$

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Table 1. The characteristics of the participants

Variables		Men (n = 4,479)	Women (n = 4,521)
Age (years)		42.27 ± 18.38	43.61 ± 18.79
Physical activity	None	2,351 (52.5)	2,704 (59.8)
	At least weekly	2,128 (47.5)	1,817 (40.2)
Household income	Under 1,000,000 won (USD 1,000)	210 (4.7)	303 (6.7)
	1,000,000 − 1,500,000 won	251 (5.6)	288 (6.4)
	1,510,000 − 2,000,000 won	361 (8.1)	377 (8.3)
	2,010,000 − 2,500,000 won	616 (13.8)	606 (13.4)
	2,510,000 − 3,000,000 won	689 (15.4)	628 (13.9)
	3,010,000 − 3,500,000 won	823 (18.4)	752 (16.6)
	3,510,000 − 4,000,000 won	586 (13.1)	587 (13.0)
	4,010,000 − 4,500,000 won	383 (8.6)	410 (9.1)
	4,510,000 − 5,000,000 won	269 (6.0)	266 (5.9)
	5,010,000 − 5,500,000 won	176 (3.9)	208 (4.6)
	5,510,000 − 6,000,000 won	51 (1.1)	51 (1.1)
	Over 6,000,000 won (USD 6,000)	64 (1.4)	45 (1.0)

Results are expressed as mean ± SD or n (%)
Estimate 1$ = 1,000 won

Table 2. The results of the multiple logistic regression analyses for the household income–physical activity relation in Korea (n = 9,000)

Physical activity		None vs. At least weekly					
		Men			Women		
		OR	95% CI	p-value	OR	95% CI	
Household income	Under 1,000,000 won (USD 1,000)	Ref.			Ref.		
	1,000,000 − 1,500,000 won	1.088	0.751–1.577	0.656	1.588	1.135–2.221	**
	1,510,000 − 2,000,000 won	1.256	0.886–1.781	0.201	1.971	1.432–2.715	***
	2,010,000 − 2,500,000 won	1.248	0.897–1.735	0.189	2.450	1.805–3.325	***
	2,510,000 − 3,000,000 won	1.334	0.956–1.862	0.090	2.104	1.538–2.877	***
	3,010,000 − 3,500,000 won	1.354	0.974–1.883	0.071	2.683	1.975–3.644	***
	3,510,000 − 4,000,000 won	1.503	1.069–2.114	0.019*	2.388	1.733–3.292	***
	4,010,000 − 4,500,000 won	1.643	1.143–2.362	0.007**	2.740	1.956–3.838	***
	4,510,000 − 5,000,000 won	2.021	1.375–2.970	<0.001***	2.687	1.857–3.888	***
	5,010,000 − 5,500,000 won	1.134	0.741–1.734	0.562	3.784	2.564–5.585	***
	5,510,000 − 6,000,000 won	2.803	1.470–-5.345	0.002**	3.043	1.639–5.652	***
	Over 6,000,000 won (USD 6,000)	2.243	1.256–4.005	0.006**	2.737	1.410–5.311	**

Estimate 1$ = 1,000 won
OR, odds ratio; CI, confidence interval; *p<0.05, **p<0.01, ***p<0.001; tested by multiple logistic regression analysis after adjusting for participant age

= 1,000 won), [2] 1,000,000–1,500,000 won, [3] 1,510,000–2,000,000 won, [4] 2,010,000–2,500,000 won, [5] 2,510,000–3,000,000 won, [6] 3,010,000–3,500,000 won, [7] 3,510,000–4,000,000 won, [8] 4,010,000–4,500,000 won, [9] 4,510,000–5,000,000 won, [10] 5,010,000–5,500,000 won, [11] 5,510,000–6,000,000 won, and [12] over 6,000,000 won.

Covariate variables: Participants' ages, as defined by the Korean Survey of Citizens' Sports Participation data, were used without any modifications.

Statistical analysis: Multiple logistic regression analyses were conducted in order to determine whether physical activity is related to the household income of men and women after adjusting for age. Analyses were performed using SPSS version 18.0 (Chicago, IL, USA) and statistical significance was accepted for values of $p < 0.05$.

RESULTS

The results of the multiple logistic regression analyses are shown in Table 2. For men, compared with the reference category of under 1,000,000 won, the odds ratios (ORs) for reporting at least weekly physical activity according to household income were: 3,510,000–4,000,000 won, 1.503

(p=0.019); 4,010,000–4,500,000 won, 1.643 (p=0.007); 4,510,000–5,000,000 won, 2.021 (p<0.001); 5,510,000–6,000,000 won, 2.803 (p=0.002); and over 6,000,000 won, 2.243 (p=0.006).

For women, compared with the reference category of under 1,000,000 won, the ORs for reporting at least weekly physical activity according to household income were: 1,000,000–1,500,000 won, 1.588 (p=0.007); 1,510,000–2,000,000 won, 1.971 (p<0.001); 2,010,000–2,500,000 won, 2.450 (p<0.001); 2,510,000–3,000,000 won, 2.104 (p<0.001); 3,010,000–3,500,000 won, 2.683 (p<0.001); 3,510,000–4,000,000 won, 2.388 (p<0.001); 4,010,000–4,500,000 won, 2.740 (p<0.001); 4,510,000–5,000,000 won, 2.687 (p<0.001); 5,010,000–5,500,000 won, 3.784 (p<0.001); 5,510,000–6,000,000 won, 3.043 (p<0.001); and over 6,000,000 won, 2.737 (p=0.003).

DISCUSSION

This study examined the relationship between household income and physical activity in Korea. The present findings suggest there is a strong relation between household income and physical activity for Korean men and women. These findings support those of previous studies in Korea[12–15]. Research has shown that obesity is a consistent negative influence on physical activity[17, 18] and physical fitness[19]. Moreover, obesity rates are also affected by socioeconomic factors[13, 15], suggesting that socioeconomic factors are also associated with physical activity.

People that live in low-income households have greater difficulty being physically active compared with higher-income people owing to various social and environmental barriers such as long distances to sports facilities, poor transportation services, poor neighborhoods and traffic conditions, a lack of parks and recreational facilities, air pollution, a lack of spare time, bad health, and a lack of exposure to social support related to exercise. Even though these barriers affect other income groups, the impact is much greater on low-income communities[20].

Interestingly, our study shows that men are affected in the over 3,510,000 won income bracket and that women are affected in the over 1,000,000 won bracket, implying that the household income–physical activity relation is stronger for women than men. In Korean culture, it is assumed that men, the traditional heads of households, have the economic responsibility of supporting the family. Therefore, for middle-income earners (over 3,010,000 won; estimated USD 3,000), participation in physical activity begins to increase and show a statistical relationship. In contrast, with rising incomes women showed a continuous increase in physical activity ORs compared with very low-income earners (under 1,000,000 won; estimated USD 1,000). The reasons behind these phenomena are unclear. Thus, further well-designed studies should be performed in order to determine the individual effects of household income on physical activity.

There were two major limitations to this study. First, the survey only investigated self-reported physical activity; it did not directly measure subjects' physical activity levels, and it did not investigate other physical activity factors such as intensity, time, or duration. Therefore, future research should aim to improve the research design considering these aspects. Second, because this survey was cross-sectional, we did not provide a cause and effect analysis, only assessing the interrelationship between household income and physical activity. Nevertheless, by investigating a large and nationally representative sample in Korea, it should be possible to generalize our findings to other research settings. In summary, the present findings show a strong relationship between household income and physical activity for Korean men and women.

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