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PHYSICAL ACTIVITY LEVELS IN HEALTHY UNIVERSITY STUDENTS

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Abstract

Nowadays, high level of inactivity and sedentary lifestyle has spread out for all-ages all over the world. Most guidelines for health promotion in different countries recommend to walk more than 10000 steps every day. Previous studies have examined physical activity level (PA) using tri-axial accelerometer for both children and middle-aged or elderly people. However, information of PA are limited for young adults like university students. So the purpose of this study was to investigate PA measured by objectively using a tri-axial accelerometer in university students from different faculty in different countries, Japan and France. One hundred healthy university students participated in this study. Sixty-one students were from faculty of Sports Science or Arts in University of Strasbourg (27 males and 34 females) in Strasbourg, France and thirty-nine female university students were from faculty of Letters and Education in Ochanomizu University in Tokyo, Japan. All participants were provided with a tri-axial accelerometer (Active Style-pro, Fukuda Denshi, JAPAN). Daily step counts were summed for each participant's total. We instructed participants not to make changes to their typical daily routines and leisure activities for the duration of the study. More than three days recording for two days during weekdays and one day during weekends were needed to analyze physical activity level of habitual daily lifestyle. According to these criteria, the number of subjects for analysis of physical activity level was sixty. Average step counts were 9744.5 (SD=3028.9), which was almost similar level for university students in previous studies. There was no significant difference by gender or faculty in step counts in French students. Step counts during weekends were significantly less than that during weekdays. Japanese students showed significant greater step counts compared to French students. In conclusion, even for young university students, it is necessary to promote physical activity in this population depending on different temporal characteristics of their lifestyle including weekends.

Introduction

Recently, World Health Organization has just stated in their fact sheet that worldwide trends of

inactivity had spread out all over the world. From this report, global age-standardized prevalence of insufficient physical activity was approximately 30%. In addition, general trends of reduction were not observed during 15 years from 2001 to 2016. Especially for high-income countries, prevalence of inactivity were higher than those of low-income countries. Previous studies investigated physical activity (PA) of elderly people had reported that increase in PA or moderate-to-vigorous activity (MVPA) would induce low level of mortality (Arem et al., 2015, Gebel et al., 2015, Karlsen et al., 2017, Loprinzi, 2015, Parks et al., 2012), risk of falls (Buchner et al., 2017) or physical performance (Izawa et al., 2017, Karlsen et al., 2017). On the other hand, the number of publication investigated PA of children or adolescents have been recently increasing in different countries (Bai et al., 2016, Landry and Driscoll, 2012, Marques et al., 2015, Pate et al., 2014, Santos et al., 2014). Compared to previous studies with middle-aged to elderly people or children, lack of investigation exists in young people in higher education such as university. However, some previous studies have examined PA or MVPA for university students and found close relations with PA and mental or social health (Cruz SY et al., 2013, Pengpid and Peltzer, 2018, Hubbs et al., 2012).

The number of participants in previous studies investigated PA in university students were relatively large, since they had measured PA by questionnaire. However, to investigate quantitative analysis to evaluate intensity-based physical activity as MVPA or sedentary behavior, objective measures should be needed for precise analysis. Health promotion in higher education, university, could be important since university students have to face much more risks for their own health during their academic lifestyle as well as after graduation. Previous study had pointed out that decrease in PA and bad habits like smoking or heavy drinking alcohol would likely prevail (Tabaroch et al., 2013). Therefore, during academic lifestyle at university, health promotion program could be one of options to solve their future health problem.

So the purpose of this study was to investigate PA measured objectively by using a tri-axial accelerometer in university students from different faculties in different countries such as Japan and France.

Method

One hundred healthy university students participated in this study. Sixty-one students were from faculty of Sports Science or Arts (Dance) in University of Strasbourg (27 males and 34 females) in Strasbourg, France and thirty-nine female university students were from faculty of Letters and Education in Ochanomizu University in Tokyo, Japan. All participants were recruited from daily classes or by a flyer of our research. They were free from regular medication and orthopedic or internal problem which would influence their lifestyle. Physical activity and step counts were recorded for 7 consecutive days using a waist-worn accelerometer (Active Style-pro, Omron Healthcare Inc.., JAPAN) widely used by individuals from children to the elderly. This device was originally produced to measure objectively physical activity as well as locomotive activity such as step counts (Ohkawa et al.., 2011). This set to record in 10-s epochs.

Participants were requested to wear the device at all times, except under special circumstances, such as sleeping, water-related activities (e.g. bathing, swimming) and dressing. Most previous studies adopted days in which more than 10 hours of wearing time not counting time allowed for unavoidable reasons. However, for participants in this study especially for the students from faculty of sports science and dance, they needed to take off the accelerometer because of their intense movements during sports activities and dancing. Therefore, we set more than 9 hours of wearing time as a minimum for analysis in this study. Physical activity was classified in different physical intensity every MET. In addition, they also classified in to sedentary (<1.5MET), moderate (≥3 to <6 MET), or vigorous (≥6 MET) physical activity. The average number of step counts, time and normalized time (%) spent in sedentary behavior, and those of each defined intensity levels of PA were determined. Continuous zero counts of ≥20 min were excluded as non-wear periods. According to the criteria for analysis by previous study (Armstrong and Welsman, 2006), participants were included for analysis if they had complete data on a minimum of 3 days (2 weekdays and 1 day on the weekend). Data were collected throughout the school year (October to February). Student's t test was carried out to assess the influence of gender, faculty, and nationality. All results are shown as means and standard deviations (SDs). Statistical analyses were performed with SPSS version 17.0J for Windows (SPSS Inc., Japan, Tokyo). Statistical significance set if P values were less than 0.05.

According to above-mentioned criteria, the number of total subjects for further analysis of PA was sixty (French male: n=21, French female: n=9, Japanese female: n=30) out of one hundred. Data on gender, age, height, and body mass were collected from the questionnaire. Body mass index was calculated from the height and body mass of each participant. All subjects provided informed consent in accordance with the University's Institutional Review Board. The university Institutional Review Board approved this study

In addition to objective measures of PA, all participants answered questionnaire asking about their regular lifestyle including both present and past regular exercise or athletic activities, smoking and drinking alcohol habits, ways of transportation to the campus, the time for wake-up and asleep.

Results

Table 1 shows demographic characteristics of our subjects. By comparison with French and Japanese female students, French female students showed significant greater height, body mass, and BMI.

Average step counts were 9744.5 (SD=3028.9) as a total in this study, which was almost similar level for university students in previous studies. Since there was no significant difference between faculty majored such as sports science and dance for French students, data for French students were summed up altogether. While there was no significant difference in gender for French students in step counts, Japanese female students showed significantly greater step

Table 1 Demographics of participants

	French students				Japanese students	
	Male (n=21)		Female (n=9)		Female (n=30)	
	mean	sd	mean	sd	mean	Sd
Age (yrs)	20.6	1.3	19.7	1.5	19.3	2.0
Height (cm)	180.3	6.5	167.1	5.4	157.2	4.6
Body Mass (kg)	73.6	7.3	59.1	8.7	48.5	6.1
BMI	22.6	1.7	21.1	2.3	19.6	2.0

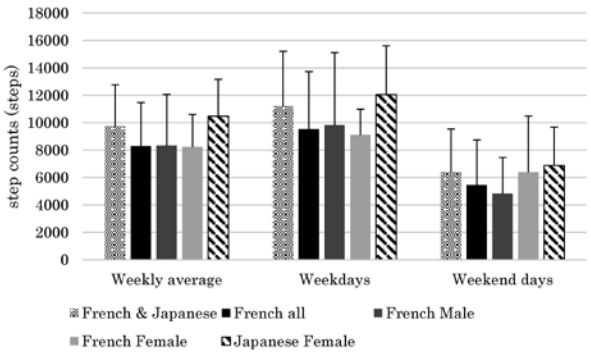

Figure 1. Daily step counts of French and Japanese university students

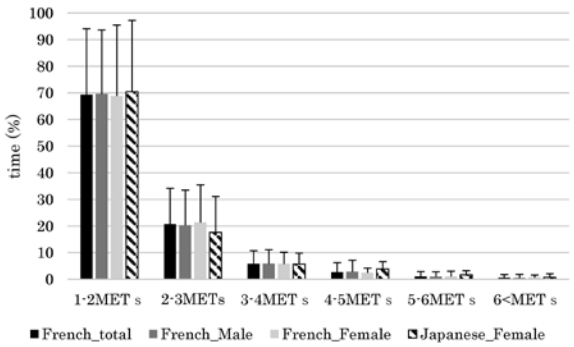

Figure 2 Normalized time spent in different PA expressed as METs for French and Japanese university students

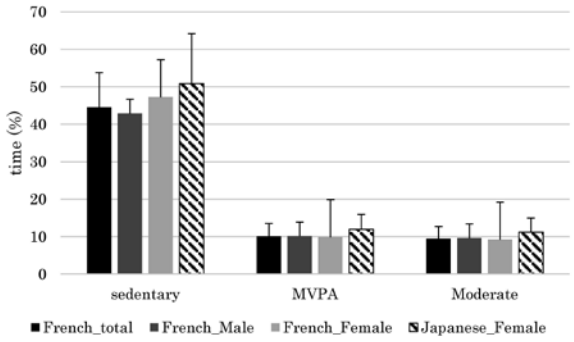

Figure 3. Normalized time expressed % of sedentary time, MVPA and Moderate physical activity of university students

Table 2 Correlations between step counts and sedentary time, moderate PA, and MPVA of university students

	Sedentary time	MVPA	3-6METs (moderate PA)
France			
Male (n=21)	-0.69 *	0.92 *	0.93 *
Female (n=9)	-0.79 *	0.77 *	0.74 *
Japan			
Female (n=30)	-0.20	0.79 *	0.76 *

counts than that of French female and male students (Figure 1).

Step counts during weekends were significantly less than that during weekdays for all groups (Figure 2). In addition, there was no significant correlation between step counts and commuting time of each group.

Figure 3 shows normalized sedentary time, MVPA, and moderate physical activity time in university students. There was also no significant difference among groups in normalized sedentary time, MPVA and moderate physical activity.

On the other hand, significant positive correlations were obtained between step counts and MVPA (Table 2). Interestingly, significant negative correlations were found between step counts and sedentary time only in French students, although there was no significant correlation between step counts and sedentary time for Japanese female students. For all groups, significant positive correlations were obtained between step counts and MVPA or moderate physical activity.

Discussion

Previous studies have reported that step counts of healthy university students were from 8000 to 9000 steps a day (Clemente et al., 2016, Hubbard-Turner et al., 2015). It is indicated that our participants in this study showed average physical activity level in high-income countries even though university students from different faculties or countries in each gender. Our findings also coincided with previous studies reported significant difference in step counts between weekdays and weekends in children (Sigmundová et al.., 2014). On the other hand, previous study determined PA of office-workers showed no significant difference between weekdays and weekend days (Smith et al.., 2015). Japanese government recommended to increase step counts in a day more than ten thousands (Ministry of Health and Welfare, Japanese Government, 2000). From our results, even for young university students, it is necessary to promote to increase PA in this population depending on different temporal characteristics of their lifestyle.

For intensity-based physical activity patterns evaluated by sedentary time, MVPA and moderate physical activity, there was no significant difference between French and Japanese students, although French students majored sports science or dance, while Japanese students

majored letters and education. However, for French students had time to take off the accelerometer in case that the device moved up-side-down or severe physical contact with others by intense physical activities during sports activities or dancing. Previous study investigated PA in university athletes and non-athletes students and found that university athletes showed greater PA in light and moderate PA, not for sedentary behavior (Clemente et al.., 2016). Therefore, it is speculated that PA in this study especially for French students could be underestimated because of small sample size or lack of time for estimation during intense physical activities. .

One of unique findings in this study was to obtain opposite significant correlations between step counts and sedentary time in French and Japanese students. Although Japanese students showed significant greater step counts, there was no significant correlations between step counts and sedentary time. However, for French students, significant negative correlations were observed for both gender indicated some relations between sedentary lifestyle and lack of locomotive physical activities. Generally speaking, it is indicated that increase of step counts could account for preventing sedentary lifestyle. However, from the results of this study, even for similar age group of university students, step counts would be more related to MVPA rather than sedentary behavior. Because of small sample size of this study, further studies should be needed to determine this relation.

In conclusion, it is indicated that promotion for increasing step counts during daily lifestyle would be necessary even for young people like university students in French and Japan. Cultural difference in lifestyle would affect the relations between step counts and sedentary behavior, although step counts closely related to MVPA for university students in France and Japan in this study.

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