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Sedentary Behaviour and Life Satisfaction in High School Students

Damian Czepiel[1] and Paweł F. Nowak[1*]

[1]Faculty of Physical Education and Physiotherapy, Opole University of Technology, Opole, Poland.

Authors' contributions

This work was carried out in collaboration between both authors. Author PFN designed the study, supervised the work, wrote this manuscript. Author DC collected data and performed the statistical analysis. Both authors managed the analyses of the study and the literature searches, read and approved the final manuscript.

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ABSTRACT

In the context of cultural and socio-economical changes, emerging from the dynamic development of technical civilization, a sedentary lifestyle is a phenomenon which is more and more common.
The relationship between a sedentary lifestyle and health in the biological dimension is very often investigated, but attention should also be paid to the psychosocial aspect of being inactive.
The aim of this paper is to determine the time spent in a seated position and life satisfaction in high school students, and to study whether physical inactivity correlates with overall satisfaction with life.
For the purposes of this study 301 students, 184 women and 117 men, of the five largest high schools in Kielce (Poland) were tested.
To assess the level of satisfaction with life, the SWLS test – The Satisfaction with Life Scale in Polish adaptation by Juczyński – was used. The respondents also described how much time per day they spent sitting last week, not counting the weekend.
Respondents estimated the daily average of being seated in the working week as 8 hours. Fifteen

**Corresponding author: Email: pawel.fryderyk.nowak@gmail.com;*

per cent of high school students declared a completely sedentary lifestyle (12 hours or more in a sitting position). Almost 38% of the respondents reported on average, 32% low and 30% of the high level of satisfaction with their own lives. There was no statistically significant difference (p<0.05) due to the gender of the respondents. There was no significant correlation (p<0.05) between the degree of satisfaction with life and the amount of time spent in a sitting position: for the total sample (r=0.0311, p=0.591), in women (r=0.018; p=0.812) and men (r=0.046; p=0.625). Organized forms of physical activity, health training and recreational sport serve valuable purposes which may be an individual challenge that provides to an opportunity to increase life satisfaction.

Keywords: Sedentary behaviour; physical activity; life satisfaction; health promotion; high school students.

1. INTRODUCTION

Every man as a human being feels the natural need of movement, but the development of civilization eliminates this need. The resulting hollowness creates danger not only to the biological, but also to the psychosocial wellbeing of a unit [1].

In the context of the cultural and socio-economical changes emerging from the dynamic development of technical civilization, a sedentary lifestyle is a phenomenon which is more and more common [2]. Sedentary lifestyle behaviour is characterized by, among others: low energy expenditure (e.g., resting metabolic rate, typically ≤1.5 metabolic equivalents - METs). This is the time when humans mostly spend the time in a sitting or lying position. The researchers of this issue are also using the term inactive with regard to people, who do not meet certain guidelines to the level of the physical activity necessary to preserve a healthy lifestyle [3].

Sedentary lifestyle leads to many negative health consequences. There is a correlation between sedentary behaviour and metabolic syndrome [4]. Owen's [5] research proved that sedentary behaviour is associated with a risk factor for many chronic diseases. Some researchers claim that physical inactivity is an additional factor of risk which is connected with an insufficient physical activity level. Too much time spent on the seat encourages excessive weight, obesity, type 2 diabetes and cardiovascular disease [6,7].

Scientists claim that in the US is possible to increase the life expectancy of people just by limiting sedentary behaviour [8].

It turns out that time spent on watching television is associated with a higher risk of death from all cardiovascular diseases. Many researchers have postulated that preventive strategies should assume not only the use of physical exercise but also a reduction in sitting time during the day, especially in relation to long-term TV watching [9,10]. Sedentary lifestyle also leads to an increased risk of cancer [11,12].

Researches demonstrated that watching television by young people for more than two hours a day is associated with an unfavourable body composition and decreased physical activity, as well as a reduction in self-esteem, pro-social behaviour and academic performance [13].

The relationship between sedentary lifestyle and health in the biological dimension is very often investigated, but attention also should be paid to the psychosocial aspect of being inactive. An active lifestyle is widely recognized to be of value, as it gives a chance of increasing the quality of life and health potential [14].

The high level of satisfaction with life is an important goal in life for many young people. It is an aim which it is possible for them to achieve only by their own activity. There exists the importance of compatibility of the planned objectives to their level of achievement. Achieving the aims that have been scheduled is important for happiness [15].

Satisfaction with life is the general assessment of satisfaction with their own achievements and living conditions of the researched students [16]. It is the standard by which a man judges the overall quality of his life, positively or negatively [17]. Veenhoven [18] claims that the concept of life satisfaction is an equivalent and commonly used term, such as other terms of happiness or subjective well-being. Satisfaction with life can be also defined as the cognitive component of subjective well-being [19].

2. OBJECTIVE

The aim of this paper is to determine the time spent in a seated position and life satisfaction in high school students, and to study whether physical inactivity correlates with overall satisfaction with life.

3. METHODS

3.1 Participants

For the purposes of this study 392 students comprising 243 women and 149 men of the five largest high schools in Kielce (Poland) were tested. The respondents were 17-20 years old; the average age was 18 years. As a result of data cleaning of their detailed treatment, 301 people (184 female and 117 male) were ultimately selected for further analysis.

3.2 Surveys and Procedures

To assess the level of satisfaction with life, test SWLS – The Satisfaction with Life Scale by Diener et al. [16]was used. The Polish adaptation of this tool which was used was developed by Juczyński [20]. It is a questionnaire consisting of five statements, the respondent assesses on a scale from 1 to 7 of the extent to which each of them relates to his/her previous life. By summing up the values of all statements, an overall indicator of a sense of satisfaction with life was obtained. The results of the test are in the range from 5 to 35 points. The higher the ratio, the higher the level of life satisfaction. The overall rate was converted to standard ten scale and the results were interpreted as low (1-4), average (5-6) and high (7-10).

The next stage of the study was to ask respondents to define (in hours and minutes) how much time per day they spent sitting last week, not counting the weekend.

Three levels of sedentary living were adopted: a) low - time spent sitting for four hours a day, b) average - from 4 to 8 hours sitting, and c) high - more than eight hours a day sitting.

3.3 Statistical Analysis

The collected material was statistically analyzed using the Statistica 10 program. To study correlations between the level of time spent in a seated position and satisfaction with life, Pearson's linear correlation was used. To assess the significance of differences between variables, a T-Student test was conducted. The analysis assumed as significant effects those for which the probability value was less than the accepted level of significance of 0.05 (p<0.05).

3.4 Ethics

An anonymous survey was carried out in the auditorium in April 2013, in accordance with the rules for conducting this type of research testing, by one of the authors of this work. Permission to conduct the research was obtained from the school heads and teachers of every school; and the researched students were informed about the objective of the research and assured of the anonymity of their answers. All of them agreed to participate in the study.

4. RESULTS

Respondents estimated the daily average of being seated in the working week as eight hours. The vast majority of respondents (87.3%) reported that, they normally spend more than four hours a day seated. To compare, it is worth mentioning that nearly 43% of those surveyed spend most of the day, i.e. over eight hours, in a sitting position to minimize the energy expenditure associated with physical activity. Fifteen percent of high school students declared a completely sedentary lifestyle (12 hours or more in a sitting position). There was no statistically significant difference (p<0.05) due to the gender of the respondents.

The average satisfaction index score of life was for women: SWLS = 20.4(min = 6; max = 35) and for men SWLS = 19.5(min = 5, max = 32). After calculating the values in accordance with the standard procedure, obtained for the entire population, a value of 5 - means the average level of satisfaction with life. There was no statistically significant difference due to the gender of the respondents (p<0.05) for both, the general SWLS index and individual levels of satisfaction with life. The detailed structure of the three levels: low, average and high is shown in Table 2.

Almost 38% of the respondents received an average of 32% low and 30% of the high level of satisfaction with their own lives.

Table 1. Time spent seated a day, in a working week, declared by the respondents

Time periods	Men			Women			*t*	*df*	*p*
	n	%	$\bar{x}$ (min.)	n	%	$\bar{x}$ (min.)			
less than 4 h	15	12.82	209.93	23	12.50	201.30	0.9626	36	0.342147
4-8 h	53	45.30	402.05	80	43.48	400.67	0.1162	131	0.907665
above 8 h	49	41.88	673.69	81	44.02	643.41	1.5902	128	0.114267
Summary	117	100	491.18	184	100	482.61	0.4020	299	0.687922

Table 2. Satisfaction level of life of surveyed high school students

SWLS level	Men			Women			*t*	*df*	*p*
	n	%	$\bar{x}$	n	%	$\bar{x}$			
High	43	36,75	26,48	43	23,36	26,3	-0,253	84	0,80109
Average	38	32,47	20,34	80	43,47	20,7	1,316	116	0,19082
Low	36	30,76	13,19	61	33,15	13,1	-0,068	95	0,94624
Summary	117	100	20,40	184	100	19,5	-1,258	299	0,20953

The next stage of the investigation was to calculate the Pearson's linear correlation for the two variables analyzed above. However, there was no significant correlation (p<0.05) between the degree of satisfaction with life and the amount of time spent in a sitting position - for the total sample (r=0.0311, p=0.591), in women (r=0.018; p=0.812) and in men (r=0.046; p=0.625).

5. DISCUSSION

Avoiding difficulties, refraining from exercise, searching facilitators is a common phenomenon in modern commercialized culture. Passiveness and inactivity wins over activity in physical culture, as exemplified by the increasing numbers of sports fans relative to the comparatively small number of those who want to be active participants in sports events or training programmes. Many people who work professionally are looking forward to a vacation and thinking mainly about passive resting and abstaining from exercise. It would seem that avoiding exercise and leading a comfortable, sedentary lifestyle can be a source of well-being, but this is not so.

Sedentary lifestyle is a feature of modern civilized societies. It is a negative cost of the technological revolution. Many researchers claim that physical or intellectual activity may be the only source of satisfaction in life. Many studies have shown that passivity makes the chance of happiness more remote [21].

In a study of adults, Withall [22] also reported no association between a sedentary lifestyle and well-being. In contrast, the Iannotti's [23] study show that sedentary behaviour and its increase have a negative impact on the psychological and social health indicators such as: self-image, perception of health status, quality of life and family relationships.

The correlation between physical activity and quality of life is well known and have been documented for many years. It has a significant impact on life satisfaction because of the participant's feeling of their own physical fitness in physical activities, which is considered to be synonymous with good health [24]. Lustyk [25], on the basis of his research, concludes that physical activity of high frequency and low intensity, where there is intensive burning off of calories and the aim is to improve health and fitness, has the strongest impact on the quality of life.

Exercising in a group particularly increases the feeling of human happiness. People learn how to work together, to help others, to increase self-confidence and to make friends. This kind of physical activity teaches how to be happy [26].

Nowadays, many young people are looking for satisfaction in all kinds of sports activities. In recreational sport it is relatively easy to achieve success because the goals are set by the participants at different sport levels. Even a participation in physical activity can be an achievement in itself. Withstanding the training regime of a chosen activity for an extended period of time (e.g. three times a week throughout the year) of a course tailored to their

abilities can be seen as an achievement, especially when the person is aware that he has no special predispositions to high performance in this discipline.

Physical activity influences the level of life satisfaction, but it happens the other way around. From a social point of view, achieving life satisfaction seems to be an important value. A person who has a high degree of feeling happy is more daring in setting his goals and characterized as being highly involved in the activities of daily living [27].

Physical activity practised regularly is essential for mental health and quality of life related to health [28,29]. It is a component of the treatment of many diseases and disorders, not only somatic, but also for example: depression or anxiety [30,31,32]. Its benefits are taken into consideration in terms of public health, and were for many years embraced by the representatives of the medical and social sciences and by specialists in the area of physical education and health. However, it is still undervalued in the daily lives of people [33]. Worryingly, the low percentages of people who are physically active regularly in the countries of Central and Eastern Europe, in particular young people, tend to reflect the causes of unsatisfactory attitudes toward physical activity. In Poland, in accordance with the recommendations of the WHO [34], only 10% of young people aged 17-18 years are physically active every day. Wojtyła-Buciora [35], in her study of Polish high school students, points out that the sedentary lifestyle increases with the teenager's age. Only 9% of respondents take part in amateur sport daily or almost daily, while 70% of students relax each day in their free time in front of the computer, and 48% of respondents watch TV. Other Polish representative surveys show that, young people aged 18-24 are sitting for 4-7 hours on average each day, of which 1.5 - 2 hours are spent in a car or other mean of transport [36].

There is similarity between the results of the present study regarding the scale of physical inactivity and those presented by other authors from distant countries. In New Zealand, young people spend an average of 8.6 hours a day sitting, whereas 181 minutes are spent on television and video games, and 340 minutes per school on passive transport [37]. In Australia youths spend 6.4 hours per day seated [38]. It is worth mentioning the fact that sedentary behaviour is dependent not only on the individual days of the week (weekday/weekend) but also on the season of the year. People more often lead a sedentary lifestyle in the winter months than in the summer months [39].

In recent years the availability of television in personal space significantly increased. It is estimated that approximately 1/3 of European children do not meet the recommendations regarding the amount of time spent in front of the screen [40].

There are quite worrying data which indicate the potential for the development of sedentary behaviour presented by Soos [41]. He examined the availability of technologies which while being used, promote the adoption of a seated or lying down position. It turns out that, 96% of British, 86% of Hungarians, and 64% of Romanians and Slovaks have more than one TV in the house. As many as 73% of British and 66% of Hungarian teenagers have television in their bedroom. In Romania it is 37% and in Slovakia it is 35%.

Pate et al. [42] claim that, throughout the whole world, the time during the day spent on a seat changes as the child is growing up. Among people aged 16-19 years old, the time is 8h/day. Nowadays, a high level of sedentary lifestyle is observed also among youths with high socio-economic status. The background of this problem is the development of increased access to television and computers. According to the findings, in families where children have limited time to spend in front of the screen, the level of sedentary behaviour is lower. Some researchers have confirmed that, in creating changes in this type of negative behaviour, a family and friends play a huge role [43].

Studies show that low socio-economic status may increase the risk of adopting sedentary behaviour through limited access to participate in sport and physical activity [44].

It seems that it is difficult to make a change in the nature of work and the mean of transport (to give up a modern, efficient means of transport) but you can limit the sitting position while resting. Especially, young people should learn to have active leisure time before they enter the labour market, because the habits developed in adolescence may appear in adulthood.

The end of high school is a critical time, because the educational influence of parents is declining, and the responsibility for life is only emerging.

Very often people who are 18 years old want to enter alone into adulthood and want to create their own individual system of values and behaviour. It is worth investigating the attitudes and habits of lifestyle, especially at this age, because as researches suggest, sedentary behaviours of the youth are the basis for further development in the future, in adulthood [45].

6. CONCLUSION

The present study shows that there is no correlation between sedentary lifestyle and life satisfaction. Passivity is not a recipe for a happy life. In order to achieve the satisfaction, struggling with challenges, setting goals and achieving them is needed, and therefore providing increased activity which is planned in action is necessary.

Generalization of organized forms of physical activity - health training, recreational sport - serves valuable purposes, which may be an individual challenge that provides to an opportunity to increase life satisfaction.

CONSENT

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Wen CP, Wai JPM, Tsai MK, Yang YC, Cheng TYD, Lee M-C, Chan HT, Tsao CK, Tsai SP, Wu X. Minimum amount of physical activity for reduced mortality and extended life expectancy: A prospective cohort study. Lancet. 2011;378:1244-1253.
2. Dumith SC, Hallal PC, Reis RS, Kohl HW. Worldwide prevalence of physical inactivity and its association with human development index in 76 countries. Preventive Medicine. 2011;53:24-28.
3. Sedentary Behaviour Research Network. Letter to the Editor: Standardized use of the terms “sedentary” and “sedentary behaviours”. Appl. Physiol. Nutr. Metab. 2012;37:540-542.
4. Edwardson CL, Gorely T, Davies MJ, Gray LJ, Khunti K, Wilmot EG, Yates T, Biddle SJH. Association of sedentary behaviour with metabolic syndrome: A meta-analysis. PLoS ONE. 2012;7(4):e34916.
5. Owen N, Bauman A, Brown W. Too much sitting: a novel and important predictor of chronic disease risk? Br J Sports Med. 2009;43:81-83.
6. Wilmot EG, Edwardson CL, Achana FA, Davies MJ, Gorely T, Gray LJ, Khunti K, Yates T, Biddle SJH. Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis. Diabetologia. 2012;55(11):2895-2905.
7. Owen N, Salmon J, Koohsari MJ, Turrell G, Giles-Corti B. Sedentary behaviour and health: Mapping environmental and social contexts to underpin chronic disease prevention. Br J Sports Med. 2014;48:174-177.
8. Katzmarzyk PT, Lee I-M. Sedentary behaviour and life expectancy in the USA: a cause-deleted life table analysis. BMJ Open. 2012;2:e000828.
9. Dunstan DW, Barr EL, Healy GN, Salmon J, Shaw JE, Balkau B, Magliano DJ, Cameron AJ, Zimmet PZ, Owen N. Television viewing time and mortality: the Australian Diabetes, Obesity and Lifestyle Study (AusDiab) Circulation. 2010;121(3): 384-391.
10. Ford ES, Caspersen CJ. Sedentary behaviour and cardiovascular disease: a review of prospective studies. Int J Epidemiol. 2012;41(5):1338-1353
11. Zhang M, Xie X, Lee AH, Binns CW. Sedentary behaviours and epithelial ovarian cancer risk. Cancer Causes and Control. 2004;15:83-89.
12. Stamatakis E, Chau JY, Pedisic Z, Bauman A, Macniven R, Coombs N, Hamer M. Are sitting occupations associated with increased all-cause, cancer, and cardiovascular disease mortality risk? A pooled analysis of seven british population cohorts. PLoS ONE. 2013;8(9):e73753.
13. Tremblay MS, LeBlanc AG, Kho ME, Saunders TJ, Larouche R, Colley RC, Goldfield G, Gorber SC. Systematic review of sedentary behaviour and health indicators in school-aged children and youth. International Journal of Behavioral Nutrition and Physical Activity. 2011;8:98.
14. Nowak PF. Physical activity as a determinant of health and high quality of life. In: Sladek A, Białas D, editors. Health - interdisciplinary perspective. Chosen

aspects. Wrocław: Uniwersytet Medyczny. 2012;180-191. (Polish).
15. Rask K, Astedt-Kurki P, Laippala, P. Adolescent subjective well-being and realized values. Journal of Advanced Nursing. 2002;38:254-263.
16. Diener E, Emmons RA, Larsen RJ, Griffin S. The satisfaction with life scale. Journal of Personality Assessment. 1985;49:71-75.
17. Veenhoven R. Questions on happiness: Classical topics, modern answers, blind spots. In: Strack F, Argyle M, Schwarz N, editors. Subjective well-being. An interdisciplinary perspective. Oxford: Pergamon Press. 1991;7-26.
18. Veenhoven R. Capability and happiness. Conceptual difference and reality links. Journal of Socio-Economics. 2010;39:344-350.
19. Diener E. Assessing subjective well-being: Progress and opportunities. Social Indicators Research. 1994;31:103-157.
20. Juczyński Z. Instruments for measurements in health promotion and psychology. Warszawa: Pracownia testów psychologicznych; 2009.
21. Davies CA, Vandelanotte C, Duncan MJ, van Uffelen JGZ. Associations of physical activity and screen-time on health related quality of life in adults. Preventive Medicine. 2012;55:46-49.
22. Withall J, Stathi A, Davis M, Coulson J, Thompson JL, Fox KR. Objective indicators of physical activity and sedentary time and associations with subjective well-being in adults aged 70 and over. Int. J. Environ. Res. Public Health. 2014;11:643-656.
23. Iannotti RJ, Janssen I, Haug E, Kololo H, Annaheim B, Borraccino A. Interrelationships of adolescent physical activity, screen-based sedentary behaviour, and social and psychological health. Int J Public Health. 2009;54 (Suppl 2):191-198.
24. Jennen C, Uhlenbruck G. Exercise and life-satisfactory-fitness: Complementary strategies in the prevention and rehabilitation of illnesses. Evidence-based Complementary and Alternative Medicine. 2004;1(2):157-165.
25. Lustyk MKB, Widman L, Paschane AAE, Olson KC. Physical activity and quality of life: assessing the influence of activity frequency, intensity, volume, and motives. Behavioral Medicine. 2004;30(3):124-31.
26. Gatab TA, Pirhayti S. The effect of the selected exercise on male students' happiness and mental health. Procedia - Social and Behavioral Sciences. 2012; 46:2702-2705.
27. Veenhoven R. The utility of happiness. Social Indicators Research. 1988;20:333-354.
28. Bize R, Johnson JA, Plotnikoff RC. Physical activity level and health-related quality of life in the general adult population: A systematic review. Preventive Medicine. 2007;45:401-415.
29. Kim YS, Park YS, Allegrante JP, Marks R, Ok H., Ok Cho K, Garber CE. Relationship between physical activity and general mental health. Preventive Medicine. 2012; 55:458-463.
30. Salmon P. Effects of physical exercise on anxiety, depression, and sensitivity to stress: A unifying theory. Clinical Psychology Review. 2001;21(1):33-61.
31. Carta MG, Hardoy MC, Pilu A, Sorba M, Floris AL, Mannu FA, Baum A, Cappai A, Velluti C, Salvi M. Improving physical quality of life with group physical activity in the adjunctive treatment of major depressive disorder. Clinical Practice and Epidemiology in Mental Health 2008;4:1.
32. Carek PJ, Laibstain SE, Carek SM. Exercise for the treatment of depression and anxiety. The International Journal of Psychiatry in Medicine. 2011;41(1):15-28.
33. Haskell WL, Blair SN, Hill JO. Physical activity: Health outcomes and importance for public health policy. Preventive Medicine. 2009;49:280-282.
34. Mazur J, Małkowska-Szkutnik A. (eds.) Research results HBSC 2010. Technical Report. Warszawa: Instytut Matki i Dziecka; 2011.
35. Wojtyła-Buciora P, Stawińska-Witoszyńska B, Wojtyła K, Klimberg A, Wojtyła C, Wojtyła A, Samolczyk-Wanyura D, Marcinkowski JT. Assessing physical activity and sedentary lifestyle behaviours for children and adolescents living in a district of Poland. What are the key determinants for improving health? Ann Agric Environ Med. 2014;21(3):606-612.
36. Biernat E, Piątkowska M. Individual and environmental factors determining sedentary lifestyle of the polish population. Iranian J Publ Health. 2014;43(8):1033-1044.
37. Foley LS, Maddison R, Jiang Y, Olds T, Ridley K. It's not just the television: Survey

analysis of sedentary behaviour in New Zealand young people. International Journal of Behavioral Nutrition and Physical Activity. 2011;8:132.
38. Hardy LL, Dobbins T, Booth ML, Denney-Wilson E, Okely AD. Sedentary behaviours among Australian adolescents. Australian and New Zealand Journal of Public Health. 2006;30(6):534-540.
39. O'Connell SE, Griffiths PL, Clemes SA. Seasonal variation in physical activity, sedentary behaviour and sleep in a sample of UK adults. Annals of Human Biology. 2014;41(1):1-8
40. Santaliestra-Pasías AM, Mouratidou T, Verbestel V, Bammann K, Molnar D, Sieri S, Siani A, Veidebaum T, Mårild S, Lissner L, Hadjigeorgiou C, Reisch L, De Bourdeaudhuij I, Moreno LA. Physical activity and sedentary behaviour in European children: The IDEFICS study. Public Health Nutrition. 2014;17(10):2295-2306.
41. Soos I, Biddle SJH, Ling J, Hamar P, Sandor I, Boros-Balint I, Szabo P, Simonek J. Physical activity, sedentary behaviour, use of electronic media, and snacking among youth: an international study. Kinesiology. 2014;46(2):155-163.
42. Pate RR, Mitchell JA, Byun W, Dowda M. Sedentary behaviour in youth. Br J Sports Med. 2011;45(11):906-913.
43. Atkin AJ, Corder K, Goodyer I, Bamber D, Ekelund U, Brage S, Dunn V, van Sluijs EMF. Perceived family functioning and friendship quality: Cross-sectional associations with physical activity and sedentary behaviours. International Journal of Behavioral Nutrition and Physical Activity. 2015;12:23.
44. Gorely T, Atkin AJ, Biddle SJH, Marshall SJ. Family circumstance, sedentary behaviour and physical activity in adolescents living in England: Project STIL. International Journal of Behavioral Nutrition and Physical Activity. 2009;6:33.
45. Biddle SJH, Pearson N, Ross GM, Braithwaite R. Tracking of sedentary behaviours of young people: A systematic review. Preventive Medicine. 2010;51(5): 345-351.

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