



Evaluation of physical activity level among Brazzaville's schoolboys and girls: case of Savorgnan De Brazza's High school

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Abstract

This study aims to evaluate the physical activity level of Brazzaville's schoolboys and girls. 560 high school students (336 girls and 224 boys aged 16 to 21 old) have enrolled in this study and answered to 24 hours physical activity recall questionnaire (24hPAR) and IPAQ-SF. The SPSS 22.0 software has been used for data process. The comparisons of the percentages and mean of variables were calculated using Chi-Square and Student t test respectively. The results showed that no difference appeared between the opinions of the girls and boys on the amount of time devoted to low physical activity level (88,1% Vs 89,3%; $\chi^2 = 0,19$; $p > 0,05$). However, the mean time devoted to low physical activities for girls was significantly higher than that of boys ($17,58 \pm 0,69$ vs $15,63 \pm 0,62$; $t = 34,70$; $p < 0,001$) while the mean time devoted on moderate to vigorous physical activities of boys was significantly higher than that of girls ($10,47 \pm 0,41$ vs $11,96 \pm 0,53$; $t = 35,86$; $p < 0,001$ and $10,60 \pm 0,34$ vs $12,03 \pm 0,53$; $t = 39,16$; $p < 0,001$). These results also showed that the time spent to the practice of low physical activities was significantly lower among the first year of high school students compared to those on the second and third years high school (112 accounted for 77,8 % Vs 304 accounted for 92,5 % and 80 accounted for 100 % respectively; $\chi^2 = 28,10$; $p < 0,001$). In conclusion, the physical activity level of Brazzaville high schoolboys and girls was weak. This weakness on one hand is related to gender, and on other hand to the study level, the time devoted to inactive activity.

Keywords: evaluation, Brazzaville high school students, physical activity level, age, study level

Introduction

Today's modern society, as reported by Simon and al., (2005) [21], is organized in such a way the majority of the individuals don't need to be physically active during one usual day. This inactivity is due to an urbanization that encourages the dependence on the car and the sedentary occupations (television, videogames, computer, telephone...) that are reversely detrimental for the use of active transportation (walk, bicycle, climbing, walks...). This increase is markedly observed among teenagers. According to Active Healthy Kid Canada (2011) [1] reported by Dubreuil (2014) [11], only 7 % of the Canadian younger's make at least 60 minutes of vigorous AP per week and that only 4% of girls reach the recommendations of the World Health Organization (WHO). However, these factors can be corrected by the increase of the practice of PA. A moderate to vigorous intensity PA (MVPA) according to Dough (1995) as reported by Guinhouya (2010) [13] can produce the beneficial effects on most levels of the child's health. It is why, the WHO recommends that the school-age children must achieved a minimum of 60 minutes of an MVPA per day (Count, 2013) [9]. These recommendations can also be reach by taking part to the courses of gymnastics, other activities to the school, on the way of school, at home, during the leisure time in a club, or while playing in the nature with his or her friends. The question is whether that is possible for the teenager to adopt an active life style that is a determinant of the health state.

The active life style is a determinant in the prevention of the chronic pathologies as the obesity, the diabetes, the cardiovascular illnesses and certain cancers, that today constitute a serious worldwide problem (Dantoine, 2006) [11]. It referred to the structured PA, non structured PA (the active transportation) and free games. School-based interventions have been reported to be a potentially important source of PA, because school is reached by almost all youth. It enhances PA through active transportation to and from school, physical education (PE), and participation in organized sports. Furthermore, the active transportation has been reported to be the biggest source of PA for the teenagers living in the urban and suburban zones. Compared with the children traveling to and from school by car, those using active transportation to and from school are more active during all day. They can at last accumulate until 45 minutes of MVPA each day and can present a better cardiovascular fitness (Larouche and coll., 2014) [14], a better body mass index (BMI), a normal waist circumference and a low cholesterol level (Larouche and coll., 2013) [15] compared to those that used to travel by car to and from school.

Despite the assessment of the PA level (PAL), the limits of measures are often amplified especially for young people due to cognitive, physiological and biomechanics reasons, it is also due to their occasional PA life style. To that end, very accurate measurement methods are needed to establish dose-response relationship of the AP on the factors of health. These

measurement methods can be subdivided into those calling subjective and objective methods. If the objective methods assess the PA with a low error, they stay very often inapplicable due to their high costs and use on restricted samples. At population level, the subjective method is the most commonly used in order to quantify as factor for regular PAL (Bigard and coll., 2005) [5]. It includes several scales conceived for the child and the teenager, among which appear the international physical activity questionnaire (IPAQ) short and long form and the questionnaire of 24 hours physical activity recall (24hPAR). These two questionnaires have been recommended as a cost-effective method to assess PA. Both records the activities of four intensity levels: 1) vigorous-intensity activity such as aerobics; 2) moderate-intensity activity such as cycling; 3) walking; and 4) sedentary activity such as sitting.

Because of the burden on teenagers to report their PA during the last 7 days recall is small, many researchers used to correlate self-reported PA data with data from objective measurement devices. Furthermore, the 24hPAR as reported by Subar and al., (2003) has stronger associations with gold standard dietary measures than other longer recall formats. 24hPAR or single-day recall due to its short enough time frame enable participant to accurately recall duration of active and sedentary periods (Gregory and al., 2014; Tudor-Locke and al., 2007) [7, 22]. On the basis of the above, correlate self-reported PA data from IPAQ-SF with data from 24hPAR measurement can be useful in the developing countries. With regard to the scales conceived for the teenagers, the IPAQ-SF and the 24hPAR have received less attention in the Republic of Congo. The literature review focus on this matter revealed that one non published study attempt to evaluate PAL of Congolese high school teenagers by using IPAQ-SF. Today, no other study try to compare their PAL by using IPAQ-SF and 24hPAR. The abovementioned facts inclined the authors to deal with the problem of high school teenagers living in Brazzaville Department. This study aims to evaluate Brazzaville’s high schoolboys and girls physical activity level.

Research Methods

Students regularly enrolled in four high schools of Brazzaville Department, Republic of Congo, were selected for the elaboration of this study. These high schoolboys and girls were selected due to the geographic localization and the year of study (first, second and third year). They were enrolled in this study and were informed about the nature of the study, and were invited to participate in it.

The method used in this research is qualitative and quantitative. Data comes from one source of 560 Brazzaville’s high school schoolboys (224) and schoolgirls (336 girls), aged from 16 to 21 old. Information concerning sedentary behaviors and the level of children’s physical activity moderate to vigorous were collected with the use of a questionnaire form in which the participants declared the time devoted to daily spontaneous activity, and organized activity during the week and weekend. Categorized replies were used and supplemented with time values (minutes and hours).

International Physical Activity Questionnaire short form (IPAQ-SF)

The IPAQ-SF as reported by Craig and al., (2003) [9] is an instrument developed with the objective of estimating the habitual practice of PA. It is composed of open items which estimating the weekly time spent in different PA (walks, moderate and moderate to vigorous intensities) and sedentary (sitting position). For the IPAQ-SF application, the schoolboys and girls were gathered per classroom. They received the questionnaire with filling instructions and recommendations, and no time limit was given for the task, and eventual doubts were promptly explained. During the questionnaire filling, they had no communication with each other. After filling the questionnaire reply, the participants received the 24hPAR instrument twelve days after as recommended by Bouchard *et al.* (1975) [6].

24 hours Physical Activity Recall (24hPAR)

The 24hPAR as reported by Calabro and al., (2009) [7] is a structured, auto-administered PA assessment instrument that provides details about the type, the duration and intensity of occupational, household and leisure-time PA performed in the past day. It utilizes a segmented day approach to capture details about the physical activity in 3 time periods (morning, afternoon and evening). The PA data were then converted to estimates of energy expenditure (EE) using established metabolic equivalent (MET) codes from the Compendium of PA (Ainsworth and al., 2011) [2].

With the information collected, the time spent in the different PA categories was established. The average energetic cost > 6 METs was considered as indicator of vigorous intensity; the average energetic cost between 3.0 and 6.0 METs was considered as indicator of moderate-intensity; the time spent in walking, and the time spent in sitting position was considered as indicator of physical inactivity.

Statistical Analyses

The statistical treatment was performed by means of the Statistical Package for the Social Science (SPSS) – 22.0. Anthropometrics variables, low, moderate and vigorous physical activity time and Metabolic Equivalent of Task (MET) of girls and boys were assessed using Student t test; Physical activity level by gender and study level among boys and girls were assessed using χ^2 test. The p values $p < 0.05$ were considered statistically significant.

Results

Table 1: Basic characteristics and relevant variables of the sample by sex

Variables	Filles (336)	Garçons (224)	t	p
Age ($\bar{x} \pm \sigma$)	17.74 ± 1.70	18.18 ± 1.26**	3.32	< 0.01
Weight (kg)	55.24 ± 3.49	60.29 ± 4.52***	14.86	< 0.001
Height (m)	1.55 ± 0.07	1.70 ± 0.05***	28.67	< 0.001
BMI (kg/m ²)	23.11 ± 2.47***	20.75 ± 1.70	13.39	< 0.001
Overweight (%)	56 (16.7%) ***	8 (3.6%)	$\chi^2 = 22.17$	< 0.001

: indicates $p < 0.01$; *: indicates $p < 0.001$

Table 2: Distribution time devoted to low and moderate-to-vigorous physical activities among schoolboys and girls

Variables	Schoolgirls (336) n (%)	Schoolboys (224) n (%)	χ^2	p
tLPA	296 (88.1 %)	200 (89.3 %)	0.19	> 0.05
tmodvigPA	40 (11.9 %)	24 (10.7 %)		

tPAL: indicates time devoted to practice low PA; tmodvig PA: indicates frequency devoted to moderate-to-vigorous practice of PA.

Table 3: Low and moderate-to-vigorous Physical activities distribution among first, second and third years schoolboys and girls in 24 hours

Variables	Low PA n (%)	modvig PA n (%)	χ^2	p
1 st year	112 (77.8%) ***	32 (22.2%)	28.10	< 0.001
School level 2 nd year	304 (92.5%) ***	32 (7.5%)		
3 rd year	80 (100.0 %) ***	0 (0.0%)		

Low PA: indicates low physical activity; Modvig PA: indicates moderate-to-vigorous physical activity

Table 4: Measurement of the time devoted to physical activities practice by schoolboys and girls in 24 hours

Variables	Schoolgirls (336)	Schoolboys (224)	t	p
IPAQ LPA	2.13 ± 0.03	18.50 ± 0.02***	6892.75	< 0.001
IPAQ modPA	3.05 ± 0.02	11.97 ± 0.02***	5421.94	< 0.001
IPAQ modvigPA	3.55 ± 0.02	40.20 ± 0.03***	15904.02	< 0.001
24h LPAR	17.58 ± 0.69***	15.63 ± 0.62	34.70	< 0.001
24h modPAR	2.42 ± 0.10	2.88 ± 0.13***	47.99	< 0.001
24h modvig PAR	2.41 ± 0.10	2.94 ± 0.13***	54.67	< 0.001

Légende: IPAQ LPA, modPA and modvigPA indicates time devoted to low practice of PA assessed by IPAQ-SF; 24h LPAR, modPAR and modvig PAR indicates time devoted to low practice of PA assessed by 24h Physical Activity Recall

Table 5: Correlation between low level, moderate and moderate-to-vigorous PA entre l'IPAQ et les 24 heures de rappel

Variables	24hLPAR	24h mod PAR	24h modvig PAR
IPAQLPAR	r= -0.10 (p > 0.05)		
IPAQmodPAR		r= 0.85*** (p < 0.001)	
IPAQmodvigPAR			r= 0.86*** (p < 0.001)

Discussion

In the present study we evaluated Brazzaville’s high schoolboys and schoolgirl’s physical activity level and investigated whether a few time devoted to physical activity is associated with a higher BMI in these teenagers. We found that Brazzaville’s high schoolboys and schoolgirls participated in low PA in a high frequency manner and this observed as the year in school increased. Furthermore, high schoolgirls spent more time in low PA whereas high schoolboys spent more time in moderate to vigorous PA. We interpret this finding to indicate that the higher BMI does interfere significantly on time of PA.

Far more interesting was that BMI did not matter in higher weight or height. It has been reported by previous study that individuals who were taller and heavier had higher BMI. Similarly, those who grew slower in height but faster in weight before the age of 20 years had higher BMI. This is not

supported by the present study. Being taller in childhood was associated with higher body fat in old age. We found that rapid height and weight gain by Brazzaville’s high schoolboys during 18.18 ± 1.26 old did not increased BMI. In contrast, later height and weight gain by high schoolgirls during 17.74 ± 1.70 old had increased BMI. Compared with high schoolgirls, this study shows that high schoolboys are significantly taller (1.70 ± 0.05 vs 1.55 ± 0,07 m ; t = 28.67; p < 0.001) and heavier (60.29 ± 4.52 vs 55.24 ± 3.49 kg; t = 14.86; p < 0.001). Indeed, high schoolgirls shows significantly higher BMI than their high schoolboys counterparts (23.11 ± 2.47 vs 20.75 ± 1.70 kg/t²; t = 13.39; p < 0.001). This result can be explained firstly by age. As reported earlier by Mansukoski and al., (2019) [17] in schools adult from in or near Guatemala City, the taller and heavier males showed a lower BMI whereas females which were older than males have showed a higher BMI. Even this case cannot ensure one hundred percent, older high schoolgirls in this study can markedly influence the result of BMI. Secondly be explained by racial difference. As reported by DS Freedman and al., (2004) [12], less weight Black females have higher BMI compared to heavier males. And thirdly be explained by the timing and the intensity of growth (Cole *et al.*, 2016) [8].

The presence study also revealed that 56 (16.7%) of high schoolgirls were overweight whereas 8 (3, 6%) of high schoolboys were overweight and the difference were significant ($\chi^2 = 22.17$; p < 0.001). Taking an account the higher BMI, Brazzaville’s high schoolgirls face the serious risk of having less PA performance. In this study, when the information associated to the time spent in low PA and moderate to vigorous PA dimensions reported by the high schoolboys and girls through IPAQ and 24hPAR are analyzed. We observed that, high schoolboys spent less time in practicing low intensity PA compared to high schoolgirls (200 (89,3 %) vs 296 (88,1 %)). This is in accordance with the social reality which is characterized by most of teenage daughter spent more time watching television or using a telephone. This finding is in accord with recent evidence from Western countries. It has been reported that that sedentary activities, such as watching television or using a computer, are associated with increasing obesity (Salmon and al., 2000) [19]. In contrast with what has been said above, the moderate-to-vigorous PA shows a contradictory outcome, the high schoolgirls having devoted more time than high schoolboys (40 (11.9 %) vs 24 (10.7 %)). The potential for a contradictory outcome is particularly due to high school girls number in study and a relatively large proportion of their time spent on housework (Dong and al., 2004).

Numerous articles show that the prevalence of overweight is inversely related to the level of physical activity. Data from Currie and al., (2012) [10] study suggest that many young people are not engaging in PA of sufficient length and intensity to benefit their health. In accordance with this, Baptista and al., (2012) [4] have reported that only 36 % of children aged 10–11 and 4 % of adolescents aged 16–17 old were considered sufficiently active. Besides the lower levels of PA, the prevalence of active children and adolescents tended to decrease with age, particularly among girls. In line with the above said, this study shows that much more low PA has been used by third year high school boys and girls (80

(100,0 %) followed by second year (304 (92,5%)) and first year (112 (77,8%)). It is clearly seen that as the school level increased as the time spent in PA tended to decrease. It can also be stated that, the time devoted to PA tended to decrease when both the high school boys and girls age increased. This is in line with what by and al., (2013) have published. Authors reported that, with the increase of age, a decrease of the amount of PA is evident which indicated a reduction in the general level of participation PA.

The tendency to decrease PA with the increase of age is a constant variable reported by Armstrong and Welsman (2006) [3]. In this regard, Riddoch and al., (2004) [18] have verified that 9 year old children were considerably more active than 15 year old adolescents. The above said case is in line with this study. Our finding show that high school in first year practiced more moderate-to-vigorous PA (32 (22.2%)) than their second year counterparts (32 (7.5%)). Furthermore, second year practiced more moderate-to-vigorous PA than their third year counterparts (0 (0.0%)).

Besides the lower levels of PA, the prevalence of active children and adolescents tended to decrease with age worldwide, particularly among girls. This particularly is due to a gender-based disparity and the fact that girls are less physically active than boys. However, when the information presented by both measurement instruments (24hPAR and IPAQ-SF) are compared, through the 24hPAL the high schoolgirls tended to report longer time spent in low PA (17.58 ± 0.69 vs 15.63 ± 0.62 ; $t = 34.70$; $p < 0.001$) whereas high schoolboys tended to report as longer time spent in activities involving walks and moderate to high intensity physical efforts. As seen in this table 3, schoolgirls preferred a low intensity PA compared to schoolboys through IPAQ-SF or 24hPAR. In 24hPAR, high schoolboys and girls tend to present higher predisposition in reporting levels of physical activity practice higher than they actually are with IPAQ-SF. For example, 25.47 ± 1.13 vs 25.25 ± 1.09 ; $p > 0.05$ and 2.13 ± 0.03 vs 18.50 ± 0.02 ; $p < 0.001$ respectively for 24hPAR and IPAQ-SF. These results confirm evidences that report that young individuals, when evaluated through questionnaires, tend to present higher predisposition in reporting levels of PA practice higher than they actually are. The two questionnaires shows the negative correlation between 24hPAR and IPAQ-SF ($r = -0.10$; $p > 0.05$). This result means through one questionnaire, schoolboys and girls tend to report high levels of PA practice than they report in another questionnaire. As seen after that, the result of two questionnaires shows a positive correlation. Although they didn't assess PA level in the same manner, this result means both trend to well assess the moderate and moderate-to-vigorous ($r = 0.85$; $p < 0.001$ and $r = 0.86$; $p < 0.001$). The overall agreement between both the IPAQ-SF and the 24hPAR in the study was quite impressive, high schoolboys and girls have less PA practice behavior and schoolgirls by using housework spent slightly more time in moderate-to-vigorous PA.

Limitation of the study

It should be noted that, Although Brazzaville high school student reflects the Congolese urban population characterized by a high amount of time devoted on sedentary activities, they are not at all representative of the Congolese population or

Congolese high school students. Second, the results are limited to one high school in Brazzaville region of the country. Nevertheless, the assessment of the PA by questionnaire are needed the upcoming years to better monitoring the PA level of Congolese adolescents in order to contribute to their healthy lifestyles.

Conclusion

In conclusion, the amount of time devoted on the practice of PA is low in both high school boys and girls. Evidence suggests that, the time and the frequency devoted to the practice of the PA decrease according to the increase of age. Concerning the time devoted to practice moderate intensity and moderate-to-vigorous intensity PA, the results revealed that boys have dominated girls due to their highest BMI. This study shows that, the time and frequency of Brazzaville high school student need to be promoting in order to serve in the prevention of their health.

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