doi: http://dx.doi.org/10.7719/jpair.v1i1.35

Physical Activity Profile of Older Elementary School Children of Batac, Ilocos Norte using the Modified Physical Activity Questionnaire for Older Children

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ABSTRACT

Physical activity has been shown by empirical evidence to have strong positive correlation with physical and mental health benefits among adults and children. With this in mind, it would seem obvious that primary intervention programs promoting physical activity should start early among children for them to carry this positive behavior in their adult lives. However, despite its obvious importance, there seems to be a scarcity in local studies detailing the physical activity levels of Filipino children. This is quite ironic considering the wealth of foreign literature supporting the benefits derived from regular physical activity. The study sought to provide data on the level of physical activity of Filipino school children, specifically in Batac, Ilocos Norte. The study made use of the Modified Physical Activity Questionnaire (MPAQ-C). The study was conducted among 238 elementary school students in Batac, Ilocos Norte. Stratified random sampling was done on 1,523 students whose ages ranged from eight (8) to twelve (12), and who belonged to Grade Three (III) to Grade Six (VI). The most common physical activity profile was tagging (7.509%) while the least was karate (3.325%). Respondents were likewise seen to be most active during weekends, coupled with observed restrictions during school days. In PE classes, students were seen to be mildly active (sometimes), with activities mainly confined to classroom work. Children were likewise observed to be involved in sports, dance or play. As to age group, mean physical activity was highest at age ten (10), and lowest at age twelve (12), with a noted increase from ages 8 to 10, and a decrease in ages 10 to 12. ANOVA however, showed that the observed differences were not significant (*f value* = 1.135, $\alpha = 0.05$). Height was like seen as the only variable to have significant effect to physical activities ($r = 0.173$).

Keywords: Physical Activity, Children, Modified Physical Activity Questionnaire, Health

INTRODUCTION

Physical activity is defined as "any bodily movement produced by skeletal muscles that results in energy expenditures [1](Caspersen *et al.,* 1985)." Likewise, it is defined as "any bodily movement produced by contraction of the skeletal muscle that increases energy expenditure above the basal level."

Empirical evidence have established that regular participation in physical activity has been associated with a range of physical and mental health benefits in adults, including reduced risk for coronary heart disease (CHD), [2](Berlin and Colditz, 1990); obesity [3](Brownell, 1982); hypertension [4](Fagard and Tipton, 1994) and non-insulin-dependent diabetes mellitus [5](Helmrich *et al.*, 1991); and anxiety and depression [6](Kesaniemi *et al.*, 2001; US Department of Health and Human Services, 1996). On the other hand, physical inactivity is a well-documented risk factor for coronary heart disease and associated with increased risk for other chronic disease including obesity [7](Treuth,2004), Type II diabetes mellitus, hypertension [8](Gavary, 2003), colon cancer, depression, Low HDL cholesterol, osteoporosis [9](Pate *et. al.*, 2002) and coronary heart disease [10](Bailey, 1995).

Despite the importance of physical activity to health, low level of fitness and recent declines in active transport such as walking and cycling to school have been reported among children in many developed countries. What is likewise alarming is that both literature and health promotional agencies currently proclaim a major epidemic of obesity, both in developed societies and among indigenous populations. Evidence that the average child or adolescent is becoming more obese is based on trends of an increase of body mass index (BMI) in various countries over the past 20 years [11](Shephard, 2004).

Despite these alarming trends, there seems to be a scarcity of local literature detailing the physical activity levels of Filipino school children. This age group should be of special concern, inasmuch as studies indicate that children who are physically active tend to carry over this positive trait to their adult lives. Moreover, the exposure of children to offshoots of development tend to affect the level of participation of children to physical activity pursuits. This is seen in the increased indulgence of children to Internet use and personal computer video games, as well as chatting and other internet based activities. Moreover, schoolchildren are subject to numerous school academic requirements which is the result of constant revision of the school curriculum by the Department of Education.

To assess physical activity level, various methodologies and technologies are available, which are divided into two groups: 1) the direct/ objective measures which make use of machines/gadgets such as double labeled water, the pedometer, and the accelerometer; and 2) the indirect measures which utilized self-reports, diaries and physical activity recall (PAR) questionnaires. The huge cost of utilizing direct measuring instruments seem to be the biggest hindrance for its use. It is for this reason that questionnaires are the most practical choice. This study then made use of the Modified Physical Activity Questionnaire for Older Children (MPAQ-C) as developed by [12]Aurelio (2006). The MPAQC has been found to be a valid instrument in measuring physical activity levels of older children.

METHODS

Research Design

The correlational-descriptive type study involved collecting and gathering of data from randomly selected elementary school children aged 8-12 years old from different elementary schools in Batac, Ilocos Norte.

The study primarily made use of the Modified Physical Activity Questionnaire for Older Children (MPAQ-C) developed by [12]Aurelio (2006), and which was found to be a valid instrument in the assessment of physical activity among Filipino children. The questionnaire likewise gathered anthropometric data (weight, height) of the respondents. Thereafter, the MPAQ-C questionnaire was administered by the researchers.

Subjects and Settings

The study was conducted among 238 randomly selected elementary schools students in Batac, Ilocos Norte. The randomly selected students were taken from three elementary schools, namely: the Hilario Valdez Memorial Elementary School (HVMES); the Mariano Marcos Memorial Elementary School (MMMES) ; and the Catalino Acosta Memorial Elementary School (CAMES). The students belonged to Grades III, IV, V and VI.

Populations and Samples

Randomized sampling was utilized in the selection of the elementary schools that were part of the study. Moreover, randomized sampling was used to select the sample population. Randomized sampling also assured that every member of the population had an equal and independent chance of being selected. The study was limited to school children aged 8-12 years old as this age group was identified as being capable in answering recall questions for the past week. This age group was likewise observed to be more involved on physical activity pursuits.

Table 1 summarizes the sample population of the study from the three randomly selected schools. The total population of older children aged 8-12 years old in HVMES was four hundred thirty eight (438) individuals; CAMES had three hundred sixty nine (369) individuals; and MMES had seven hundred sixteen (716) schoolchildren.

Table 1. Shows the total population of sample per age in each school

School	8 years old	9 years old	10 years old	11 years old	12 years old
MMMES	3	21	17	26	17
CAMES	10	20	19	17	17
HVMES	9	12	26	21	19

Using the formula as previously mentioned, the following sample was eventually derived: HVMS had eighty one (81) individuals; CAMES had seventy five (75) respondents; and MMES had eighty two (82) schoolchildren.

Instrumentation

Physical Activity Instrumentation

The Modified Physical Activity Questionnaire for Older Children (MPAQ-C) developed by Aurelio (2006) was used as the primary assessment tool. The MPAQ-C was found to be a valid instrument in the assessment of physical activity among Filipino schoolchildren.

Anthropometric Measure Instrumentation [13]Preecho project anthropometric and mobility testing procedure

The study likewise gathered physical objective measures among the students. The anthropometric measurements taken were: a) height; b) weight; and c) waist girth. These measures were essential for the correlation aspect of the study.

Weight was the anthropometric measure taken from the respondents where they were asked to remove their shoes or heavy jewelry, and carefully step on to the weighing scale. The respondents were likewise assisted or leaned against any object such as a wall or chair. The respondent was asked to look straight ahead, to stand very still, and remain on the scale until the body weight number on the scale did not move. The weight was taken in kilograms.

The height, taken in centimeters, was the anthropometric measure taken from the respondents where they were asked to stand upright on the floor with the back pressed on the wall. The height was taken using a fixed tape measure that was taped on the wall.

Waistline was the anthropometric measure taken from the respondents where they were asked to stand up and then requested to remove any belt, or loosen any clothing that would interfere with the measurement procedure. The pants and underclothing of the respondent was lowered slightly for the examiner to palpate directly on the hip area for the iliac crest. The examiner stood directly behind the respondent and palpated the hip area for the right iliac crest. The examiner marked the horizontal line at the high point of the iliac crest and then crossed the line to indicate the mid-axillary line of the body. The examiner then stood on the respondent's right side and placed the measuring tape around the trunk in a horizontal plane at this level on the right side of the body trunk. The recorder walked around the respondent to make sure that the tape was parallel to the floor and that the tape was snug (somewhat tightly) but did not compress the skin. The measurement was made at minimal respiration to the nearest 0.25 inch

Body Mass Index Measurement

The Body Mass Indexes (BMI) were eventually computed using the height (in centimeters) and weight (in kilograms) as measured from the sample.

The following figures were used to classify data regarding the BMI of the samples:

Table 2. Values for BMI for girls

	8 y.o.	9 y.o.	10 y.o.	11 y.o.	12 y.o.
Underweight	<13.4	13.8	14	14.4	14.8
Normal	13.6-18.2	13.8-19	14-20	14.4-20.8	14.8-21.8
At risk of overweight	18.2-21.8	19-21	20-22	21-23	22-24
Overweight	21.8	22	23	24	25

Based on tables developed by the National Center for Health Statistics (United States Center for Disease Control)

Table 3. Values for BMI for boys

	8 y.o.	9 y.o.	10 y.o.	11 y.o.	12 y.o.
Underweight	≤13.8	≤14	≤14.2	≤14.6	≤15
Normal	14.8-18	14-18.6	14.2-19.4	14.6-20.2	15-21
At risk of overweight	14.8-20	18-20	14.8-22	14.8-23.2	15-24.2
Overweight	>20	>21	>22	>23.2	>24.2

Based on tables developed by the National Center for Health Statistics (United States Center for Disease Control)

Procedures

The researcher, through a letter, initially sought permission from the Division Superintendent to get a list of all elementary schools within the Batac, Ilocos Norte - Department of Education District. There were two districts within the locality. After randomly selecting the school to be included in the study, the researchers also forwarded request letters to the Principals of the three schools randomly selected. Assurances were likewise given that no disruption of classes would occur.

Upon approval of the requests, the researchers sought the class advisers for the complete list of students. Initially, there were 438 students, of which 238 were randomly selected.

The conduct of the questionnaire involved two successive days. The first day involved MMMES and HVMS, while the second day involved CAMES. As to each school, an initial discussion and clarification was made with the advisers regarding the items in the MPAQ-C. Thereafter, the students were gathered in a big social hall, where respondents were asked to answer the MPAQ-C which was administered by a randomly selected faculty member from the school. Anthropometric measures were taken by physical therapy undergraduate students.

Data Analysis

The responses for each item in the questionnaire were collated in a table. As to each item in the MPAQ-C, means, standard deviation and percentages were used to interpret the results. Analysis of Variance (ANOVA) was likewise used in the correlation part of the study, with the aim of seeing any relationship between the anthropometric data and the level of physical activity.

RESULTS

Characteristics of the Respondents

Sample Population

The total population of older children aged 8-12 years old in HVMES was four hundred thirty eight (438) individuals; CAMES had three hundred sixty nine (369) individuals; and MMES had seven hundred sixteen (716) schoolchildren.

Table 4 shows the sample population per age in each school.

Table 4. Samples per age in each school

School	8 years old	9 years old	10 years old	11 years old	12 years old
MMMES	3	21	17	26	17
CAMES	10	20	19	17	19
HVMES	9	12	26	21	19
Total	22	53	62	64	55

Body Mass Index

Age. Utilizing the height (in centimeters) and weight (in kilograms) measured from each sample, the BMI was computed for each student. A tabulation was made of the BMI of the respondents according to age, as shown in Table 5.

Table 5. BMI of the respondents according to age.

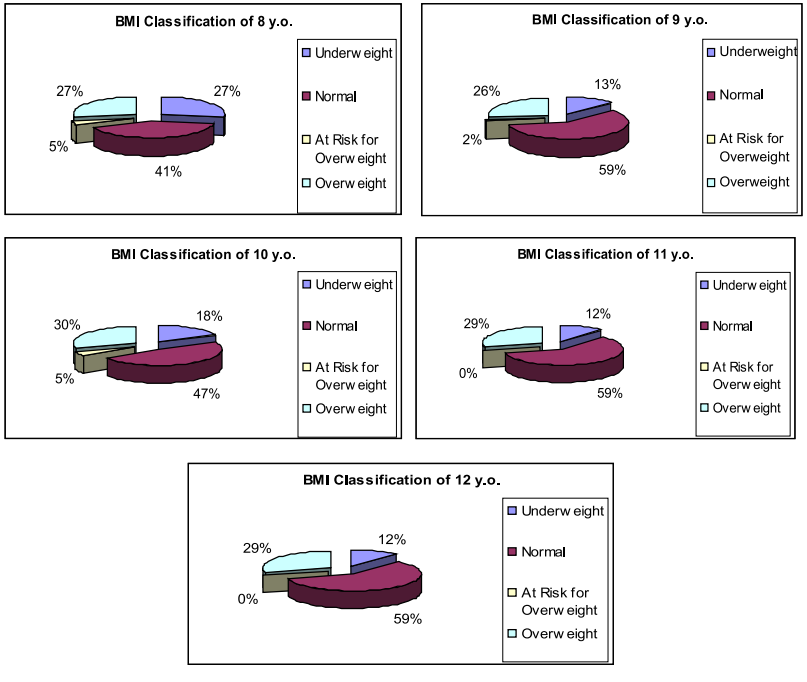
SCHOOL	Sex	Age 8				9				10				11				12			
		U	N	A	O	U	N	A	O	U	N	A	O	U	N	A	O	U	N	A	O
CAMES	M	3	1	0	1	2	4	1	2	0	5	0	4	1	6	0	1	0	3	0	0
	F	0	4	1	0	3	6	0	3	1	5	1	0	1	9	0	0	2	5	2	0
HVMES	M	1	0	0	4	0	1	0	2	2	4	1	9	2	4	0	6	0	0	1	4
	F	1	2	0	1	0	3	0	5	3	3	1	4	0	2	0	7	2	3	0	3
MMMES	M	0	0	0	0	0	9	0	2	4	2	0	1	2	4	0	1	1	3	0	6
	F	1	2	0	0	2	8	0	0	1	9	0	0	0	5	0	0	3	7	1	6
TOTAL		6	9	1	6	7	31	1	14	11	28	3	18	6	30	0	15	8	21	4	19

U- underweight, N- normal, A- at risk for overweight O- overweight

The 10 year old bracket registered the highest number students who belonged to the overweight category (30%), with the 11 and 12 year olds not far behind at 29% each. Curiously, the 8 year old bracket showed the most sizeable percentage of students who belonged to the underweight category (27%), while the 9, 11 and 12 year old brackets showed the highest percentage of students who belonged to the normal category (at 59% each).

Figure 1 gives a summary of the percentages of the BMI classification as to age bracket.

Figure 1. BMI Classification as to Age



Gender. As to the BMI by gender, boys had an almost identical percentage for those who were classified as normal and overweight. Figure 2 shows that 42% of the students had normal BMI, while 39% were considered overweight.

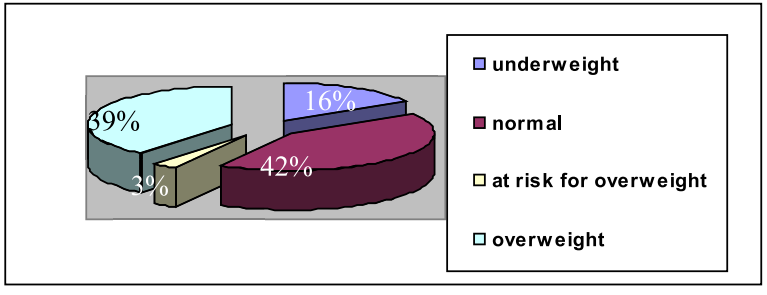


Figure 2. Percentage of BMI of boys of total population.

Majority of the girls, on the other hand, registered a normal BMI classification (57%). A far second (23%) were classified as overweight. Figure 3 summarizes the BMI percentage of the girl respondents.

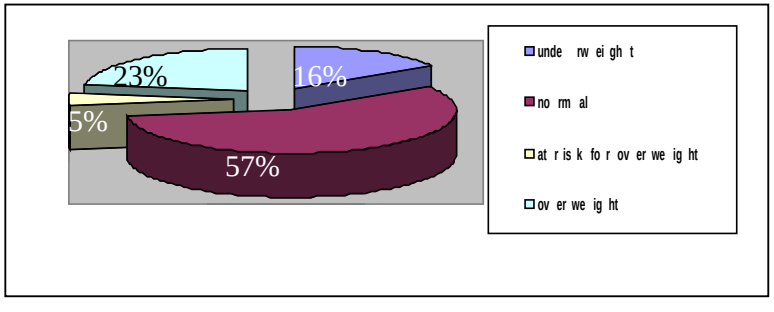


Figure 3. Percentage of BMI of girls

Sample Population. As for the sample population, 50% of the respondents had normal BMI's, with still a sizeable number classified as overweight (30%). Figure 4 shows the BMI percentage for the sample population.

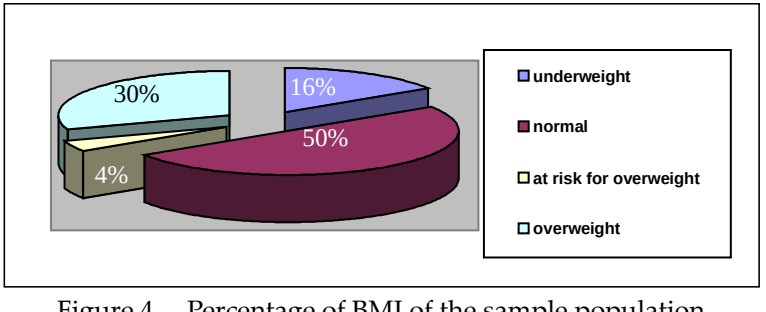


Figure 4. Percentage of BMI of the sample population.

Physical Activity Profile

Tables 6 and 7 present specific details on the physical activities of the respondents. In particular, Table 6 presents the various physical activities that school children may be involved with. Tagging or "*panagtaray*" was the most frequently performed physical activity, with an average of weekly frequency of 2.71 (3 – 4 times a week).

Table 6. Physical Activities of respondents

Activity	Frequency	Interpretation
Skipping	1.61	Never
Dancing	1.89	1 – 2 times
Tag	2.71	3 – 4 times
Walking	2.34	1 – 2 times
Biking	2.36	1 – 2 times
Jogging	1.86	1 – 2 times
Aerobics	1.60	Never
Swimming	1.80	1 – 2 times
Baseball/Softball	1.38	Never
Badminton	2.16	1 – 2 times
Skateboarding	1.23	Never
Soccer	1.36	Never
Volleyball	1.42	Never
Basketball	1.68	Never
Gymnastics	1.29	Never
Karate	1.20	Never
Taekwondo	1.21	Never
Filipino games	2.57	1 – 2 times
Malling	2.19	1 – 2 times
Board games	2.23	1 – 2 times

Table 7 on the other hand shows the average frequency of physical activities through the week. As shown, the respondents were most active with physical activities during weekends, particularly Sunday (2.72, sometimes) and Saturday (2.68, sometimes).

Table 7. Average Frequency of Physical Activity for each day of the week

Days	Mean Freq	Interpretation
Monday	2.22	Rarely
Tuesday	2.34	Rarely
Wednesday	2.28	Rarely
Thursday	2.42	Rarely
Friday	2.41	Rarely
Saturday	2.68	Sometimes
Sunday	2.72	Sometimes

MPAQ-C Results

Table 8 shows the other results of the MPAQ-C instrument. As can be seen, the respondents admit to be very active in their PE class only sometimes (wm = 2.81). This is because there are limited activities that they can perform.

Also, during the past 7-day period, the children reported that they simply stood and walked around either for the whole day or when they were at school. With means of 1.89 and 1.90, it could be deduced that their activities were confined to classroom work and not much on physical work.

As to their performance of sports, dance or play, the children admitted to performing them 2 – 3 times in the past week.

The children also admitted that they play video game and use the computer one (1) to two (2) hours per week, as well as watching television/ VHS/VCD/DVD movies in a week.

Table 8. MPAQ-C results

Statements	Mean Score	
	WM	Interpretation
1. In the last 7 days, during your physical education (PE), how often were you very active?	2.81	Sometimes
2. In the last 7 days, what did you normally do (besides eating)?	1.89	Stood and walked around
3. In the last 7 days, what did you normally do at school (besides eating lunch)?	1.90	Stood and walked around
4. In the last 7 days, how many days right after school, did you do sports, dance or play?	3.03	2 – 3 times
5. In the last 7 days, how many evenings, did you do sports, dance or play?	2.05	Once
6. In the last weekend, how many times did you do sports, dace or play games ?	2.64	2 – 3 times
7. What describes you best for the last 7 days?	2.48	Often

8. Were you sick last week or did anything prevent you from doing your normal physical activities?	1.68	No
9. How long did you play video games and use the computer in a week?	2.66	1 – 2 hours
10. How long did you watch television/VHS/VCD/DVD movies in a week?	3.19	1 – 2 hours

Physical Activity at Various Age Levels

Table 9 shows a comparison of the scores in the modified PAQ-C scores of the respondents at different age levels. As can be seen, the children had the highest rating at age 10 and lowest at age 12.

Table 9. Physical activity at different age levels

Age	Mean Physical Activity Rating
8	2.40
9	2.57
10	2.72
11	2.42
12	2.37

Analysis of Variance in Table 9, however, indicates that the observed differences was not significant. Thus, the level of physical activity as assessed in the MPAQ-C instrument is the same for all the age levels. Table 10 gives a summary of the findings.

Table 10. ANOVA of Table 9

Source of Variation	Sum of Squares	Mean Squares	df	F-value	Significance
Age	4.507	1.127	4	1.135	Not significant
Error	199.596	.857	233		Alpha = 0.05
Total	204.103		237		

Relationship of Variables

Table 11 shows several factors that the researcher assumed to have significant relationship with the physical activities of children aged 8 – 12 years

old. Correlation analysis, however, showed that only height has a significant effect to physical activities of the respondents.

Table 11. Relationship of physical activity with age, gender, height, weight and waist line

Variable	r-value	Relationship	Significance
Age	-0.059	weak correlation	not significant
Gender	0.087	weak correlation	not significant
Height	0.173	strong positive	Significant at 0.05 level
Weight	0.027	weak correlation	not significant
Waistline	-0.059	weak correlation	not significant

With a correlation value of r = 0.173, it shows that height is directly related to physical activity. It can then be inferred that the taller children in the study have higher levels of physical activity.

BMI had an effect to the physical activity in a way that if our respondents were obese and overweight, the result of our study would be negative because it will be hard for our respondents to do the activity listed.

Age, gender, weight, and size of waistline did not show significant relationships with the physical activities of the respondents.

Table 12 shows that height was inversely proportional to BMI. This meant that taller students tended to have smaller BMI's. However, age, sex, weight and waistline were observed to be directly proportional to BMI. This meant that older students, and those who had higher values for their weight and waistline were also found to have higher BMI's.

Table 12. Relationship of profile with BMI

Variable	r-value
Age	0.102 (ns)
Sex	0.086 (ns)
Height	-0 .734 **
Weight	0.372 **
Waistline	0.523 **

CV (df = 236, alpha = .01,2-tailed) = 0163 (highly significant)

DISCUSSION

Results of the study revealed that the types of physical activity where school children mostly engaged in Batac, Ilocos Norte were that of tagging or *"panagtaray"* and playing around. This was reported to be frequently done in a week. It was also shown that school children were most active in weekends as compared to during weekdays. This could be attributed to the mostly academic pursuits of the students during school days, effectively limiting their opportunity to engage in physical activities. Moreover, weekends offer more chances to students to engage in activities that would be physically demanding in nature.

As to their spare time, school children reported that they usually play, run and walked around, rather than engaging in sports. This could be attributed to the school's lack of facilities and equipment that would encourage the children to engage in sports activities. Arguably, students are expected to be more engrossed in their academic pursuits during school days.

Ten year olds were seen to be the most active in age group in terms of physical activity, with the age of 12 as seen to be the least active. This somehow confirms the observation in related studies that there seems to be a decline in the level of physical activity as children go older. On the relationship to variables, age, weight, gender and waistline had no effect on physical activity. Only height was seen to haven effect in the physical activity of children. Other factors that would affect the active participation of children in physical activity were likewise considered, notably that on playing video games, watching television and video movies, and use of the computer. School children reported to be devoting 1-2 hours in a week.

RECOMMENDATIONS

Based from the results, it is recommended that schoolchildren should find ways to increase their level of physical activity specially during weekdays. Established literature recommend that children should spend at least 60 minutes of moderate to vigorous physical activities each day to decrease the risk for childhood and adolescent obesity. The study shows that children seem to spend less time on physical activities that what is recommended.

The study should likewise be replicated in other localities in the country, most notably in metropolitan areas like Manila, Cebu, Cagayan de Oro and Davao. Thereafter, a cross sectional study could be undertaken to compare the results for each locality.

Though found to be minimal in the study (1-2 hours per week), further studies should look into the television and computer habits of children and how these affect their physical activity levels. Moreover, a study about the dietary habits of children should be undertaken. This would be valuable in a correlational study linking BMI, physical activity and the nutritional status among Filipino schoolchildren.

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