PHYSICAL ACTIVITY AND DIETARY HABITS OF FILIPINO COLLEGE STUDENTS: A CROSS-SECTIONAL STUDY

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Original scientific paper
https://doi.org/10.26582/k.50.1.11
UDC: 796.012.6-057.875:613.2

Abstract:

No published study has been tracked to date on the physical activity (PA) and dietary habits (DH) of Filipino college students. Thus, this cross-sectional study aimed to determine (1) the prevalence of regular PA among college students in a Philippine setting and (2) the reasons for either adherence to PA or for being inactive, (3) to describe DH of the students, (4) to compare PA involvement and DH across year levels, and (5) to correlate PA and diet behaviors. Data were collected using a self-administered survey questionnaire. Results showed that only 32.8% of the 1,706 students in this study engaged in regular PA. There were greater proportions of inactivity at higher-year levels (62.5%, 66.5%, 76.5%, and 84.8% in the first, second, third and fourth year, respectively). The major reason for inactivity was lack of time, while the students' PA adherence was largely due to predisposing factors such as knowledge about PA, beliefs in benefits and enjoyment of PA, and confidence in performing physical activity. About one of every three students in each year level had below-average to poor dietary habits, meaning they seldom eat proper types of food. Findings of this study indicate the need for an intervention that will effectively increase regular PA and ensure proper food intake in the student population.

Key words: *exercise, food intake, university students*

Introduction

College life can be stressful due to academic, financial and time-related issues, among others (Ross, Niebling, & Heckert, 1999; Misra & McKean, 2000; Misra & Castillo, 2004). Because of various stressors, it is common to find college students developing unhealthy dietary habits and not being able to engage in regular physical activity (Racette, Deusinger, Strube, Highstein, & Deusinger, 2005).

Sufficient "regular" PA for adults aged 18 to 65 years has been defined by the updated recommendation of the American College of Sports Medicine (ACSM) and the American Heart Association (AHA) as "moderate-intensity aerobic (endurance) physical activity for a minimum of 30 minutes on five days each week or vigorous-intensity aerobic physical activity for a minimum of 20 minutes on three days each week. Combinations of moderate- and vigorous-intensity activity can also be performed to meet this recommendation." (Haskell, et al., 2007)

From 1985 to 2001, 19 primary studies were published on a total of 27 countries studied (Irwin, 2004), which showed that college students were not physically active enough to gain health benefits. In a meta-analysis of college students' PA behaviors (Keating, Guan, Piñero, & Bridges, 2005), it was found that approximately 40% to 50% of students do not participate in adequate volume of PA to accrue health benefits. More recent research studies have likewise shown that a considerable proportion of students are either not able to exercise regularly or are insufficiently physically active (Kilpatrick, Hebert, & Bartholomew, 2005; Racette, et al., 2005; Irwin, 2007; Pedišić, Rakovac, Bennie, Jurakić, & Bauman, 2014).

Physical activity and obesity have known associations with diseases and, thus, have corresponding health care costs. In a study conducted in the U.S. by Pratt, Macera, and Wang (2000), it was found out that higher direct medical costs were associated with physical inactivity. Similarly, in Canada, the economic burden of physical inactivity and obesity was found to be $5.3 billion and $4.3 billion, representing 2.6% and 2.2%, respectively, of the total health care costs in Canada (Katzmarzyk & Janssen, 2004). These research findings lay emphasis on the

significance of studies on physical inactivity and obesity in various populations.

Generally, people are either physically active or inactive due to predisposing, enabling and reinforcing factors. Predisposing factors are antecedents to behavioral change that provide motivation for a certain type of behavior. These are things that make one person more likely to engage in regular PA, such as knowledge about PA, belief in the benefits of and enjoyment in PA, and confidence in performing PA. Enabling factors are antecedents to behavioral change that allow a motivation to be realized. These are things that help one to carry out PA, such as good sport skills, ability to plan one's own PA program, access to a place and equipment for fitness activities, and time to do such activities. Reinforcing factors follow a type of behavior and provide continuing reward for sustaining that behavior. These are things that provide encouragement to adhere to maintain PA for a lifetime, such as the support of family, friends, teachers, and health care providers (Green & Iverson, 1982; Corbin, Lindsey, & Welk, 2000; Sharma & Romas, 2012).

For college students, PA behaviors are influenced by the multifaceted interaction of motivations and self-regulatory skills along with the distinct social and physical environment encompassing college life. In a qualitative study by LaCaille, Dauner, Krambeer, and Pedersen (2011), both male and female college students indicated motivation (predisposing factor), social support (reinforcing factor) and convenience and diversity of on-campus options (enabling factors) as the facilitating factors for exercise and lack of time due to the demands of college life as the primary hindering factor.

Since students get more occupied as they reach higher years in college, greater prevalence of inactivity may be expected among upper-year students. In relation to this, rates of inactivity have been found to increase by 3 to 8 percentage points per year during ages 15 to 18 (Caspersen, Pereira, & Curran, 2000). Low PA has also been found to be associated with inappropriate dietary behavior (Pate, Heath, Dowda, & Trost, 1996).

A myriad of studies have also shown that college students often have poor dietary habits (Haberman & Luffey, 1998; Anding, Suminski, & Boss, 2001; Huang, et al., 2003; Racette, et al., 2005; Brunt, Rhee, & Zhong, 2008; Al-Rethaiaa, Fahmy, & Al-Shwaiyat, 2010). Unhealthy dietary and PA patterns of college students may have carryover effects in their adulthood, predisposing them to future health problems such as obesity, cardiovascular problems and a host of many other diseases (Calfas, Sallis, Lovato, & Campbell, 1994; Sparling & Snow, 2002; Racette, et al., 2005; Pritchard, Wilson, & Yamnitz, 2007), so it is of utmost importance to adopt healthy dietary habits during the college life. In a study on obesity trends in the U.S. from 1991 to 2013, 40% of college-aged adults (ages 18-24) were classified as either overweight or obese, which marks the start of a trend towards larger percentages of overweight and obesity among adults in later stages of life. This trend suggests the necessity for interventions aimed at obesity-related behaviors among college-aged adults as a strategy for reducing rates and long-term health problems among adults (Harmon, Forthofer, Bantum, & Nigg, 2016).

However, to the authors' best knowledge, no study on these health-related variables among Filipino college students has been published to date. Thus, this study aimed to determine the prevalence of regular PA among college students in a Philippine setting, to describe the type, duration, and frequency of activities they engage in and the reasons for either adherence to PA or for being inactive. Additionally, this study sought to describe dietary habits of the students, compare PA involvement and dietary habits across college year levels, and correlate PA and diet behaviors. This research also constitutes Phase 1 of a longitudinal study which tracks the diet and PA behaviors of Filipino students as they go through their college experience.

Methods

Participants

This is an analytic cross-sectional study. Data collection was conducted from January to March 2014 among the first to fourth year Filipino college students in a privately owned university in the Philippines. Total enumeration was attempted among the Filipino freshman students by administering the survey during Physical Education (PE) classes. This was done because the freshman data are crucial for a longitudinal study being conducted by the researchers on PA, dietary habits and body mass index of students in the same university.

A total of 1,568 first-year students responded, but only 1,121 completely and correctly accomplished questionnaires were included in the final analysis. The first-year students diagnosed with health conditions that prohibited PA were automatically excluded because such students were exempted from PE classes. Likewise, students who were players in the varsity teams of the university, and were thus expected to have regular PA, were not included as study participants.

On the other hand, cluster random sampling was done to obtain sophomore, junior and senior student-participants. The sampling frame consisted of the list of sections per degree program per year level. With a population size of 3,629 upper class persons, a sample size of 348 achieves 95% confidence and 5% maximum tolerable error in detecting a 50% prevalence of physical activity/inactivity.

Table 1. Demographic characteristics of study participants

Characteristic	Year level			
	1st (n = 1,121)	2nd (n = 188)	3rd (n = 200)	4th (n = 197)
Age in years (median ± IQR)	17±1	18±1	19±0	20±1
Gender				
Male, n (%)	426 (38.0)	53 (28.2)	30 (15.0)	46 (23.4)
Female, n (%)	695 (62.0)	135 (71.8)	170 (85.0)	151 (76.6)
BMI[a] (median ± IQR)	20.7±4.4	20.4±4.5	20.8±3.9	21.3±3.9
Underweight (< 18.5), n (%)	222 (19.8)	42 (22.3)	43 (21.5)	27 (13.7)
Increasing but acceptable risk (18.5 to < 23), n (%)	593 (52.9)	95 (50.5)	112 (56.0)	111 (56.4)
Increased risk (23 to < 27.5), n (%)	222 (19.8)	41 (21.8)	34 (17.0)	47 (23.9)
Higher high risk (>= 27.5), n (%)	84 (7.5)	10 (5.3)	11 (5.5)	12 (6.1)

Note. [a]WHO Expert Consultation (2004).

However, a sample size of 200 per year level (5 to 6 sections) was obtained to ensure that the minimum target of 348 would be achieved. The final numbers of participants with completely and correctly filled out questionnaires for sophomores, juniors and seniors were 188, 200, and 197, respectively. The demographic characteristics of the study participants are presented in Table 1.

Measures

A self-administered questionnaire was the primary instrument used for collecting the data in this study. Part I of the questionnaire consisted of items on the students' basic characteristics, namely their age, gender, study course, year, and section. Body weight (BW) was measured by the researchers using Seca Clara 803 Digital Scale and body height (BH) was measured using Seca Body meter. Body mass index (BMI), which is the ratio of BW in kilograms to BH in meters squared, was computed and interpreted based on the recommendations for the appropriate BMI for Asian populations from the WHO Expert Consultation (2004). In this study, BMI was determined for descriptive purposes only.

Part II consisted of items on the students' PA (e.g. whether students did engage in regular PA, with the term "regular" operationally defined as at least 150 minutes or 2.5 hours of moderate PA per week based on Haskell et al., 2007; the general and specific types of PA students participated in; frequency and duration of PAs, reasons for not engaging in PA, if any). Part III was the "Physical Activity Adherence Questionnaire" (PAAQ) by Williams (1993) which consisted of 12 statements with a 3-point response scale (very true=3, somewhat true=2, not true=1). The items of the PAAQ are presented in Table 6. The first four statements are considered predisposing factors, the next four enabling factors and the last four reinforcing factors. Responses to the four items under each factor were summed and scores were interpreted as follows: 8 and below – adherence unlikely, 9 to 10 – good adherence, and 11 to 12 – adherence likely. An overall PA adherence score was also obtained by adding the three factors scores. This overall adherence score was interpreted as follows: 24 and below – adherence unlikely, 25 to 32 – good, and 33 to 36 – adherence likely. The overall Cronbach's alpha for the PAAQ was computed to be 0.846, indicating good internal consistency. Lastly, Part IV was the 25-item "Dietary Habits Questionnaire" (DHQ) by Corbin et al. (2000). Some types of food in this questionnaire were localized to Philippine context. For all items, except for items 5, 7, 8, 9, 10, and 12, the options were arranged according to health value. The first option represented the most ideal choice, which was accorded a score of 4; the second option was the next most ideal choice, and this was accorded a score of 3, and so on. The total score was obtained for the DHQ by summing the responses to the 25 items after reverse scoring responses to items 5, 6, 7, 8, 9, 10, and 12. Responses to item 20 were scored as follows: skim or non-fat milk=4, whole milk=1, don't drink milk=0. The total score was then classified as poor (24 to 44), below average (45 to 59), about average (60 to 74), good (75 to 89), or excellent (90 to 100).

Since the researchers' institution did not yet have an accredited ethics review committee at the time of this study, formal ethical clearance was not sought. Nonetheless, the applicable principles outlined in the Declaration of Helsinki were conscientiously followed (World Medical Association, 2013). Prior to filling out the questionnaire, the students were informed about the objectives of the study and were assured of the confidentiality of their individual responses. They were also given instructions on how to fill out the questionnaire completely and truthfully. All participants signed a written informed consent form. For students below the age of 18 years, a written informed consent was obtained from the students and their parents or legal guardians.

Statistical analysis

To describe the prevalence of regular PA, the type, duration, and frequency of activities engaged in, the reasons for either adherence to PA or for being inactive, and the dietary habits of the students, frequency and percentage distributions of the categorical data were presented.

Quantitative data (total number of hours of PA per week and summated scale scores from the PAAQ and DHQ) were subjected to distribution normality test through Shapiro-Wilk tests which yielded p-values less than .05, indicating non-normal distribution. These non-normally distributed quantitative data were presented as median±inter-quartile range. Non-parametric tests were then performed on the said non-normally distributed data.

Chi-square **(χ^2)** test was used to compare responses of the physically active and inactive students to the PAAQ. Chi square **(χ^2)** test, along with Kruskal Wallis test, was also used to compare PA involvement and dietary habits, respectively, across year levels. Spearman rho **(ρ)** was used to determine correlation between PA and diet behaviors. P-values less than .05 were considered significant. All statistical computations were performed using Intercooled Stata, version 13 (StataIC 13).

Results

On the whole, 560 out of 1,706 study participants (32.8%) were found to engage in regular PA. This engagement in PA was found to be significantly associated with a year level with greater proportions of inactivity in higher year levels (62.5%, 66.5%, 76.5%, and 84.8% in the first, second, third, and fourth year, respectively; χ^2=46.54, p<.01) (Table 2).

More students were found to be into PAs which were recreational as opposed to mandatory Physical Education (47.1% vs. 18.0%). About one third of the physically active participants performed both mandatory Physical Education and recreational activities. The most popular activities were: jogging / walking / cycling (70.4%) and ball games (50.7%) (Table 3). The active participants' median duration of PAs per week was 3±3 hours (Table 4). The primary reason for inactivity was lack of time (87.2%) (Table 5).

Majority of both physically active and inactive participants had a strong belief that PA was good for them, although the proportion with such belief among the active participants was statistically higher (87.3 vs. 79.2, χ^2=17.08, p<.01). Additionally, a significantly higher proportion of physically active students expressed enjoyment in doing regular exer-

Table 2. Distribution of students' involvement in regular[a] physical activity by year level

Year level	With regular PA n (%)	No regular PA n (%)	Chi-square test statistic
1 (n = 1,121)	420 (37.5)	701 (62.5)	
2 (n = 188)	63 (33.5)	125 (66.5)	
3 (n = 200)	47 (23.5)	153 (76.5)	46.54**
4 (n = 197)	30 (15.2)	167 (84.8)	
Total	560 (32.8)	1146 (67.2)	

Note. [a]At least 150 minutes or 2.5 hours of moderate PA per week based on Haskell et al. (2007).
*** p<.01*

Table 3. Physical activity engagement

Type of regular PA	Frequency	% (n = 560)
Recreational	264	47.1%
Mandatory Physical Education	101	18.0%
Recreational and mandatory	195	34.8%
Specific PAs	Frequency	% (n = 560)
Jogging / walking / cycling	394	70.4%
Ball games (basketball, volleyball, softball, etc.)	284	50.7%
Rhythmic activities (aerobics, dancing, pep squad, taebo, etc.)	191	34.1%
Racket games (table tennis, badminton, lawn tennis, etc.)	153	27.3%
Body building (weight lifting, etc.)	111	19.8%
Aquatics (swimming, kayaking, diving, etc.)	73	13.0%
Combative (boxing, arnis, martial arts e.g. taekwondo, karate, aikido, etc.)	69	12.3%
Leisure (golf, billiards, skydiving, wall climbing, etc.)	31	5.5%
Target games (shooting, archery, darts, paintball, etc.)	30	5.4%

cise and PA as opposed to the inactive students (67.9% vs. 36.3%, χ^2=153.28, p<.01) (Table 6).

Likewise, significantly greater percentages of physically active students indicated having many friends who enjoyed the same kinds of PAs that they did (51.6% vs. 29.0%, χ^2=88.97, p<.01), had the support of their family (49.6% vs. 29.7%, χ^2=69.89, p<.01) and friends for doing regular physical activity (47.9% vs. 30.2%, χ^2=56.21, p<.01), had a place to do PA near their home or school (52.5% vs. 24.5%, χ^2=144.13, p<.01), had the equipment they needed for PAs that they enjoyed (42.1% vs. 16.7%, χ^2=157.40, p<.01), were confident of their abilities in PAs (48.2% vs. 24.9%, χ^2=105.37, p<.01), were very knowledgeable about PAs (45.0% vs. 26.9%, χ^2=63.09, p<.01), possessed good sport skills (31.3% vs. 14.9%, χ^2=83.07, p<.01), knew how to plan their own PA program (30.7% vs. 12.0%, χ^2=115.94, p<.01), and had a doctor who encouraged them to exercise (19.1% vs. 13.3%, χ^2=11.70, p<.01) (Table 6).

Based on the foregoing, the predisposing, enabling and reinforcing factors were all found to be significantly associated with greater likelihood of engagement in PA (χ^2=179.0, 219.6, and 76.1; for all three p<.01). Among the three determinants of PA adherence, students who regularly do their PAs were highest in predisposing factors (knowledge about PA, belief in the benefits of PA, enjoyment in doing PA, and confidence in PA abilities) (Table 7).

In terms of dietary habits, the participants generally often ate a wide variety of foods each day, selecting foods from each of the three basic food groups (Go, Grow, Glow Foods), foods that were high in dietary fiber (fruits and vegetables), and eggs or foods containing eggs (51.8%, 43.8%, and 45.8%, answered "frequently or often" to the said items, respectively). They also usually had at least two pieces of fresh fruit in their meals as well as dark green leafy vegetables such as malunggay (moringa) and pechay (pak choy), dark orange vegetables such as carrots, or deep yellow vegetables such as squash (41.8% and 43.0% answered "3 to 4 days per week" to the said items, respectively). They often kept the serving sizes fairly small (like

Table 4. Duration and frequency of regular physical activity per week

Duration of PA per session		No. of days of PA per week			Total
		2	3-4	≥ 5	
1 hour	n	0	186	61	247
	%	0.0%	75.3%	24.7%	100.0%
2 hours	n	116	103	45	264
	%	43.9%	39.0%	17.0%	100.0%
3 hours	n	13	23	13	49
	%	26.5%	46.9%	46.9%	100.0%
Total	n	129	312	119	560
	%	23.0%	55.7%	21.3%	100.0%

Table 5. Reasons for not engaging in any physical activity

Reason for not engaging in PAs	Frequency	% (n=727)
No time	634	87.2%
No resources available for preferred PA	64	8.8%
No need, I am already physically fit	15	2.1%
Lazy	14	1.9%

Table 6. Responses of physically active and inactive students in the Physical Activity Adherence Questionnaire

Items	No regular PA n (% out of 1146)	With regular PA n (% out of 560)	Chi-square test statistic
I am very knowledgeable about PA.	308 (26.9)	252 (45.0)	63.09**
I have a strong belief that PA is good for me.	908 (79.2)	489 (87.3)	17.08**
I enjoy doing regular exercise and PA.	416 (36.3)	380 (67.9)	153.28**
I am confident of my abilities in sports, exercise, and other PAs.	285 (24.9)	270 (48.2)	105.37**
I possess good sport skills.	171 (14.9)	175 (31.3)	83.07**
I know how to plan my own PA program.	137 (12.0)	172 (30.7)	115.94**
I have a place to do PA near my home or school.	281 (24.5)	294 (52.5)	144.13**
I have the equipment I need to do PAs I enjoy.	191 (16.7)	236 (42.1)	157.40**
I have the support of my family for doing my regular PA.	340 (29.7)	278 (49.6)	69.89**
I have many friends who enjoy the same kinds of PAs that I do.	332 (29.0)	289 (51.6)	88.97**
I have the support of my friends for participation in activity.	346 (30.2)	268 (47.9)	56.21**
I have a doctor who encourages me to exercise.	152 (13.3)	107 (19.1)	11.70**

Note. Frequencies and percentages presented are for "very true" responses only.
** p<.01

Table 7. Physical activity adherence of students with and without regular physical activity

Physical activity[a] adherence due to predisposing factors	With regular PA n (% out of 560)	No regular PA n (% out of 1,146)	Chi-square test statistic
Unlikely	66 (11.8)	299 (26.1)	
Good	191 (34.1)	593 (51.8)	179.0**
Likely	303 (54.1)	254 (22.2)	
Physical activity[b] adherence due to enabling factors	With regular PA n (% out of 560)	No regular PA n (% out of 1,146)	Chi-square test statistic
Unlikely	212 (37.9)	831 (72.5)	
Good	205 (36.6)	244 (21.3)	219.6**
Likely	143 (25.5)	71 (6.2)	
Physical activity[c] adherence due to reinforcing factors	With regular PA n (% out of 560)	No regular PA n (% out of 1,146)	Chi-square test statistic
Unlikely	233 (41.6)	730 (63.7)	
Good	207 (37.0)	280 (24.4)	76.1**
Likely	120 (21.4)	136 (11.9)	
Overall PA adherence	With regular PA n (% out of 560)	No regular PA n (% out of 1,146)	Chi-square test statistic
Unlikely	106 (18.9)	579 (50.5)	
Good	359 (64.1)	515 (44.9)	187.9**
Likely	95 (17.0)	52 (4.5)	

Note. [a] – Predisposing factors – things that make one person more likely to engage in regular physical activity such as knowledge about, belief in the benefits and enjoyment of, and confidence on performing physical activity
[b] – Enabling factors – things that help one to carry out physical activity such as good sport skills, ability to plan one's own physical activity program, access to a place and equipment for fitness activities and time to do such activities
[c] – Reinforcing factors – things that provide encouragement to maintain physical activity for a lifetime such as the support of family, friends, teachers, and health care providers
** p<.01

the size of small matchbox) when they eat animal protein (pork, beef, and chicken) and eat whole wheat breads, cereals and other grain products (43.4% and 40.3% answered "3 to 4 days per week" to the said items, respectively). What they normally had on their sandwich is roast beef or peanut butter (33.7%) or tuna (31.8%) (Table 8).

However, they also generally often ate foods that were high in refined sugar, such as common table sugar, candy, cakes and soft drinks / soda; ate at least one typical meal per day at a fast-food restaurant; ate a lot of highly processed packaged foods that contained numerous additives (bacon, longganisa, tocino, etc.); ate salty snacks, such as chips and other vending machine products; and add salt to meals (fish sauce, soy sauce and seasoning) (40.0%, 40.3%, 41.4%, 40.2% and 36.6% answered "frequently or often" to the said items, respectively). What they usually put on bread is butter (43.3%) and what they usually had for dessert or sweet snacks were ice cream or candy bar or sherbet or milk shake (44.8%). Also, their foods were normally cooked using vegetable oil (34.7%) (Table 8).

On the other hand, the participants generally seldom ate pasta as their main meal, legumes, hard cheeses, packaged luncheon meats and other processed meat in cans (51.9%, 44.4%, 45.6%, and 41.8%, answered sometimes or occasionally to the said items, respectively), vegetables in the cabbage family, such as broccoli, cauliflower, or lettuce, oat bran, oatmeal, or other oat products and they seldom drank milk (42.4%, 43.3%, and 31.8% answered 1 or 2 days per week to the said items, respectively). If they ever drank milk, they usually had whole milk instead of non-fat or skim milk (52.9%) (Table 8).

Based on the foregoing, only around 7.5% of the students can be said to have good to excellent dietary habits. Conversely, 34.0% of students were found to have below average to poor dietary habits (Table 9). No significant differences in dietary habits were found across year levels (χ^2=19.6, p>.05) (Table 10).

Dietary habits were found to be positively correlated with PA behaviors (ρ=0.1501 to 0.2632, p<.01), indicating that college students with relatively better dietary habits also had higher PA involvement (Table 11).

Table 8. Responses to the Dietary Habits Questionnaire (n = 1,706)

I eat –	Almost always n (%)	Frequently or often n (%)	Sometimes or occasionally n (%)	Rarely or never n (%)
a wide variety of foods each day, selecting foods from each of the 3 basic food groups (Go, Grow, Glow Foods)	511 (30.0)	885 (51.8)	293 (17.2)	17 (1.0)
pasta in my main meal about two to three times per week.	144 (8.4)	450 (26.4)	885 (51.9)	227 (13.3)
legumes (beans such as mongo) several times per week.	137 (8.0)	530 (31.0)	757 (44.4)	282 (16.5)
foods that are high in dietary fiber (fruits and vegetables)	498 (29.2)	747 (43.8)	396 (23.2)	65 (3.8)
foods that are high in refined sugar, such as common table sugar, candy, cakes and soft drinks / soda.	483 (28.3)	683 (40.0)	480 (28.1)	60 (3.5)
a lot of hard cheeses, such as cheddar cheese.	175 (10.3)	525 (30.8)	777 (45.6)	229 (13.4)
a lot of packaged luncheon meats and other processed meat in cans.	194 (11.4)	614 (36.0)	713 (41.8)	185 (10.8)
at least one typical meal per day at a fast-food restaurant.	313 (18.4)	688 (40.3)	575 (33.7)	130 (7.6)
a lot of highly processed packaged foods that contain numerous additives (bacon, longganisa, tocino etc.).	253 (14.8)	706 (41.4)	635 (37.2)	112 (6.6)
eggs or foods containing eggs on a daily basis.	405 (23.7)	781 (45.8)	458 (26.9)	62 (3.6)
salty snacks, such as chips and other vending machine products.	296 (17.4)	685 (40.2)	588 (34.5)	137 (8.0)
I add salt to meals (fish sauce, soy sauce and seasoning).	359 (21.0)	624 (36.6)	543 (31.8)	180 (10.6)
How often do you –	More than 5 days per week	3 to 4 days per week	1 or 2 days per week	0 to 2 days per month
have at least two pieces of fresh fruit?	214 (12.5)	713 (41.8)	677 (39.7)	102(6.0)
have dark green leafy vegetables such as malunggay and pechay, dark orange vegetables such as carrots, or deep yellow vegetables such as squash?	264 (15.5)	734 (43.0)	600 (35.2)	108 (6.3)
have vegetables in the cabbage family, such as broccoli, cauliflower, or lettuce?	220 (12.9)	616 (36.1)	723 (42.4)	147 (8.6)
keep the serving sizes fairly small (like the size of small matchbox) when you eat animal protein (pork, beef, chicken)	397 (23.3)	741 (43.4)	426 (25.0)	142 (8.3)
eat whole wheat breads, cereals, or other grain products?	357 (20.9)	687 (40.3)	547 (32.1)	115 (6.7)
include oat bran, oatmeal, or other oat products in your diet?	162 (9.50)	451 (26.4)	739 (43.3)	354 (20.8)
have at least two glasses of milk per day?	318 (18.6)	479 (28.1)	542 (31.8)	367 (21.5)
	Skim or non-fat milk	Whole milk	I don't drink milk.	
Which type of milk do you normally drink?	603 (35.4)	903 (52.9)	200 (11.7)	
	Fish or plant protein	Chicken, or other poultry	Red meat, such a beef or pork	Hard cheeses
Which of the following protein sources do you normally select?	468 (27.4)	696 (40.80)	531 (31.1)	11 (0.6)
	Nothing or low-sugar spreads	Diet margarine	Regular margarine	Butter
What do you normally put on bread?	575 (33.7)	61 (3.6)	331 (19.4)	739 (43.3)
	Fresh fruit	Presweetened yogurt	Sherbet or milk shake	Ice cream or candy bar
What do you normally have for sweet snacks or dessert?	681 (39.9)	108 (6.3)	152 (8.9)	765 (44.8)
	Tuna fish	Chicken	Roast beef or peanut butter	Packaged, processed luncheon meat
What do you normally have on a sandwich?	542 (31.8)	438 (25.7)	574 (33.7)	152 (9.0)
	Bake, grill, steam, or microwave	Use olive or peanut oil	Use other vegetable oil	Use butter, lard, coconut or palm oil
How do you normally cook your foods?	553 (32.4)	186 (10.9)	592 (34.7)	375 (22.0)

Table 9. Overall classification of eating habits

Eating habits	Frequency	% (n = 1,706)
Poor	10	0.6%
Below average	569	33.4%
About average	1,000	58.6%
Good	124	7.3%
Excellent	3	0.2%
Total	1,706	100.0

Table 10. Comparison of eating habits by year level

Eating habits	Year Level				Total	Chi-square test statistic
	1 n (%)	2 n (%)	3 n (%)	4 n (%)		
Poor	5 (0.5)	2 (1.1)	0 (0.0)	3 (1.5)	10 (0.6)	19.6
Below average	387 (34.5)	50 (26.6)	69 (34.5)	63 (32.0)	569 (33.4)	
About average	650 (58.0)	122 (64.9)	116 (58.0)	112 (56.9)	1,000 (58.6)	
Good	78 (7.0)	14 (7.5)	15 (7.5)	17 (8.6)	124 (7.3)	
Excellent	1 (0.1)	0 (0.0)	0 (0.0)	2 (1.0)	3 (0.2)	
Total	1,121	188	200	197	1,706	

Note. p=.074

Table 11. Correlation between dietary habits and physical activity behaviors

	Spearman Rho correlation coefficient
No. of hours of PA per week	0.1665**
Physical activity adherence due to predisposing factors	0.2490**
Physical activity adherence due to enabling factors	0.2605**
Physical activity adherence due to reinforcing factors	0.1501**
Overall PA adherence	0.2632**

Note. ** p<.01

Discussion and conclusions

This study, which sought to determine the prevalence of regular PA among college students in a Philippine setting, revealed a very high proportion of physical inactivity among Filipino college students in the selected university, with greater proportions of inactivity in higher year levels. The major reason for inactivity was lack of time, while the students' PA adherence was largely due to predisposing factors. About one of every three students in each year level had below average to poor dietary habits.

Physical activity

The proportion of physically inactive Filipino students in this study was found to be 67.2%. This is higher than the prevalence of inactivity cited by Keating et al. (2005) in their meta-analysis, which made use of the same criterion for "regular" physical activity as the one used in this study. Their results showed that approximately 40% to 50% of students did not participate in enough PA to maintain and improve health. Similarly, the prevalence of insufficient PA in this study was higher than the 28.4% found among the Croatian students (Pedišić, et al., 2014). However, PA in the latter study was measured using the International Physical Activity Questionnaire (IPAQ) which based the adequacy of PA on MET-hours per week.

Based on the ACSM / AHA recommendation, overall, 67% of the students in our study did not meet the recommended amount of PA per week. This is higher than the US data in 2005 (Haskell, et al., 2007) wherein the prevalence of adults (18 to 24 years of age) not meeting the recommendation was 40.4%. Similarly, in a systematic review by Irwin (2007), more than one-half of college students in the United States and Canada were not active enough to gain health benefits. Internationally, the same is true, although Australian students appear to have the highest level of sufficient activity (at 60%). No data were found among Asian college students.

Greater proportions of inactivity were noted among students in higher year levels (62.5%, 66.5%, 76.5%, and 84.8% in the first, second, third and fourth year, respectively). This finding is consistent with that of Kristjansdottir and Vilhjalmsson (2001) wherein sedentary behavior was found to increase with age especially after early adolescence because

PA was only attributed largely to compulsory Physical Education classes, suggesting that when there is no more mandatory Physical Education in the curriculum, many students do not engage anymore in voluntary physical activities. In the Philippines, Physical Education subjects are included in the college curricula in all courses only during the first and second years. Thus, in the upper year levels, due to the absence of a "required" physical education subject, coupled with a greater bulk of work needed for their major coursework, junior and senior college students become less physically active.

Similarly, Caspersen et al. (2000) noted that there is usually a decrease in PA levels between the ages of 15 to 18 years and this decrease is consistent up to 29 years of age. As the said authors explained, the decline in PA patterns could be discerned through simple observation where one is much more likely to find younger adolescents at playgrounds, playing their favorite sports, than older adolescents or young adults. The erosion of PA during young adulthood (ages 18-29) also represents the period of increasing assimilation into adult work and family roles. This is also true in the Philippine setting. This finding underscores the necessity for proper interventions for age groups 15 to 29 years.

Physical activity engagement is a complex behavior influenced by multiple factors within the environmental, social/cultural, and psychological/cognitive domains (Sallis, Prochaska, & Taylor, 2000). In this study, the major reason for inactivity was lack of time, while the students' PA adherence was largely due to predisposing factors. Allender, Cowburn, and Foster (2006) identified that weight management, social interaction and enjoyment were common reasons for the participation in sport and physical activity. Concerns about maintaining a slim body shape motivated participation among young girls.

Dietary habits

About one of every three students in each year level had below average to poor dietary habits. This finding is similar to the finding of other research studies: Al-Rethaiaa et al. (2010) indicated that irregular and infrequent meals together with low vegetables and fruits intake were the most common unhealthy dietary habits of college students. Similarly, in the study by Racette et al. (2005), 70% of the college fresh persons had poor dietary habits (i.e., ate fewer than 5 fruits and vegetables daily, and more than 50% ate fried or high-fat fast foods at least 3 times during the previous week). Another study by Huang et al. (2003) found that more than 69% of the participants reported less than 5 servings of fruits and vegetables per day and more than 67% reported less than 20 g of fiber per day. Because of their schedule and the available food choices, college students may be eating the same foods day after day (Haberman & Luffey, 1998). This is why college administrators should create health promotion and skill-building programs to improve students' diet variety (Brunt, et al., 2008). Unfortunately, there is a lack of literature in the Philippine setting regarding adherence to dietary guidelines among Filipinos in any age group, which could have served as basis for programs on promoting a healthy diet. This is because of the complicated process of recording the actual quantity of food intake and converting them to equivalents of serving portions of common foods as stipulated in the Daily Nutritional Guide Pyramid for Filipinos ages 13 to 19 (Food and Nutrition Research Institute – Department of Science and Technology, 2000).

Dietary habits and PA

In this study, dietary habits were found to be positively correlated with PA behaviors suggesting that college students who tend to eat healthier meals are also the ones who tend more to perform PA regularly. This finding is similar to that of Pate et al. (1996).

In conclusion, this study serves as the fundamental first step for the development of effective health promotion interventions as it has provided evidence that a high percentage of the Filipino college students in the selected university are not meeting the requirements for PA and dietary intake. This underscores the need for measures that will effectively increase involvement in regular PA and proper food intake in the student population. Physical education pedagogy specialists, who are the ones who actually teach physical education courses, should work together with the college / university health officials to promote PA and proper food intake among college students.

To promote physical activity, we recommend the following: the administrators of the school should provide facilities, equipment and materials for PA of the students; they should offer variety of physical fitness programs for students to engage in; physical educators should motivate their students to engage themselves incessantly in any type of organized PA to lessen their exposure to sedentary lifestyle; and they should make the students become aware of their present physical status. Likewise, the school may require special courses in Physical Education during higher years as elective subjects so that the students will be provided with the opportunity to do PA.

To promote healthy dietary habits, the school canteen should only offer variety of healthy foods and drinks at affordable prices and conduct massive information campaigns on the "Daily Nutritional Guide Pyramid" by the FNRI.

Limitations

As in other studies on PA, the present research relied on self-reported PA due to the lack of devices such as accelerometers or pedometers in the study setting. On the other hand, dietary habits were not based on a food diary (which is a logbook of the actual foods taken and their corresponding number of servings), but on a one-time survey questionnaire administration that depended largely on the recall of foods usually consumed. Intensity of PA was also not considered. Only the amount of time spent in PA (volume) was asked because of the difficulty of determining the level of intensity of various activities. Moreover, the research design of the present study is only cross-sectional. A longitudinal study may be done in the future to track the actual changes in the students' physical activity, dietary habits and BMI as they progress in their college life. Experimental studies may also be done to test the effect of interventions such as an individual physical fitness plans on the said variables. Furthermore, a similar study may be conducted in a public university to improve generalizability of results.

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Submitted: August 27, 2016
Accepted: June 13, 2017
Published Online First: November 9, 2017

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