

Dietary behavior and physical activity patterns of tertiary students at a state university in the Philippines

John Michael Aquino^{1*}, Maria Rossa Agatha Medel¹, Bernardo Lirio II², Joseph Lobo³

¹ Laguna State Polytechnic University, Philippines.

² Southern Luzon State University, Philippines.

³ College of Sports, Exercise and Recreation, Bulacan State University, Philippines.

* Correspondence: John Michael Aquino; johnmichael.aquino@lspu.edu.ph

ABSTRACT

Understanding the dietary behavior and physical activity of tertiary students is essential, as these factors significantly impact their physical well-being, academic performance, and long-term health outcomes. This study examined the relationship between dietary intake and physical activity among tertiary student in one state university in the Philippines with family background considered as a contextual factor. A quantitative research design was employed, involving 366 randomly selected students from Hospitality Management (n=247), Food Technology (n=78), and Technology and Livelihood Education (n=41) programs who completed a validated questionnaire through online platforms including a non-quantitative Food Frequency Questionnaire (FFQ) and physical activity items. Results were analyzed and indicated that while many students engaged in moderate to vigorous physical activity, they also reported prolonged sedentary behavior averaging a five hours per day. Students with sufficient physical activity were more likely to consume healthier foods ($p < 0.05$). However, financial constraints contributed to meal skipping and low intake of nutrient-dense foods like legumes and red meat. These findings highlight the interdependence of physical activity and diet, shaped by socio-economic background, and underscore the need for targeted institutional interventions. Higher Education Institutions should integrate nutrition education, affordable healthy meals, and structured physical activity into campus life.

KEYWORDS

Dietary Behavior; Family Background; Physical Activity; Students; Health and Well-Being

1. INTRODUCTION

In recent years, growing attention had been given to the health and wellbeing of tertiary students, especially as they navigate academic, social, and lifestyle transitions. Among the most influential factors affecting student health were dietary behavior and physical activity (Deliens et al., 2014). While there was a general awareness that students often have poor diets and are physically inactive, studies focused specifically on these behaviors within the college population remain limited, particularly in local contexts (Martínez-de-Quel et al., 2021). Understanding these behaviors was essential for designing interventions that can support healthier student lifestyles and improve wellbeing during the critical years of higher education (Plotnikoff et al., 2015).

Dietary behavior and physical activity were known to be important as key determinants of overall health of individuals and maintaining these healthy behaviors remained a challenge for them (Wood & Neal, 2016). These kind of behaviors greatly affect with a range of socio-demographic factors including age, gender, ethnicity, and socioeconomic status (Janssen et al., 2018). Likewise, individuals from less wealthy socioeconomic backgrounds also often eat meals that has lower nutritional quality, with reduced intake of fruits, vegetables, and other essential nutrients (Darmon & Drewnowski, 2015). Similarly, those individuals with higher body mass index (BMI) tend to report more unhealthy eating habits, which means that they have greater consumption of sugar-sweetened beverages and processed foods (Lobo et al., 2023; Seguin et al., 2016).

Meanwhile, there are difference in gender that affects their dietary behavior which have also been documented, with women typically consuming more fruits and vegetables than men (Ahmed et al., 2014). Moreover, there was a research which had a positive association between physical activity and healthy dietary intake showing that physically active individuals were more likely to make healthier food choices (Loprinzi et al., 2014). This was further emphasized how important it is to address multiple behavioral areas at the same time, since they all affect each other and overall health (Liu et al., 2022).

In terms of physical activity, there were differences in how much people of different income levels and gender exercised. Students from lower-income family backgrounds often engaged in less physical activity, while those from more privileged backgrounds report higher activity levels (Griffiths et al., 2022). Men were generally more inclined toward vigorous activities, whereas women tend to participate in moderate forms of exercise. In addition, environmental factors such as access to

recreational facilities, walkable spaces, and institutional policies were significantly impacted students' activity patterns (Aquino, 2023; Van Horn et al., 2019).

While international studies have established links between diet and physical activity among tertiary students (Deliens et al., 2014; Plotnikoff et al., 2015), there remains a lack of Philippine-based research investigating these behaviors in higher education settings. Local reports have raised concerns about poor dietary patterns and increasing sedentary lifestyles among Filipino youth, contributing to early risks of obesity and non-communicable diseases (“Department of Science and Technology–Food and Nutrition Research Institute (DOST-FNRI).,” 2021). Despite this, limited empirical studies have focused specifically on Filipino tertiary students, a population undergoing critical lifestyle transitions that can shape long-term health outcomes. This study addresses this gap by examining the relationship between dietary intake and physical activity in a state university in the Philippines, while considering family background as a contextual variable influencing these behaviors.

This research explores to enhance literature by offering and providing localized insights into the behavioral health patterns of students, a demographic frequently neglected now a days in wellness studies. The findings were expected and anticipated to assist educational leaders, policymakers, and campus wellness programs in crafting interventions that promote balanced lifestyles. On a broader scale, the study aligned with national efforts to improve adolescent and young adult health outcomes through integrated, evidence-based approaches.

The aim of this study is to explore the dietary intake and physical activity of tertiary students at a higher learning institution using quantitative methods.

2. METHODS

2.1. Design

This study utilized descriptive research design which was a type of research method used to describe the traits and characteristics of a certain group of people or to investigate relationships between variables given by the researchers based on their readings. In this study, researchers explored the dietary behavior and physical activity of tertiary students in a state university to investigate the dietary choices of the students and to describe any correlations between their dietary habits and physical activity level.

2.2. Participants

Random sampling technique was employed to select respondents from among tertiary students at a state university. This method was used to ensure that the sample would be representative of the broader student population. Specifically, the researchers randomly selected students from three undergraduate programs—Hospitality Management, Food and Beverage Services and Management (FBPSM), and Technology and Livelihood Education (TLE). These programs were chosen due to their alignment with and exposure to the fields of food, nutrition, and wellness, which are directly relevant to the study’s focus on dietary behavior and physical activity.

As shown in Figure 2, the total number of respondents was 366 students. The majority of respondents (192 or 52.46%) were between the ages of 20 to 22 years, followed by those aged 17 to 19 years (136 or 37.16%). A smaller proportion of students (38 or 10.39%) were aged 23 and above. In terms of gender, female respondents comprised the majority, with 212 students (57.9%), while male respondents accounted for 154 students (42.1%).

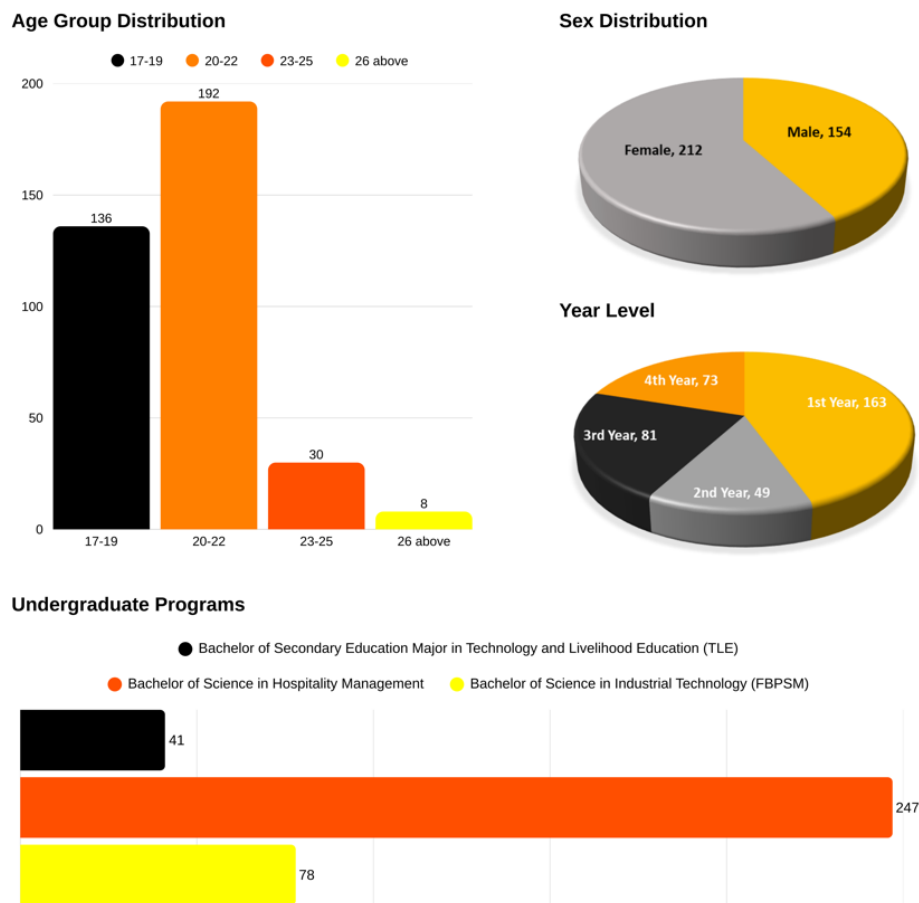


Figure 2. Respondents’ profile

Meanwhile, the highest number of respondents came from the Hospitality Management program (247 or 67.5%) among the academic programs, which also has the largest student population among the three selected programs. This was followed by FBPSM with 78 respondents (21.3%), and TLE with 41 respondents (11.2%). In terms of year level, first-year students represented the largest group with 163 respondents (44.5%), followed by third-year students (81 or 22.1%). Fourth-year students accounted for 73 respondents (19.9%), and second-year students made up the remaining 49 respondents (13.4%).

2.3. Instruments

In this study, data were collected using an online self-reported survey questionnaire administered via Google Forms. At the start of the survey, respondents were informed about the research objectives, procedures, and ethical considerations. Participation was voluntary, and informed consent was obtained through a digital consent form embedded in the survey, where respondents indicated their agreement to participate.

The questionnaire consisted of two main sections: dietary intake and physical activity. A non-quantitative, validated Food Frequency Questionnaire (FFQ) was used to assess the weekly consumption frequency (in days per week) of 11 food categories: rice and rice products, whole wheat bread, milk and dairy products, eggs, beans and legumes, vegetables, fruits, red meat, white meat, fish and shellfish, and sugary drinks. Each food item included six response options indicating frequency: never, seldom (less than once a month), 1–3 times per month, 1–2 times per week, 3–4 times per week, and daily. Respondents were asked to reflect on their average intake of each item over the past 12 months. Based on their responses, dietary intake was dichotomized into two categories: low intake (<5 days/week) and high intake (≥ 5 days/week). Supplementary questions were also included to capture broader eating habits, such as the frequency of eating out, consumption of home-cooked meals, and use of nutritional supplements.

To assess physical activity in this study, the questionnaire included items on frequency, type, and duration of exercise. Respondents were categorized into two groups based on their responses: sufficiently active (those who exercised more than three times per week) and insufficiently active (those who exercised two times per week or less) (Aljefree et al., 2016).

Moreover, the instrument underwent expert review and pilot testing to ensure content validity and clarity. Three experts in the fields of nutrition, physical education, and health sciences reviewed the questionnaire to ensure that the content was appropriate, relevant, and aligned with the study's

objectives (Ormshaw et al., 2016). Following this, a pilot test was conducted with a group of 15 students who were not part of the main study sample. The purpose of the pilot test was to evaluate item clarity, layout, and the overall flow of the questionnaire. Feedback from the pilot test was used to refine wording and format. Preliminary reliability analysis using Cronbach's alpha indicated acceptable internal consistency for both the FFQ items and physical activity questions, with alpha values exceeding 0.70. These procedures helped ensure that the instrument was both valid and reliable for assessing the dietary and physical activity patterns of tertiary students in the target population. Figure 2 shows the research process made by the researchers.

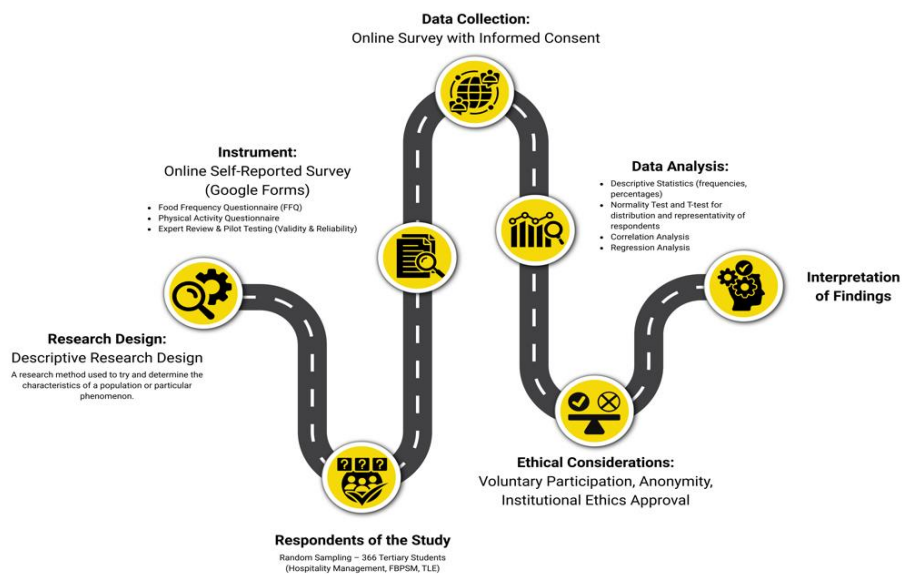


Figure 2. Research Process. Source: Author's work.

2.4. Statistical Analyses

In this study, the data were collected from the online survey conducted by the researchers to describe the dietary behaviors of tertiary students and to examine potential associations between their dietary intake and levels of physical activity. Statistical analysis was conducted using Statistical Package for Social Sciences (SPSS) version 29.0 from Armond, New York, United States of America. Descriptive Statistics such as frequencies and percentages were used to summarize the respondents' demographics information, dietary patterns and physical activity levels. To ensure the validity of the data, a normality test was performed to assess the distribution of key variables. For population representativity and group comparisons, student's t-test was applied where appropriate. To further explore the relationship between dietary intake and physical activity, correlation analysis

was performed. Where applicable, regression analysis was also used to assess the predictive value of physical activity on dietary behavior. All statistical tests were conducted at a significant level of $p < 0.05$ to determine the presence of meaningful associations.

2.5. Ethical Statement

Regarding ethical considerations, their involvement in the study were completely voluntary. There are no acknowledged hazards or dangers to individuals or researchers. The study poses a negligible to nonexistent risk and level of harm or impairment (physical, psychological, social, or economic) to respondents. This study has the potential to offer valuable insights into the dietary intake habits and physical activity of tertiary students. Furthermore, data collection methods guarantee the protection of respondents' personal information by preventing its disclosure in the study. There will be no gathering of personally identifiable information. Once the research is over, the data will be kept for a period of five years. The researchers provide a detailed explanation of the study's goal and context to the respondents. The consent to voluntarily engage in a specific section of the questionnaire was also explained. Respondents have the option to decline to fill out the questionnaire and choose not to participate in the study. The informed consent forms were stored in a secure place, separate from the data. Likewise, this study has been approved and cleared by the institution's ethics committee in connection to the study's consent form, data collection tools and the format.

3. RESULTS

This part presents the gathered data and analysis on the family background, dietary behavior and physical activity of tertiary students at a State University in the Philippines.

Family Background of Student Respondents

The socio-economic background of the respondents comprises of 366 students. The majority (50.5%) came from households with 4 to 5 members ($n=185$), followed by 6 to 7 members (24.6%, $n=90$), 2 to 3 members (16.4%, $n=60$), and more than 7 members (7.9%, $n=29$). Only 2 respondents (0.5%) reported living alone.

In terms of household income, 51.1% ($n=187$) reported monthly family earnings below ₱10,000. Another 38.1% ($n=140$) reported income between ₱11,000 and ₱20,000, while 5.5% ($n=20$) had incomes above ₱30,000. Only 5.2% ($n=19$) fell within the ₱21,000–₱30,000 range.

Regarding students' personal allowances, the vast majority (88.8%, n=325) received less than ₱5,000 monthly. About 10.1% (n=37) received ₱5,000–₱10,000, and only 4 respondents (1.1%) received more than ₱10,000.

Meal allowances were also limited. Most students (61.5%, n=225) reported receiving less than ₱300 weekly for meals, while 30.9% (n=113) received between ₱301 and ₱500. Only a few students had more than ₱500 for meals. When asked about the source of their meal allowance, the majority (89.1%, n=326) cited support from parents or guardians. Others reported part-time jobs (8.5%, n=31), scholarships (1.4%, n=5), or unspecified sources (1.1%, n=4). Additionally, 64.5% (n=236) reported skipping meals due to financial constraints.

Dietary Intake

Table 1 summarizes the frequency of intake for 11 food categories. A majority of students reported high intake of rice and rice products (71.0%), eggs (77.9%), vegetables (83.3%), fruits (67.8%), white meat (80.0%), fish and shellfish (60.7%), milk and dairy products (56.3%), and sugary drinks (59.3%). In contrast, lower intake was observed for whole wheat bread (54.6%), beans and legumes (90.4%), and red meat (66.7%).

Table 1. Dietary intake of tertiary students at a higher learning institution

	High Intake		Low Intake	
	f	%	f	%
Rice and rice products	260	71.0	106	29.0
Whole wheat bread	166	45.4	200	54.6
Milk and dairy products	206	56.3	160	43.7
Egg	285	77.9	81	22.1
Beans and legumes	35	9.6	331	90.4
Vegetables	305	83.3	61	16.7
Fruits	248	67.8	118	32.2
Red meat	122	33.3	244	66.7
White meat	293	80.0	73	19.9
Fish and shellfish	222	60.7	144	39.3
Sugary drinks	217	59.3	149	40.7

Physical Activity Patterns

Over the past 7 days, students reported engaging in vigorous physical activity (e.g., aerobics, heavy lifting) an average of 3 times per week, lasting approximately 90 minutes per session. Similarly, moderate activity (e.g., regular-paced cycling, doubles tennis) was also performed 3 times per week, with sessions averaging 98 minutes.

Light physical activity, particularly walking for at least 10 minutes, occurred more frequently—averaging 5 days per week at 50 minutes per session. Meanwhile, sedentary behavior (e.g., sitting on weekdays) averaged 279 minutes (approximately 5 hours) daily.

Association Between Physical Activity and Dietary Intake

Table 2 displays the association between physical activity and dietary intake.

Table 2. Association between dietary intake and physical activity levels of tertiary students in a higher learning institution

Dietary Intake	Physical Activity						p-value
	Sufficiently active		Insufficiently active		Total		
	f	%	f	%	f	%	
<i>Rice and rice products</i>							
High intake	96	26.2	164	44.8	260	71	<.001*
Low intake	0	0	106	29	106	29	
<i>Whole wheat bread</i>							
High intake	96	26.2	70	19.1	166	45.4	<.001*
Low intake	0	0	200	54.6	200	54.6	
<i>Milk and dairy products</i>							
High intake	96	26.2	110	30.1	206	56.3	<.001*
Low intake	0	0	160	43.7	160	43.7	
<i>Egg</i>							
High intake	96	26.2	189	51.6	285	77.9	<.001*
Low intake	0	0	81	22.1	81	22.1	
<i>Beans and legumes</i>							
High intake	35	9.6	0	0	35	9.6	<.001*
Low intake	61	16.7	270	73.8	331	90.4	
<i>Vegetables</i>							
High intake	96	26.2	209	57.1	305	83.3	<.001*
Low intake	0	0	61	16.7	61	16.7	
<i>Fruits</i>							
High intake	96	26.2	152	41.5	248	67.8	<.001*
Low intake	0	0	118	32.2	118	32.2	
<i>Red meat</i>							
High intake	96	26.2	26	7.1	122	33.3	<.001*
Low intake	0	0	244	66.7	244	66.7	
<i>White meat</i>							
High intake	96	26.2	197	53.8	293	80.1	<.001*
Low intake	0	0	73	19.9	73	19.9	
<i>Fish and shellfish</i>							
High intake	96	26.2	126	34.4	222	60.7	<.001*
Low intake	0	0	144	39.3	144	39.3	
<i>Sugary drinks</i>							
High intake	96	26.2	121	33.1	217	59.3	<.001*
Low intake	0	0	149	40.7	149	40.7	

All food items showed a statistically significant association with physical activity levels ($p < 0.05$), except beans and legumes. Students with sufficient physical activity had significantly higher intake of most food items, especially fruits, vegetables, eggs, white meat, and dairy products. Conversely, insufficiently active students showed lower consumption of whole wheat bread, legumes, fish, and red meat.

4. DISCUSSION

The findings reveal a complex interplay between students' socioeconomic background, dietary intake, physical activity levels and its relationships.

Family Background and Economic Constraints

The family background of the respondents paints a telling picture of the financially vulnerable tertiary students in a state university in the Philippines. More than half of the families earn less than Php 10,000 monthly, and a vast majority of students receive a monthly allowance below Php 5,000. These numbers reveal structural economic limitations that may compromise students' access to adequate nutrition emphasized that lower socioeconomic status often results in reduced dietary quality (Darmon & Drewnowski, 2015). Similarly, the findings confirm that dietary behaviors are strongly shaped by age, gender, and socioeconomic status (Janssen et al., 2018). The data further shows that more than 60% of the students experience meal skipping, signalling food insecurity within the student population. This aligns with broader concerns about student hunger in higher education settings, where financial strain often forces students to prioritize academic expenses over basic nutritional needs. The fact that food allowances predominantly come from parents or guardians indicates a dependency model, which may collapse under economic shocks such as inflation or familial job loss. These conditions necessitate institutional interventions, reflecting the importance of addressing socioeconomic barriers as highlighted in previous works.

Students' Dietary Behaviors and University Lifestyle

The dietary intake pattern of the respondents reflects both cultural eating habits and economic accessibility. Students consume staple foods such as rice, eggs, and vegetables, but conspicuously under consume whole wheat bread, beans, legumes, and red meat. This imbalance leads to micronutrient deficiencies in iron, fiber, and protein, nutrients crucial for cognitive performance and immune function. These findings confirm that individuals with higher BMI or lower socioeconomic status tend to adopt less nutritious dietary patterns characterized by processed food and sugar-sweetened beverages (Lobo et al., 2023; Seguin et al., 2016). Moreover, gender differences in dietary

practices observed in this study are reported that women are generally more likely to consume fruits and vegetables compared to men (Ahmed et al., 2014). The reliance on convenience foods, limited meal preparation skills, and irregular schedules further exacerbate unhealthy eating behaviors (Wood & Neal, 2016), who described maintaining healthy dietary practices as a persistent challenge for students. While awareness of dietary needs may exist, the gap between knowledge and practice highlights the necessity of institutional structural support and accessible food options on campus (Reuter et al., 2021).

Physical Activity and Health Patterns

Students reported physical activity levels that are notably higher than minimum global health standards, with an average of 270 minutes of vigorous activity per week, exceeding WHO's recommended levels (Heckel et al., 2024). This shows a positively inclined behavior in terms of fitness and reflects findings (Loprinzi et al., 2014), who showed that physical activity often clusters with healthier lifestyle behaviors. However, despite these high levels of activity, students also reported long hours of sedentary behavior which was an average of five hours daily. This paradox reflects (Griffiths et al., 2022), who noted that differences in socioeconomic background and daily routines influence both activity and sedentary time. Gender-related differences in activity levels also mirror (Van Horn et al., 2019), where men were more inclined toward vigorous activities while women leaned toward moderate forms of exercise. These results reinforce existing literature that highlights the nuanced balance between sufficient physical activity and the risks of sedentary lifestyles (Greenwalt et al., 2023).

Interplay Between Physical Activity and Dietary Intake

The results also demonstrated a significant association between physical activity and dietary intake, providing compelling evidence of the interdependence of lifestyle behaviors. Students who engage in sufficient physical activity tend to consume healthier foods, supporting the findings that active individuals are more likely to make nutritious food choices (Fonseca et al., 2021; Loprinzi et al., 2014). This further emphasized that dietary and activity behaviors should be addressed simultaneously, given their reciprocal impact on health outcomes (Liu et al., 2022). However, the unusually low consumption of beans and legumes, even among active students, suggests cultural or taste preferences may override physiological cues. Moreover, despite high levels of physical activity, students still fail to meet fiber and micronutrient requirements, indicating that activity alone cannot compensate for poor food choices. Stress, peer influence, and convenience continue to shape eating

behaviors (Harmon et al., 2016). Differences in types of activity further reveal dietary tendencies, with resistance training associated with higher protein intake and aerobic activity linked to fiber and micronutrient consumption (Zhang et al., 2023), though students often lack the nutritional literacy to adapt diets accordingly. These findings stressed the importance of connecting activity-specific nutritional needs to student education (Thurecht & Pelly, 2020).

Environmental and structural factors also influence these behaviors. The transition to college often marks reduced parental oversight and increased autonomy, which, without adequate preparation, disrupts established dietary routines (Deng et al., 2022). Additionally, behavioral cues such as portion size and food presentation, often manipulated in marketing or campus food settings, may undermine health-conscious intentions. The bidirectional link between physical activity and mental health, where mood influences diet and vice versa, further supports the holistic perspective (Wang & Li, 2022).

Collectively, these results affirm much of the existing literature cited in the introduction while also contributing local evidence from a Philippine state university context. The conformity of findings and others underscores that tertiary students continue to face challenges in maintaining healthy behaviors during their academic years. The study highlights that while students may achieve sufficient or even high levels of physical activity, this does not automatically translate into optimal health unless complemented by mindful dietary choices and structural institutional support. Thus, integrated and cross-sectoral health promotion strategies that combine physical activity programs with practical nutrition education, campus food reforms, and psychosocial support are essential for promoting student wellbeing.

4.1. Practical Implications

In the Philippine context, Higher Education Institutions (HEIs) should realize and recognize how important they are in supporting well-being of the students beyond the confines of academic instruction. Comprehensive wellness programs are significant and important to implement that may access to affordable, healthy food options on campus, nutrition education workshops, and personalized dietary counseling, especially for students from low-income families. Additionally, HEIs should also incorporate structured interventions that promote regular physical activity that will combat sedentary behavior and its adverse health effects. Moreover, creating a health-supportive campus environment that encourages balanced eating, having nutritious food, and consistent physical activity can also have wider benefits which may reduce academic burnout, support mental health, and

foster lifelong habits that promote overall well-being. HEIs may also benefit from collaborating and working with student organizations, health professionals, and policymakers to design holistic interventions that are culturally relevant, evidence-based and sustainable.

5. CONCLUSIONS

The findings of this study reveal a complex and interconnected relationship between dietary intake, physical activity levels, and socio-economic background among tertiary students in a state university in the Philippines. Most respondents came from low-income households with four to five family members and limited financial support, which significantly shaped their health behaviors. While many students met or exceeded recommended levels of moderate to vigorous physical activity, they also reported high sedentary time and poor dietary patterns, including frequent meal skipping and low consumption of nutrient-dense foods. These patterns point to the dual burden of economic constraints and lifestyle challenges in shaping student health.

This study adds to the expanding corpus of literature and studies that examines the intersection of health behaviors and socio-economic factors in university settings. This research emphasizes their interdependence, shaped by financial limitations, academic demands, and environmental constraints unlike studies that view dietary habits and physical activity in isolation. The findings show the need of health polices which are integrated and context-sensitive health strategies that recognize student diversity and the broader structural factors influencing health decisions.

To address the interconnected challenges of poor dietary habits and sedentary lifestyles among tertiary students, higher education institutions (HEIs) should establish affordable campus-based food programs that provide at least two balanced meal options per day aligned with basic nutritional guidelines, with implementation targeted within one academic year and monitored through participation rates and menu diversity. Nutrition literacy may be enhanced by integrating a nutrition and meal-planning module into the general education curriculum in the next cycle, complemented by quarterly workshops and peer-led campaigns, evaluated through pre- and post-surveys of student knowledge and behaviors. To combat sedentary lifestyles, HEIs can implement structured physical activity by introducing 5 to 10-minute movement breaks every two hours in at least half of general education classes within one semester, while maintaining open access to fitness facilities and tracking utilization through sign-in records. Partnerships with local health agencies, NGOs, and alumni networks should be pursued, with a goal of at least one formal partnership per year to support subsidized meals or wellness grants benefitting 10–20% of low-income students. Finally, a whole-

campus health equity approach can be advanced through the adoption of an institutional wellness policy integrating food, fitness, and mental health services within two years, with annual student health surveys and participatory feedback mechanisms used to monitor progress. Collectively, these strategies provide actionable, measurable, and sustainable steps for HEIs to foster healthier eating, reduce sedentary behavior, and build a culture of wellbeing and academic resilience.

6. REFERENCES

1. Ahmed, F., L, A. R., Gzs, A. A., & M, A. B. (2014). Association between Stress and Dietary Behaviours among Undergraduate Students in Kuwait Gender Differences. *Journal of Nutrition and Health Sciences*, 1(1), 1-8. <https://doi.org/10.15744/2393-9060.1.104>
2. Aljefree, N., Lee, P., Alsaqqaf, J., & Ahmed, F. (2016). Association between Vitamin D Status and Coronary Heart Disease among Adults in Saudi Arabia: A Case-Control Study. *Healthcare*, 4(4), 1-16. <https://doi.org/10.3390/healthcare4040077>
3. Aquino, J. M. D. (2023). Assessing the Role of Recreational Activities in Physical Education Participation of College Students in One State University in Laguna Philippines. *International Journal of Multidisciplinary Sciences*, 1(2), 190–204. <https://doi.org/10.37329/ijms.v1i2.2506>
4. Darmon, N., & Drewnowski, A. (2015). Contribution of food prices and diet cost to socioeconomic disparities in diet quality and health: A systematic review and analysis. *Nutrition Reviews*, 73(10), 643–660. <https://doi.org/10.1093/nutrit/nuv027>
5. Deliens, T., Clarys, P., De Bourdeaudhuij, I., & Deforche, B. (2014). Determinants of eating behaviour in university students: A qualitative study using focus group discussions. *BMC Public Health*, 14(1), 1-12. <https://doi.org/10.1186/1471-2458-14-53>
6. Deng, Y., Hwang, Y., Kim, T., & Yli-Piipari, S. (2022). First semester changes in college students' objectively-measured physical activity and dietary behaviors. *Journal of American College Health*, 72(3), 1–6. <https://doi.org/10.1080/07448481.2022.2135379>
7. Department of Science and Technology–Food and Nutrition Research Institute (DOST-FNRI). (2021). Expanded National Nutrition Survey: Philippine Nutrition Facts and Figures. Taguig City, Philippines: DOST-FNRI.
8. Fonseca, L. B., Pereira, L. P., Rodrigues, P. R. M., Andrade, A. C. D. S., Muraro, A. P., Gorgulho, B. M., Pereira, R. A., & Ferreira, M. G. (2021). Food consumption on campus is associated with meal eating patterns among college students. *British Journal of Nutrition*, 126(1), 53–65. <https://doi.org/10.1017/S0007114520003761>
9. Greenwalt, D., Phillips, S., Ozemek, C., Arena, R., & Sabbahi, A. (2023). The Impact of Light Physical Activity, Sedentary Behavior and Cardiorespiratory Fitness in Extending Lifespan and Healthspan Outcomes: How Little is Still Significant? A Narrative Review. *Current Problems in Cardiology*, 48(10), 1-41. <https://doi.org/10.1016/j.cpcardi.2023.101871>
10. Griffiths, K., Moore, R., & Brunton, J. (2022). Sport and physical activity habits, behaviours and barriers to participation in university students: An exploration by socio-economic group. *Sport, Education and Society*, 27(3), 332–346. <https://doi.org/10.1080/13573322.2020.1837766>
11. Harmon, B. E., Forthofer, M., Bantum, E. O., & Nigg, C. R. (2016). Perceived influence and college students' diet and physical activity behaviors: An examination of ego-centric social networks. *BMC Public Health*, 16(1), 473. <https://doi.org/10.1186/s12889-016-3166-y>
12. Heckel, L., Eime, R., Karg, A., McDonald, H., Yeomans, C., & O'Boyle, I. (2024). A systematic review of the wellbeing benefits of being active through leisure and fitness centres. *Leisure Studies*, 43(4), 545–561. <https://doi.org/10.1080/02614367.2023.2243654>

13. Janssen, H. G., Davies, I. G., Richardson, L. D., & Stevenson, L. (2018). Determinants of takeaway and fast food consumption: A narrative review. *Nutrition Research Reviews*, 31(1), 16–34. <https://doi.org/10.1017/S0954422417000178>
14. Liu, H., Bi, C., Lin, H., Ma, W., Zhang, J., Hu, Y.-Y., & Liu, J.-Z. (2022). Compared with dietary behavior and physical activity risk, sedentary behavior risk is an important factor in overweight and obesity: Evidence from a study of children and adolescents aged 13–18 years in Xinjiang, China. *BMC Pediatrics*, 22(1), 1-12. <https://doi.org/10.1186/s12887-022-03646-y>
15. Lobo, J., Prevandos, F. G., Bautista, C., De Dios, D. A., Dimalanta, G., & Gazali, N. (2023). Exploring the Effectiveness of a Battery of Physical Fitness Tests via Virtual Learning Environment. *Physical Education Theory and Methodology*, 23(4), 487–498. <https://doi.org/10.17309/tmfv.2023.4.01>
16. Loprinzi, P. D., Smit, E., & Mahoney, S. (2014). Physical Activity and Dietary Behavior in US Adults and Their Combined Influence on Health. *Mayo Clinic Proceedings*, 89(2), 190–198. <https://doi.org/10.1016/j.mayocp.2013.09.018>
17. Martínez-de-Quel, Ó., Suárez-Iglesias, D., López-Flores, M., & Pérez, C. A. (2021). Physical activity, dietary habits and sleep quality before and during COVID-19 lockdown: A longitudinal study. *Appetite*, 158, 1-19. <https://doi.org/10.1016/j.appet.2020.105019>
18. Ormshaw, M. J., Kokko, S. P., Villberg, J., & Kannas, L. (2016). The desired learning outcomes of school-based nutrition/physical activity health education: A health literacy constructed Delphi survey of Finnish experts. *Health Education*, 116(4), 372–394. <https://doi.org/10.1108/HE-12-2014-0097>
19. Plotnikoff, R. C., Costigan, S. A., Williams, R. L., Hutchesson, M. J., Kennedy, S. G., Robards, S. L., Allen, J., Collins, C. E., Callister, R., & Germov, J. (2015). Effectiveness of interventions targeting physical activity, nutrition and healthy weight for university and college students: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 12(1), 1-10. <https://doi.org/10.1186/s12966-015-0203-7>
20. Reuter, P. R., Forster, B. L., & Brister, S. R. (2021). The influence of eating habits on the academic performance of university students. *Journal of American College Health*, 69(8), 921–927. <https://doi.org/10.1080/07448481.2020.1715986>
21. Seguin, R. A., Aggarwal, A., Vermeylen, F., & Drewnowski, A. (2016). Consumption Frequency of Foods Away from Home Linked with Higher Body Mass Index and Lower Fruit and Vegetable Intake among Adults: A Cross-Sectional Study. *Journal of Environmental and Public Health*, 2016, 1–12. <https://doi.org/10.1155/2016/3074241>
22. Thurecht, R., & Pelly, F. (2020). Key Factors Influencing the Food Choices of Athletes at two Distinct Major International Competitions. *Nutrients*, 12(4), 1-12. <https://doi.org/10.3390/nu12040924>
23. Van Horn, L., Lenders, C. M., Pratt, C. A., Beech, B., Carney, P. A., Dietz, W., DiMaria-Ghalili, R., Harlan, T., Hash, R., Kohlmeier, M., Kolasa, K., Krebs, N. F., Kushner, R. F., Lieh-Lai, M., Lindsley, J., Meacham, S., Nicastro, H., Nowson, C., Palmer, C., ... Lynch, C. (2019). Advancing Nutrition Education, Training, and Research for Medical Students, Residents, Fellows, Attending Physicians, and Other Clinicians: Building Competencies and Interdisciplinary Coordination. *Advances in Nutrition*, 10(6), 1181–1200. <https://doi.org/10.1093/advances/nmz083>
24. Wang, Y., & Li, Y. (2022). Physical activity and mental health in sports university students during the COVID-19 school confinement in Shanghai. *Frontiers in Public Health*, 10, 1-19. <https://doi.org/10.3389/fpubh.2022.977072>
25. Wood, W., & Neal, D. T. (2016). Healthy through Habit: Interventions for Initiating & Maintaining Health Behavior Change. *Behavioral Science & Policy*, 2(1), 71–83. <https://doi.org/10.1177/237946151600200109>

26. Zhang, J., Chen, J., Sui, X., Drenowatz, C., & Wang, Q. (2023). Association between Different Types of Exercise and Intake of Nutrients including Carbohydrate, Fat, Protein, and B Vitamins in Young Adults. *Nutrients*, 15(4), 1-13. <https://doi.org/10.3390/nu15040806>

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no external funding.

COPYRIGHT

© 2026 by the authors. This is an open-access article distributed under the terms of the [Creative Commons CC BY 4.0 license](https://creativecommons.org/licenses/by/4.0/), meaning that anyone may download and read the paper for free. The use, distribution or reproduction in other forums is permitted, provided the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms. These conditions allow for maximum use and exposure of the work, while ensuring that the authors receive proper credit.