Body appreciation and motivation toward physical activity as predictors of eating habits in university students from the Peruvian Altiplano

Apreciación corporal y motivación hacia la práctica de la actividad física como predictores de los hábitos alimentarios en estudiantes universitarios del altiplano peruano

Authors

Marisol Yana-Salluca [1]
Edwin Gustavo Estrada-Araoz [2]
Nancy Yana-Salluca [1]
Reynaldo Cutipa-Luque [1]
Zara Turpo-Puma [1]
Gilber Chura-Quispe [3]
Elizabeth Orfelia Cruz-Laricano [2]

[1] Universidad Nacional del Altiplano (Perú)
[2] Universidad Nacional Amazónica de Madre de Dios (Perú)
[3] Escuela de Posgrado Newman (Perú)

Corresponding author:
Edwin Gustavo Estrada-Araoz
gestrada@unamad.edu.pe

How to cite in APA

Yana-Salluca, M., Estrada-Araoz, E. G., Yana-Salluca, N., Cutipa-Luque, R., Turpo-Puma, Z., Chura-Quispe, G., & Cruz-Laricano, E. O. (2025). Body appreciation and motivation toward physical activity as predictors of eating habits in university students from the Peruvian Altiplano. *Retos*, *69*, 703–715. https://doi.org/10.47197/retos.v69.116117

Abstract

Introduction and objective: during the university stage, eating habits may deteriorate due to factors such as increased academic responsibilities, greater autonomy in decision-making, and changes in daily routines. In the Peruvian highlands, these conditions are exacerbated by sociocultural and economic limitations, making it relevant to investigate the psychological factors that influence the eating behaviors of this population. The objective of the present study was to determine whether body appreciation and motivation toward physical activity predict eating habits among university students in the Peruvian highlands.
Methodology: a quantitative, non-experimental, predictive design was adopted. The sample consisted of 866 university students (M= 22.04, SD= 3.633) who responded to the Body Appreciation Scale-2 (BAS-2), the PALMS scale, and the Eating Habits Questionnaire, all of which demonstrated adequate psychometric properties.
Results: Both body appreciation (β= 0.148, p < 0.01) and motivation for physical activity (β= 0.270, p < 0.01) had a significant predictive effect on the eating habits of university students. Furthermore, the model showed a good fit to the data (F= 63.733, p < 0.01) and explained 12.9% of the variance in eating habits (R^2= 0.129), highlighting the importance of psychological and motivational variables in shaping eating behaviors.
Conclusions: Body appreciation and motivation for physical activity significantly predict eating habits among university students in the Peruvian Altiplano.

Keywords

Body condition; body image; lifestyle; motivational tendency; university students.

Resumen

Introducción y objetivo: durante la etapa universitaria, los hábitos alimentarios pueden deteriorarse debido a factores como el aumento de responsabilidades académicas, la autonomía en la toma de decisiones y los cambios en la rutina diaria. En el altiplano peruano, estas condiciones se agravan por limitaciones socioculturales y económicas, lo que hace relevante investigar los factores psicológicos que influyen en la alimentación de esta población. El objetivo de la presente investigación fue determinar si la apreciación corporal y la motivación hacia la práctica de la actividad física predicen los hábitos alimentarios en estudiantes universitarios del altiplano peruano.
Metodología: se adoptó un enfoque cuantitativo, con un diseño no experimental de tipo predictivo. La muestra estuvo conformada por 866 estudiantes universitarios (M= 22.04, DE= 3.633), quienes respondieron la Escala de Apreciación Corporal-2 (BAS-2), la Escala PALMS y el Cuestionario de Hábitos Alimentarios, instrumentos con adecuadas propiedades psicométricas.
Resultados: se determinó que tanto la apreciación corporal (β= 0.148, p<0.01) como la motivación hacia la práctica de la actividad física (β= 0.270, p<0.01) tienen un efecto predictivo significativo sobre los hábitos alimentarios de los estudiantes universitarios. Además, el modelo ajustó adecuadamente los datos (F= 63.733, p<0.01) y explicó el 12.9% de la variabilidad en los hábitos alimentarios (R^2= 0.129), lo que evidencia que las variables psicológicas y motivacionales cumplen un rol importante en la configuración de las conductas alimentarias.
Conclusiones: La apreciación corporal y la motivación hacia la práctica de la actividad física predicen los hábitos alimentarios en estudiantes universitarios del altiplano peruano.

Palabras clave

Condición corporal; estilo de vida; estudiantes universitarios; imagen corporal; tendencia motivacional.

Introduction

University life involves a series of challenges and demands that extend beyond academic matters (Restrepo et al., 2023). Students face new responsibilities, such as time management, adaptation to a new social environment, and balancing study with daily activities (Duche et al., 2020). These demands may affect various aspects of their lives, including their eating habits (AlJaber et al., 2019). Academic and social pressure, lack of time to prepare healthy meals, or stress may lead students to make less healthy dietary choices, potentially affecting their physical and mental well-being (Choi, 2020).

Eating habits refer to the patterns and behaviors associated with the selection, preparation, and consumption of food by an individual or social group (Rivera et al., 2020). These habits develop over time and are influenced by factors such as culture, education, and economics, as well as, in the case of university students, the academic and social environment (Kabir et al., 2018). Healthy eating habits include a balanced diet, the consumption of fresh and varied foods, and portion control (Cena & Calder, 2020). However, within the university context, students commonly fall into less healthy eating patterns, such as consuming fast food, overindulging in sugary beverages, or skipping meals due to unstructured schedules (Li et al., 2022).

The causes of poor eating habits among university students are multifaceted (Scaglioni et al., 2018). Factors such as lack of time, academic stress, social pressure, and the availability of quick and inexpensive food options are key determinants in food choices (Sogari et al., 2018). Furthermore, insufficient knowledge about nutrition and the influence of friends or classmates may also play a significant role (Salvy et al., 2012). The transition to university life also involves a change in environment, which may lead students to adopt less healthy eating habits as a result of seeking convenience and speed in their food choices (Yun et al., 2018).

Inadequate eating habits can have serious health consequences for university students (Zhang, 2025). In the short term, they may lead to issues such as fatigue, lack of concentration, digestive discomfort, or even mood disturbances caused by nutritional deficiencies (Azzolino et al., 2020). In the long term, these habits can contribute to the development of chronic diseases such as obesity, type 2 diabetes, and cardiovascular disorders (Tafuri & Latino, 2025). Moreover, unhealthy eating habits may negatively affect academic performance, as poor nutrition directly impacts cognitive abilities and the energy levels required to meet academic demands (López et al., 2022).

Likewise, university education may influence body appreciation. This construct refers to how individuals value their own bodies and is shaped by psychological, social, and cultural factors (Liu et al., 2022). It results from a combination of perceived physical appearance and acceptance of one's body characteristics (Weinberger & Luck, 2021). In the university setting, students may be more exposed to social comparisons, which often negatively affect their body image (Bonfanti et al., 2025). A high level of body appreciation is associated with a positive attitude toward physical activity and healthy eating habits, as individuals who feel comfortable with their bodies are generally more motivated to maintain their health (Kriaučionienė et al., 2024). In contrast, those with low body appreciation may experience insecurity, which could lead to unhealthy decisions such as restrictive dieting (Rounsefell et al., 2020).

The factors influencing body appreciation among university students are diverse. Internal factors such as self-confidence and previous personal experiences play an important role, but external factors also exert a significant influence (Wodarz & Rogowska, 2024). Social media, traditional media, and interpersonal interactions within the university environment contribute to the construction of body image (Fardouly & Vartanian, 2016). The pressure to conform to certain beauty standards may trigger feelings of dissatisfaction and discontent with one's appearance, affecting not only mental health but also eating and physical activity behaviors (Merino et al., 2024).

The consequences of low body appreciation can be severe, both physically and emotionally (Quittkat et al., 2019). On a physical level, it may lead to eating disorders such as anorexia or bulimia, or simply to unhealthy eating habits that negatively impact overall well-being (Mallaram et al., 2023). Additionally, a low perception of one's body can reduce motivation to engage in physical activity, as students may view exercise solely as a tool for changing their appearance rather than as a healthy habit that improves

quality of life (Sabiston et al., 2019). On an emotional level, this negative body image can result in psychological disorders such as anxiety, depression, and stress, which in turn diminish individuals' quality of life (El Basiouny et al., 2024).

University education, in addition to influencing body appreciation, may also affect students' motivation to engage in physical activity, as academic schedules and demands often limit the time available for exercise (Ferreira et al., 2022). Students, constantly focused on their studies and academic responsibilities, may prioritize other tasks over physical activity, leading to a more sedentary lifestyle (Deliens et al., 2015). In this context, maintaining adequate levels of motivation for physical activity is essential, as motivation may serve as a key factor in counteracting the negative effects of university life and promoting healthy habits, even within a demanding schedule (Sáez et al., 2021).

This variable refers to the internal drive or desire to engage in physical activities, whether to improve health, maintain well-being, or achieve specific fitness-related goals (Buckworth et al., 2007). Motivation can be divided into two main types: intrinsic motivation, which stems from personal enjoyment and the satisfaction experienced while exercising, and extrinsic motivation, which is related to external rewards such as improved physical appearance or social pressure to stay fit (Gaibor, 2023). Among university students, motivation toward physical activity may be influenced by both internal factors, such as the desire to feel good about oneself, and external factors, such as the pressure to meet certain aesthetic standards or the influence of peers and social media (Sierra et al., 2019).

Motivation toward physical activity is influenced by a variety of factors (Ahsan et al., 2024). On an individual level, elements such as age, sex, health status, and previous experiences with physical exercise affect the degree of motivation (Estrada et al., 2024). In the social domain, support from family, friends, and peers plays a crucial role, as their encouragement and companionship often promote active participation (Duffey et al., 2021). Likewise, cultural factors such as social pressure and stereotypes related to physical appearance can have a significant impact, especially among younger individuals (Guo et al., 2023). Finally, environmental aspects such as the availability of adequate spaces for physical activity, weather conditions, and the perceived safety of the surroundings may facilitate or hinder regular exercise (Pedersen et al., 2022).

The consequences of maintaining high levels of motivation for physical activity are generally positive. Physically, regular exercise improves cardiovascular health, strengthens the musculoskeletal system, and contributes to weight management (Pinckard et al., 2019). Psychologically, physical activity has been shown to reduce levels of stress, anxiety, and depression, which is especially important in the university context, where students face high academic and social pressures (Wanjau et al., 2023; Childs & De Wit, 2014). Maintaining high motivation not only enhances students' physical and mental health but also promotes healthier eating habits, contributing to a more balanced and positive lifestyle (Cachón et al., 2023).

This research is relevant given the current context in which young people face multiple challenges related to their physical and emotional well-being. University life, characterized by high academic and social demands, can negatively affect students' body image and health-related behaviors, potentially leading to long-term consequences. Addressing these variables is necessary to understand how body perception and motivation for physical activity influence dietary choices and, more broadly, the adoption of healthy habits. This study will contribute to a deeper understanding of the factors that affect the well-being of university students. Moreover, the findings will provide empirical evidence that can serve as a basis for designing and implementing intervention programs aimed at improving their overall health, particularly in regions like the Peruvian Altiplano, where external pressures and academic stress directly impact students' lifestyles.

The objective of the present study was to determine whether body appreciation and motivation toward physical activity predict eating habits among university students in the Peruvian Altiplano.

Method

Design

This study followed a quantitative approach, as it enabled the objective collection and analysis of numerical data. A non-experimental design was adopted, since the variables were not deliberately manipulated but rather observed as they occurred naturally, which is appropriate given the behavioral phenomena examined in a real population. Additionally, the study was classified as predictive in nature, as its purpose was to determine the extent to which body appreciation and motivation for physical activity could predict university students' eating habits.

Participants

The sample consisted of 866 students enrolled in the 2025-I academic term at a public university in the Peruvian Altiplano. Participants were selected through probabilistic sampling, with a 95% confidence level and a 5% significance level. The sample size was calculated using the finite population formula, considering a statistical power of 80% to detect significant effects. Inclusion criteria were: students enrolled in the 2025-I academic term, over 17 years of age, who voluntarily agreed to participate in the study. Students with incomplete data or who did not provide informed consent were excluded.

Procedure

Data collection was conducted in accordance with a previously established protocol. In the initial stage, authorization for the execution of the study was requested and obtained from the university authorities. Subsequently, students were contacted via the WhatsApp messaging application, through which they received a message containing the survey form link, along with a detailed explanation of the study objectives and the instructions necessary to complete the questionnaire properly. Regarding data security and privacy, responses were collected through an online platform that ensured information protection via encryption and restricted access. Only the principal investigators had access to the database. Once the target number of participants (866 students) was reached, access to the form was disabled, marking the end of the data collection phase.

Instrument

For data collection, a digital questionnaire was created using the Google Forms platform. The first section collected sociodemographic data from participants, including variables such as sex, age, employment status, and relationship status. The second section included the Body Appreciation Scale-2 (BAS-2); the third applied the PALMS Scale; and the fourth, the Eating Habits Questionnaire.

Body Appreciation Scale-2 (BAS-2)

This instrument was developed by Tylka & Wood (2015). It is unidimensional and evaluates positive body image, understood as acceptance, respect, and appreciation for one's body regardless of its appearance. It consists of 10 items using a Likert scale, with responses ranging from 1 (never) to 5 (always). A previous study conducted in Peru by Tapia (2023) reported high levels of internal consistency ($\alpha = 0.960$).

PALMS Scale

The PALMS Scale was designed to measure the factors that motivate individuals to engage in physical activities and how these motivations influence their behaviors and habits related to exercise and leisure. The scale consists of 40 Likert-type items with 5 response options, where 1 means "strongly disagree" and 5 "strongly agree." It is structured into eight dimensions, each comprising 5 items: ego, appearance, external expectations, affiliation, physical condition, psychological well-being, mastery, and enjoyment. In a previous study, the questionnaire demonstrated adequate internal consistency, with Cronbach's alpha values above 0.800 for each component (Pérez et al., 2022).

Eating Habits Questionnaire

This unidimensional instrument was developed by Vidal et al. (2022) with the aim of assessing the quality of eating behaviors over a given period, typically the past month. The questionnaire consists of 14 Likert-format items, with response options ranging from 1 (never) to 5 (always). The authors reported

acceptable levels of content validity and internal consistency, with an Aiken's V of 0.840 and a Cronbach's alpha coefficient of 0.736.

Data analysis

Data analysis was carried out using the statistical software SPSS, version 25. In the first phase, descriptive statistics were calculated for the variables under study, including mean, standard deviation, skewness, and kurtosis. Subsequently, the Student's t-test for independent samples was applied to compare the variables based on sociodemographic characteristics. To complement this analysis, effect sizes were estimated using Cohen's *d* coefficient. Following the criteria established by López & Ardura (2023), values of 0.20, 0.50, and 0.80 were interpreted as small, moderate, and large effect sizes, respectively. Next, Pearson's correlation coefficient was used to examine statistically significant relationships between the variables, considering a significance level of $p < 0.05$. Finally, a multiple linear regression analysis was conducted to determine whether body appreciation and motivation toward physical activity function as significant predictors of eating habits.

Ethical considerations

This research was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Each participant was provided with accurate, clear, and accessible information regarding the objectives, scope, and conditions of the study, thereby ensuring informed, voluntary, and free consent. Participants were guaranteed the right to withdraw from the study at any time without facing any negative consequences. To protect students' privacy, confidentiality procedures were implemented, including data coding and secure storage, thus ensuring ethical integrity throughout all stages of the research process.

Results

Table 1 shows that, among the total participants, 53% were women and 47% were men. Regarding age, 69.6% were between 17 and 22 years old, while 30.4% were older than 22. In terms of employment status, 64% were not working and 36% were employed. Concerning relationship status, 88.8% did not have a stable partner, and only 11.2% reported being in such a relationship.

Table 1. Sociodemographic characteristics of the sample

Variables		n= 866	%
Sex	Male	407	47.0
	Female	459	53.0
Age	Between 17 and 22	603	69.6
	Over 22	263	30.4
Employment status	Employed	312	36.0
	Unemployed	554	64.0
Relationship status	In a stable relationship	97	11.2
	Not in a stable relationship	769	88.8

Table 2 presents the descriptive statistics for the main variables of the study. The mean score for body appreciation was 42.14 (SD = 7.966), while the mean for motivation toward physical activity was 151.07 (SD = 26.073). Regarding eating habits, the mean score was 44.74 (SD = 6.835). The skewness and kurtosis values for these variables fell within the acceptable range of ±2, suggesting that the data distribution can be considered approximately normal, according to the criteria proposed by Gravetter & Wallnau (2014).

Table 2. Descriptive results of the variables and dimensions

	N	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis
Body appreciation	866	10	50	42.14	7.966	-1.062	0.663
Motivation toward physical activity	866	40	200	151.07	26.073	-0.430	0.683
Ego	866	5	25	17.06	4.643	-0.184	-0.462
Appearance	866	5	25	18.23	4.520	-0.505	-0.166
External expectations	866	5	25	14.93	4.698	0.162	-0.420
Affiliation	866	5	25	19.19	4.149	-0.745	0.601
Physical condition	866	5	25	20.47	3.586	-0.924	1.336

Psychological well-being	866	5	25	20.44	3.638	-0.811	0.780
Mastery	866	5	25	20.07	3.760	-0.757	0.811
Enjoyment	866	5	25	20.68	3.644	-1.103	0.905
Eating habits	866	14	70	44.74	6.835	0.543	1.359

Table 4 shows significant differences between age groups in two main variables and several of the evaluated dimensions ($p < 0.05$). Older students scored higher in body appreciation, motivation toward physical activity, and some of its dimensions, such as ego, appearance, external expectations, and physical condition. These differences were statistically significant, although of small magnitude (*d* ranging from 0.165 to 0.296), with the most notable difference observed in body appreciation (d = 0.296), indicating that older students tended to have a more positive body image. However, no significant differences were found in affiliation, psychological well-being, mastery, enjoyment, or eating habits ($p > 0.05$), suggesting that some motivational and health-related behavioral aspects did not vary substantially by age.

Table 4. Comparative results for variables and dimensions according to age group

Variable and dimensions	17 - 22 years		over 22 years		t	p	d
	M	SD	M	SD			
Body appreciation	41.44	8.035	43.75	7.579	-3.950	0.000	0.296
Motivation toward physical activity	149.64	25.246	154.35	27.651	-2.448	0.015	0.178
Ego	16.66	4.557	18.00	4.709	-3.964	0.000	0.289
Appearance	18.00	4.530	18.74	4.465	-2.198	0.028	0.165
External expectations	14.64	4.558	15.59	4.949	-2.745	0.006	0.200
Affiliation	19.17	4.007	19.23	4.466	-0.207	0.836	0.014
Physical condition	20.27	3.509	20.92	3.723	-2.447	0.015	0.180
Psychological well-being	20.37	3.564	20.60	3.806	-0.861	0.390	0.062
Mastery	19.92	3.732	20.41	3.809	-1.768	0.077	0.130
Enjoyment	20.61	3.607	20.84	3.730	-0.880	0.379	0.063
Eating habits	44.74	6.622	44.74	7.313	0.003	0.998	0.010

Table 5 reveals statistically significant differences in two of the main variables and most of the dimensions evaluated according to students' employment status ($p < 0.05$). Students who were employed showed higher levels of body appreciation, motivation toward physical activity, and in most of its dimensions, including ego, appearance, external expectations, affiliation, physical condition, psychological well-being, and enjoyment. These differences presented small effect sizes (d ranging from 0.153 to 0.243). However, no significant differences were found in the mastery dimension or in the eating habits variable ($p > 0.05$). Overall, it can be inferred that students who balanced both work and study tended to exhibit a more favorable motivational and psychological profile.

Table 5. Comparative results for variables and dimensions according to employment status

Variable and dimensions	Employed		Unemployed		t	p	d
	M	SD	M	SD			
Body appreciation	43.05	7.431	41.62	8.214	2.616	0.009	0.182
Motivation toward physical activity	154.92	25.456	148.90	26.189	3.278	0.001	0.233
Ego	17.63	4.685	16.75	4.593	2.675	0.008	0.190
Appearance	18.67	4.577	17.98	4.473	2.166	0.031	0.153
External expectations	15.66	4.803	14.52	4.590	3.462	0.001	0.243
Affiliation	19.79	3.883	18.84	4.257	3.259	0.001	0.233
Physical condition	20.86	3.253	20.25	3.745	2.402	0.016	0.174
Psychological well-being	20.88	3.536	20.19	3.675	2.688	0.007	0.191
Mastery	20.35	3.639	19.92	3.821	1.626	0.104	0.115
Enjoyment	21.08	3.426	20.45	3.746	2.418	0.016	0.176
Eating habits	45.33	6.827	44.41	6.824	1.902	0.058	0.135

Table 6 shows that no statistically significant differences were found in the evaluated variables and dimensions based on students' relationship status, as all p-values were greater than 0.05 ($p > 0.05$). Overall, the results indicated that relationship status did not significantly influence body appreciation, motivation toward physical activity, or eating habits.

Table 6. Comparative results for variables and dimensions according to relationship status

Variable and dimensions	In a stable relationship		Not in stable relationship		t	p	d
	M	SD	M	SD			
Body appreciation	42.63	8.121	42.08	7.950	0.642	0.521	0.068

Motivation toward physical activity	148.46	27.342	151.40	25.909	-1.045	0.296	0.110
Ego	16.96	4.585	17.08	4.653	-0.238	0.812	0.026
Appearance	18.18	4.435	18.23	4.534	-0.121	0.904	0.011
External expectations	14.92	4.636	14.93	4.708	-0.024	0.981	0.002
Affiliation	18.39	4.412	19.29	4.107	-2.004	0.054	0.211
Physical condition	19.96	4.158	20.53	3.505	-1.491	0.136	0.148
Psychological well-being	20.10	3.537	20.49	3.651	-0.978	0.329	0.109
Mastery	19.56	4.010	20.14	3.725	-1.435	0.152	0.150
Enjoyment	20.40	3.517	20.71	3.661	-0.794	0.427	0.086
Eating habits	45.63	8.389	44.63	6.611	1.128	0.262	0.132

Table 7 shows that body appreciation was positively correlated with motivation toward physical activity ($r = 0.431$, $p < 0.01$) and with eating habits ($r = 0.264$, $p < 0.01$). This indicates that students with a more positive body image tended to be more motivated to engage in physical activity and to maintain healthier eating behaviors. Likewise, a positive correlation was observed between motivation for physical activity and eating habits ($r = 0.333$, $p < 0.01$), suggesting that those with greater motivation to exercise also adopted better dietary practices.

Table 7. Correlation matrix between variables and dimensions

	BA	MPA	EG	AP	EE	AF	PC	PWB	MA	ENJ	EH
BA	1	-	-	-	-	-	-	-	-	-	-
MPA	0.431**	1	-	-	-	-	-	-	-	-	-
EG	0.293**	0.834**	1	-	-	-	-	-	-	-	-
AP	0.209**	0.792**	0.712**	1	-	-	-	-	-	-	-
EE	0.162**	0.641**	0.686**	0.527**	1	-	-	-	-	-	-
AF	0.350**	0.794**	0.610**	0.492**	0.421**	1	-	-	-	-	-
PC	0.483**	0.857**	0.565**	0.661**	0.331**	0.614**	1	-	-	-	-
PWB	0.414**	0.816**	0.504**	0.531**	0.307**	0.642**	0.793**	1	-	-	-
MA	0.455**	0.886**	0.640**	0.595**	0.399**	0.691**	0.849**	0.788**	1	-	-
ENJ	0.484**	0.808**	0.509**	0.482**	0.247**	0.655**	0.812**	0.821**	0.829**	1	-
EH	0.264**	0.333**	0.261**	0.272**	0.221**	0.252**	0.299**	0.257**	0.309**	0.272**	1

**p<0.01

Note: BA = Body appreciation; MPA = Motivation for physical activity; EG = Ego; AP = Appearance; EE = External expectations; AF = Affiliation; PC = Physical condition; PWB = Psychological well-being; MS = Mastery; ENJ = Enjoyment; EH = Eating habits.

As shown in Table 8, the results of the multiple regression analysis revealed that both body appreciation and motivation toward physical activity were statistically significant and positive predictors of eating habits. In this regard, motivation exhibited a higher relative weight ($\beta = 0.270$) compared to body appreciation ($\beta = 0.148$). These findings indicate that students with a more positive body image and those with greater willingness to engage in physical activity tend to adopt healthier eating behaviors. The model explained 12.9% of the variance in eating habits ($R^2 = 0.129$, $F = 63.733$, $p < 0.01$), which represents a low explanatory power.

Table 8. Predictors of eating habits

Predictors	B	SD	β	t	p
(Constant)	28.732	1.443		19.908	0.000
Body appreciation	0.127	0.030	0.148	4.193	0.000
Motivation toward physical activity	0.071	0.009	0.270	7.655	0.000
R^2			0.129		
Adjusted R^2			0.127		
F			63.733 (p<0.01)		

Note: Dependent variable = Eating habits.

Discussion

Preliminary analyses examined differences in the main variables according to participants' sociodemographic characteristics. In the case of body appreciation, statistically significant differences were found based on sex, age, and employment status. Specifically, male students, those over 22 years of age, and those who were employed obtained higher scores in body appreciation. This could be partially explained by sociocultural patterns that promote greater body acceptance among men, as well as lower aesthetic pressure compared to women, who are typically more exposed to rigid body ideals that negatively affect

their self-image. Moreover, older age may be associated with greater emotional maturity, which fosters acceptance of one's body beyond externally imposed physical standards. Likewise, students who work may develop a more positive self-perception due to experiencing greater financial independence and a sense of competence, which may enhance their body-related self-esteem.

Previous research has reported similar findings. For example, Lemoine et al. (2018), when validating the Body Appreciation Scale-2 (BAS-2) in adolescents and young adults in Denmark, Portugal, and Sweden, found that men scored significantly higher in body appreciation than women. Similarly, Lee & Lee (2023) investigated associations between age and body appreciation and found that older individuals displayed more positive body appreciation compared to younger ones. However, our results differ from those of Estrada et al. (2025a), who found no significant differences in body appreciation between students who worked and those who did not.

When analyzing motivation toward physical activity, statistically significant differences were also observed according to sex, age, and employment status. First, men showed higher motivation toward physical activity than women, which could be attributed to sociocultural patterns that encourage greater male participation in sports and exercise settings, as well as to social pressure to maintain a body image associated with strength and performance. Second, students over 22 scored higher than their younger peers, possibly due to greater awareness of the health benefits of exercise, increased maturity that promotes self-discipline, or more structured routines that allow them to incorporate physical activity more consistently. Finally, employed students also showed higher motivation than those who were not working, which may be related to a greater sense of personal responsibility, autonomy, and the need to stay active to meet both academic and work demands.

These findings are consistent with previous studies. For instance, in Mexico, one study explored gender differences in motivation toward physical activity and found that women had significantly lower levels of motivation compared to men (Gutiérrez et al., 2021). Similarly, in Peru, Estrada et al. (2025b) determined that students aged 26 to 35 showed higher levels of sports motivation than those aged 16 to 25. However, regarding employment status, no previous studies have been identified that directly compare levels of motivation for physical activity between working and non-working students, making this finding a novel contribution to this area of research.

Regarding eating habits, statistically significant differences were found based on sex, with men scoring higher than women. This result may be linked to a stronger health orientation and physical activity engagement among male students, while factors such as stress or aesthetic pressure may negatively influence women's eating behaviors. This finding was supported by Angelucci et al. (2022), who also reported a greater presence of healthy eating habits among men. However, it contrasts with previous studies indicating that women generally adopt healthier eating behaviors due to greater concern for their diet and health (Majeed et al., 2024; Mardones et al., 2021). This discrepancy may be explained by contextual or cultural factors specific to the sample, highlighting the need for further research on sex-based differences in eating habits.

Another relevant finding reveals a direct relationship between body appreciation, motivation toward physical activity, and eating habits. Furthermore, the multiple regression analysis showed that both body appreciation and motivation for physical activity were statistically significant and positive predictors of eating habits. This implies that students with a more positive body image and greater motivation to engage in physical activity tend to follow healthier eating behaviors. Consequently, promoting better body perception and increasing motivation to exercise could be effective strategies for encouraging the adoption of healthier eating habits among the student population.

Our findings are consistent with the principles of Self-Determination Theory (Deci & Ryan, 2000), which suggests that health-related behaviors, such as eating and engaging in physical activity, are more likely to be maintained when they are guided by autonomous motivations—those that stem from personal interest, satisfaction, or the intrinsic value attributed to the behavior. From this perspective, greater body appreciation may strengthen a positive relationship with one's own body, fostering participation in physical activity that is driven by well-being and health rather than by external pressures or aesthetic ideals. This type of self-determined motivation not only facilitates adherence to exercise routines but also promotes healthier food choices, which may explain the predictive role of both body appreciation and motivation for physical activity on eating habits as evidenced in this study.

To date, very few studies have jointly examined body appreciation, exercise motivation, and eating habits among university students. Karaağaç & Kalkan (2025) found that a positive body image is associated with higher levels of intrinsic motivation for engaging in sports, which supports the adoption of healthier eating habits. In line with this finding, Deliens et al. (2015) reported that a negative body image can negatively affect eating behaviors, and that motivations for engaging in physical activity—particularly those centered on appearance—are linked to less healthy dietary choices. These studies reinforce our results, suggesting that both body image and exercise motivation are key factors in predicting university students' eating habits.

This study has the strength of addressing the topic holistically by examining how body perceptions and motivations for engaging in physical activity influence eating habits. This approach not only provides empirical data on dietary behaviors but also offers deeper insight into the psychological and motivational factors that shape them. By analyzing these variables together, the study presents a broader view of the factors that regulate eating behaviors, serving as a foundation for the design of preventive interventions aimed at promoting healthy lifestyles among university students. This perspective, which encompasses both the physical and attitudinal aspects of eating behavior, facilitates the development of more effective intervention programs with the potential to sustainably enhance students' health and well-being.

Based on the findings, the development of integrated intervention programs is recommended to strengthen positive body image and stimulate autonomous motivation for physical activity as an indirect pathway to promote healthier eating habits among university students. These interventions could adopt a psychoeducational approach, incorporating participatory workshops on body acceptance, emotional regulation, and critical perception of socially imposed aesthetic standards, along with practical sessions that promote physical activity as a source of well-being rather than solely performance or appearance. Additionally, it is recommended to optimize the university environment through awareness campaigns that reinforce inclusive and accessible health messages, as well as through the creation of spaces that connect bodily movement with mindful food choices. This integrative strategy would allow for the targeting of psychosocial variables, creating favorable conditions for the adoption and maintenance of healthier lifestyles among students.

It is important to acknowledge that this study also presents limitations that should be considered when interpreting the results. First, the research was limited to a single university, which restricts the generalizability of the findings to other universities or different sociocultural contexts. Additionally, the use of self-administered instruments may have introduced response biases, particularly due to social desirability effects, partially compromising the validity of the data. Moreover, the cross-sectional design adopted prevents the analysis of variable evolution over time, as the data collected reflect only a single point in time. These considerations highlight the need to interpret the findings with caution and suggest that future studies should incorporate longitudinal designs, more heterogeneous samples, and mixed data collection methods in order to achieve a more comprehensive and contextualized understanding of the phenomenon under investigation.

Conclusions

The results of this study indicate that both body appreciation and motivation toward physical activity are significant predictors of eating habits among university students in the Peruvian Altiplano. Specifically, it was found that a positive perception of one's own body and greater motivation to engage in physical activity predict a tendency to adopt healthier eating behaviors. These findings highlight the importance of psychological and motivational variables in predicting students' dietary behaviors.

Therefore, it is recommended to implement programs aimed at strengthening positive body appreciation and promoting motivation for physical activity focused on enjoyment, personal growth, and overall well-being, rather than goals centered exclusively on physical appearance. These interventions, by addressing variables shown to have significant predictive effects, may help encourage the adoption of healthier eating habits. Furthermore, this approach could reduce the risk of behaviors associated with body dissatisfaction and exercise driven by external pressures or unrealistic aesthetic ideals.

References

Ahsan, M., Ali, M. F., & Alam, M. (2024). Determining and comparing the level of motivation for exercise according to the sociodemographic characteristics of university students. *BMC Public Health, 24*(1), 3400. https://doi.org/10.1186/s12889-024-20971-2

AlJaber, M., Alwehaib, A., Algaeed, H., Arafah, A., & Binsebayel, O. (2019). Effect of academic stressors on eating habits among medical students in Riyadh, Saudi Arabia. *Journal of Family Medicine and Primary Care, 8*(2), 390. https://doi.org/10.4103/jfmpc.jfmpc_455_18

Angelucci, L., Cañoto, Y., & Lugli, Z. (2022). Hábitos alimentarios en estudiantes universitarios: Influencia del sexo, IMC, influencias socioculturales sobre la apariencia, burlas, dietas y satisfacción corporal. *Psicología: Tercera época, 41*(1-2), 85-111. http://saber.ucv.ve/ojs/index.php/rev_ps/article/view/24996

Azzolino, D., Arosio, B., Marzetti, E., Calvani, R., & Cesari, M. (2020). Nutritional status as a mediator of fatigue and its underlying mechanisms in older people. *Nutrients, 12*(2), 444. https://doi.org/10.3390/nu12020444

Bonfanti, R. C., Melchiori, F., Teti, A., Albano, G., Raffard, S., Rodgers, R., & Lo Coco, G. (2025). The association between social comparison in social media, body image concerns and eating disorder symptoms: A systematic review and meta-analysis. *Body Image, 52*, 101841. https://doi.org/10.1016/j.bodyim.2024.101841

Buckworth, J., Lee, R. E., Regan, G., Schneider, L. K., & DiClemente, C. C. (2007). Decomposing intrinsic and extrinsic motivation for exercise: Application to stages of motivational readiness. *Psychology of Sport and Exercise, 8*(4), 441-461. https://doi.org/10.1016/j.psychsport.2006.06.007

Cachón, J., Carrasco, H., Sánchez, M., & Zagalaz, M. L. (2023). Motivation toward physical activity and healthy habits of adolescents: A systematic review. *Children, 10*(4), 659. https://doi.org/10.3390/children10040659

Cena, H., & Calder, P. C. (2020). Defining a healthy diet: Evidence for the role of contemporary dietary patterns in health and disease. *Nutrients, 12*(2), 334. https://doi.org/10.3390/nu12020334

Childs, E., & De Wit, H. (2014). Regular exercise is associated with emotional resilience to acute stress in healthy adults. *Frontiers in Physiology, 5*, 161. https://doi.org/10.3389/fphys.2014.00161

Choi, J. (2020). Impact of stress levels on eating behaviors among college students. *Nutrients, 12*(5), 1241. https://doi.org/10.3390/nu12051241

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Deliens, T., Deforche, B., De Bourdeaudhuij, I., & Clarys, P. (2015). Determinants of physical activity and sedentary behaviour in university students: A qualitative study using focus group discussions. *BMC Public Health, 15*, 201. https://doi.org/10.1186/s12889-015-1553-4

Duche, A., Paredes, F., Gutiérrez, O., & Carcausto, L. (2020). Transición secundaria-universidad y la adaptación a la vida universitaria. *Revista de Ciencias Sociales, 26*(3), 244-258. https://doi.org/10.31876/rcs.v26i3.33245

Duffey, K., Barbosa, A., Whiting, S., Mendes, R., Yordi, I., Tcymbal, A., Abu, K., Gelius, P., & Breda, J. (2021). Barriers and facilitators of physical activity participation in adolescent girls: A systematic review of systematic reviews. *Frontiers in Public Health*, *9*, 743935. https://doi.org/10.3389/fpubh.2021.743935

El Basiouny, D., Habib, H. I., Moore, S., & Khalil, M. A. (2024). Relation between body appreciation, eating disorder risk, emotional distress, and BMI among a group of Egyptian subjects. *Middle East Current Psychiatry, 31*, 34. https://doi.org/10.1186/s43045-024-00423-8

Estrada-Araoz, E. G., Quispe-Mamani, Y. A. ., Noblega-Reinoso, H. ., & Malaga-Yllpa , Y. . (2024). Autoconcepto físico y motivación hacia la práctica de actividad física en estudiantes universitarios: un estudio transversal (Physical self-concept and motivation toward physical activity in university students: a cross-sectional study). *Retos*, *61*, 39–48. https://doi.org/10.47197/retos.v61.109580

Estrada, E. G., Farfán, M., Lavilla, W. G., Cruz, E. O., & Avendaño-Cruz, C. E. (2025a). Explorando la relación entre la autoestima corporal y la motivación deportiva en una muestra de estudiantes universitarios: Un estudio transversal. *Retos, 65*, 307–319. https://doi.org/10.47197/retos.v65.111585

Estrada, E. G., Quispe, Y. A., Noblega, H., & Malaga, Y. (2024). Autoconcepto físico y motivación hacia la práctica de actividad física en estudiantes universitarios: un estudio transversal. *Retos*, *61*, 39–48. https://doi.org/10.47197/retos.v61.109580

Fardouly, J., & Vartanian, L. R. (2016). Social media and body image concerns: Current research and future directions. *Current Opinion in Psychology, 9*, 1–5. https://doi.org/10.1016/j.copsyc.2015.09.005

Ferreira, R. M., Mendonça, C. R., Azevedo, V. D., Raoof, A., Noll, P. R., & Noll, M. (2022). Barriers to high school and university students' physical activity: A systematic review. *PloS One, 17*(4), e0265913. https://doi.org/10.1371/journal.pone.0265913

Gaibor, D. L. (2023). La motivación intrínseca en las clases de educación física en estudiantes de bachillerato. Revisión sistemática. *GADE: Revista Científica*, *3*(2), 145-159. https://revista.redgade.com/index.php/Gade/article/view/218

Gravetter, F., & Wallnau, L. (2014). *Essentials of statistics for the behavioral sciences* (8th ed.). Wadsworth.

Guo, S., Izydorczyk, B., Lipowska, M., Kamionka, A., Lizińczyk, S., Sajewicz, U., Radtke, B., Liu, T., & Lipowski, M. (2023). Socio-cultural attitudes toward the body as a predictor of motivation for physical activity in young people brought up in Asian and European culture-Chinese-Polish comparison. *BMC Sports Science, Medicine & Rehabilitation, 15*(1), 52. https://doi.org/10.1186/s13102-023-00662-y

Gutiérrez, P., Rocha, A., González, R., Ramírez, M., & Gómez, E. (2021). Motivación hacia el ejercicio en estudiantes universitarios: Diferencias demográficas. *Revista de Ciencias del Ejercicio FOD, 16*(2), 13-23. https://doi.org/10.29105/rcefod16.2-58

Kabir, A., Miah, S., & Islam, A. (2018). Factors influencing eating behavior and dietary intake among resident students in a public university in Bangladesh: A qualitative study. *PLoS ONE, 13*(6), e0198801. https://doi.org/10.1371/journal.pone.0198801

Karaağaç, R. M., & Kalkan, I. (2025). Factors Affecting Eating Motivation Play a Role in Orthorexia Nervosa in University Students: A Cross-Sectional Study. *Behavioral Sciences*, *15*(3), 301. https://doi.org/10.3390/bs15030301

Kriaučionienė, V., Gajewska, D., Raskilienė, A., Myszkowska, J., Ponichter, J., Paulauskienė, L., & Petkevičienė, J. (2024). Associations between body appreciation, body weight, lifestyle factors and subjective health among bachelor students in Lithuania and Poland: Cross-sectional study. *Nutrients, 16*(22), 3939. https://doi.org/10.3390/nu16223939

Lee, M., & Lee, H. H. (2023). The interaction effects of age and body size on body appreciation and health-related behaviors. *International Journal of Psychological Research, 15*(2), 34–43. https://doi.org/10.21500/20112084.5490

Lemoine, J. E., Konradsen, H., Lunde, A., Roland, C., Ny, P., Khalaf, A., & Torres, S. (2018). Factor structure and psychometric properties of the Body Appreciation Scale-2 among adolescents and young adults in Danish, Portuguese, and Swedish. *Body Image, 26*, 1–9. https://doi.org/10.1016/j.bodyim.2018.04.004

Li, X., Braakhuis, A., Li, Z., & Roy, R. (2022). How does the university food environment impact student dietary behaviors? A systematic review. *Frontiers in Nutrition, 9*, 840818. https://doi.org/10.3389/fnut.2022.840818

Liu, Z.-H., Cai, H., Bai, W., Liu, S., Liu, H., Chen, X., Qi, H., Cheung, T., Jackson, T., Liu, R., & Xiang, Y.-T. (2022). Gender differences in body appreciation and its associations with psychiatric symptoms among Chinese college students: A nationwide survey. *Frontiers in Psychiatry, 13*, 771398. https://doi.org/10.3389/fpsyt.2022.771398

López, E., & Ardura, D. (2023). El tamaño del efecto en la publicación científica. *Educación XX1, 26*(1), 9-17. https://doi.org/10.5944/educxx1.36276

López, J. F., Mesas, A. E., Álvarez, C., Pascual, C., Saz, A., & Cavero, I. (2022). Association between eating habits and perceived school performance: A cross-sectional study among 46,455 adolescents from 42 countries. *Frontiers in Nutrition, 9*, 797415. https://doi.org/10.3389/fnut.2022.797415

Majeed, M., Khalid, S., Khan, M., Kavanagh, K., & Nazir, F. (2024). Comparing gender-based eating habits and nutritional status among boarding students at University of Agriculture, Faisalabad. *Journal of Nutrition Education and Behavior, 56*(8), S5–S6. https://doi.org/10.1016/j.jneb.2024.05.016

Mallaram, G. K., Sharma, P., Kattula, D., Singh, S., & Pavuluru, P. (2023). Body image perception, eating disorder behavior, self-esteem and quality of life: A cross-sectional study among female medical

students. *Journal of Eating Disorders, 11*(1), 225. https://doi.org/10.1186/s40337-023-00945-2

Mardones, L., Muñoz, M., Esparza, J., & Troncoso-Pantoja, C. (2021). Hábitos alimentarios en estudiantes universitarios de la Región de Bío-Bío, Chile, 2017. *Perspectivas en Nutrición Humana, 23*(1), 27–38. https://doi.org/10.17533/udea.penh.v23n1a03

Merino, M., Tornero, J. F., Rubio, A., Villanueva, C. V., Martín, A., & Clemente, V. J. (2024). Body perceptions and psychological well-being: A review of the impact of social media and physical measurements on self-esteem and mental health with a focus on body image satisfaction and its relationship with cultural and gender factors. *Healthcare, 12*(14), 1396. https://doi.org/10.3390/healthcare12141396

Pedersen, M., Bredahl, T., Elmose, K., & Hansen, A. (2022). Motives and barriers related to physical activity within different types of built environments: Implications for health promotion. *International Journal of Environmental Research and Public Health, 19*(15), 9000. https://doi.org/10.3390/ijerph19159000

Pérez, S., Gonzalez, J., Arellano, Ó., & Vargas, A. (2022). Spanish validation of the PALMS (Physical Activity and Leisure Motivation Scale). *International Journal of Environmental Research and Public Health, 19*(16), 10064. https://doi.org/10.3390/ijerph191610064

Pinckard, K., Baskin, K. K., & Stanford, K. I. (2019). Effects of exercise to improve cardiovascular health. *Frontiers in Cardiovascular Medicine, 6*, 69. https://doi.org/10.3389/fcvm.2019.00069

Quittkat, H. L., Hartmann, A. S., Düsing, R., Buhlmann, U., & Vocks, S. (2019). Body dissatisfaction, importance of appearance, and body appreciation in men and women over the lifespan. *Frontiers in Psychiatry, 10*, 864. https://doi.org/10.3389/fpsyt.2019.00864

Restrepo, J. E., Bedoya, E. Y., Cuartas, G. P., Cassaretto, M. De los M., & Vilela, Y. P. (2023). Estrés académico y adaptación a la vida universitaria: Mediación de la regulación cognitivo-emocional y el apoyo social. *Anales de Psicología / Annals of Psychology, 39*(1), 62–71. https://doi.org/10.6018/analesps.472201

Rivera, C., Briones, M., De Jesús, A., & Toledo, Á. (2020). Eating habits associated with nutrition-related knowledge among university students enrolled in academic programs related to nutrition and culinary arts in Puerto Rico. *Nutrients, 12*(5), 1408. https://doi.org/10.3390/nu12051408

Rounsefell, K., Gibson, S., McLean, S., Blair, M., Molenaar, A., Brennan, L., Truby, H., & McCaffrey, T. A. (2020). Social media, body image and food choices in healthy young adults: A mixed methods systematic review. *Nutrition & Dietetics: The Journal of the Dietitians Association of Australia, 77*(1), 19–40. https://doi.org/10.1111/1747-0080.12581

Sabiston, C. M., Pila, E., Vani, M., & Thogersen, C. (2019). Body image, physical activity, and sport: A scoping review. *Psychology of Sport and Exercise, 42*, 48–57. https://doi.org/10.1016/j.psychsport.2018.12.010

Sáez, I., Solabarrieta, J., & Rubio, I. (2021). Motivation for physical activity in university students and its relation with gender, amount of activities, and sport satisfaction. *Sustainability, 13*(6), 3183. https://doi.org/10.3390/su13063183

Salvy, S. J., De la Haye, K., Bowker, J. C., & Hermans, R. C. (2012). Influence of peers and friends on children's and adolescents' eating and activity behaviors. *Physiology & Behavior, 106*(3), 369–378. https://doi.org/10.1016/j.physbeh.2012.03.022

Scaglioni, S., De Cosmi, V., Ciappolino, V., Parazzini, F., Brambilla, P., & Agostoni, C. (2018). Factors influencing children's eating behaviours. *Nutrients, 10*(6), 706. https://doi.org/10.3390/nu10060706

Sierra, M. J., González, S., Pastor, J. C., & López, G. F. (2019). Can we motivate students to practice physical activities and sports through models-based practice? A systematic review and meta-analysis of psychosocial factors related to physical education. *Frontiers in Psychology, 10*, 2115. https://doi.org/10.3389/fpsyg.2019.02115

Sogari, G., Velez, C., Gómez, M. I., & Mora, C. (2018). College students and eating habits: A study using an ecological model for healthy behavior. *Nutrients, 10*(12), 1823. https://doi.org/10.3390/nu10121823

Tafuri, D., & Latino, F. (2025). Association of dietary intake with chronic disease and human health. *Nutrients, 17*(3), 446. https://doi.org/10.3390/nu17030446

Tapia, V. (2023). *Alimentación intuitiva y Apreciación corporal en bailarinas* [tesis de pregrado]. Universidad de Ciencias Aplicadas. http://hdl.handle.net/10757/673058

Tylka, T. L., & Wood, N. L. (2015). The Body Appreciation Scale-2: Item refinement and psychometric evaluation. *Body Image, 12*, 53–67. https://doi.org/10.1016/j.bodyim.2014.09.006

Vidal, F. G., Vidal, M., Huillca, H., Gutiérrez, E., Castro, M., & Gómez, Y. (2022). Hábitos alimentarios y calidad de sueño en universitarios en tiempos de COVID-19, Lima-Perú. *Nutrición Clínica y Dietética Hospitalaria, 41*(4), 90–97. https://doi.org/10.12873/414vidal

Wanjau, M. N., Möller, H., Haigh, F., Milat, A., Hayek, R., Lucas, P., & Veerman, J. L. (2023). Physical activity and depression and anxiety disorders: A systematic review of reviews and assessment of causality. *AJPM Focus, 2*(2), 100074. https://doi.org/10.1016/j.focus.2023.100074

Weinberger, N. A., & Luck, C. (2021). Body appreciation and appearance evaluation in individuals with obesity compared to individuals with normal-weight: Findings from a representative German population sample. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity, 26*(7), 2241–2249. https://doi.org/10.1007/s40519-020-01071-7

Wodarz, R., & Rogowska, A. M. (2024). The moderating effect of body appreciation on the relationship between self-esteem and life satisfaction. *European Journal of Investigation in Health, Psychology and Education, 14*(4), 870–887. https://doi.org/10.3390/ejihpe14040056

Yun, T. C., Ahmad, S. R., & Quee, D. K. S. (2018). Dietary habits and lifestyle practices among university students in Universiti Brunei Darussalam. *The Malaysian Journal of Medical Sciences, 25*(3), 56–66. https://doi.org/10.21315/mjms2018.25.3.6

Zhang, Y. (2025). Impact of dietary habit changes on college students' physical health: Insights from a comprehensive study. *Scientific Reports, 15*, 9953. https://doi.org/10.1038/s41598-025-94439-7

Authors' and translators' details:

Marisol Yana-Salluca	myana@unap.edu.pe	Author
Edwin Gustavo Estrada-Araoz	gestrada@unamad.edu.pe	Author
Nancy Yana-Salluca	nyanas@epg.unap.edu.pe	Author
Reynaldo Cutipa-Luque	reynaldo.cutipa@unap.edu.pe	Author
Zara Turpo-Puma	zturpo@unap.edu.pe	Author
Gilber Chura-Quispe	gilber.chura@epnewman.edu.pe	Author/Translator
Elizabeth Orfelia Cruz-Laricano	22230024@unamad.edu.pe	Author