

Healthy Habits Factors and Stress Associated with Health-Related Quality of Life in a Peruvian Adult Population: A Cross-Sectional Study

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Background: Healthy habits contribute to the prevention of diseases and, therefore, improve the health-related quality of life of people. However, stress is one of the main risk factors associated with serious health problems in the individual. Therefore, the literature suggests a relationship between healthy habits, stress, and health-related quality of life.

Objective: To assess the factors of healthy habits and stress associated with health-related quality of life in a Peruvian adult population.

Methods: A cross-sectional study was conducted with a sample of 540 Peruvian citizens aged between 18 and 60 years. A questionnaire was applied on the Google Forms platform to be completed online, using the “Healthy Lifestyle Questionnaire” and the PSS-4 to assess healthy habits and stress, respectively. Health-related quality of life was evaluated using the EuroQol-5D.

Results: In the multivariate analysis, stress was the most associated factor with quality of life. Physical activity, drug consumption, tobacco consumption, rest habits, and a balanced diet were healthy habits associated with quality of life.

Conclusion: Physical activity, rest habits, and a balanced diet improve health-related quality of life, while drug or tobacco consumption and stress are associated with a lower health-related quality of life.

Keywords: adults, healthy habits, health-related quality of life, stress, Peru

Introduction

Healthy habits are a set of conscious, collective, and repetitive behaviors aimed at improving the physical, social, and mental health of people.¹ Unhealthy habits are one of the main causes of the increase in the rates of non-communicable diseases in Peru.² In fact, 14.9% and 62.2% of the Peruvian population over 15 smoked at least one cigarette and consumed some alcoholic beverage in the last 12 months, respectively.³ Only 10.5% of Peruvians over the age of 15 consumed at least 5 servings of fruits and/or vegetables per day.³ In addition, the average daily consumption of fruit servings by people in this same age group was 2.0 servings, which is lower than the amount recommended by the World Health Organization (≥ 5 servings of fruits and vegetables per day).^{3,4} On the other hand, less than 12% of the Peruvian population performs physical activity exclusively for the benefit of their health, which is worrying because not performing these healthy practices can favor the appearance of non-communicable diseases, such as arterial hypertension, obesity, osteoporosis, diabetes and even various types of cancer, among others.³

In contrast, a healthy and balanced diet can improve health-related quality of life and decrease the risk of mortality.^{5,6} The findings of a study found that healthy dietary patterns improve the quality of life of participants.⁵ Similarly, the

results of another study that examined the relationship between dietary patterns and health-related quality of life indicated that greater adherence to healthy dietary patterns, such as the Mediterranean diet, was associated with better quality of life in different aspects, such as physical, mental, and social health.⁷ On the other hand, unhealthy dietary patterns, such as the Western diet, were associated with poorer quality of life.⁶ Additionally, in a study he investigated the health-related quality of life in vegetarians and non-vegetarians, the results showed that vegetarians had a better quality of life in terms of physical, emotional, and social well-being compared to non-vegetarians.⁸ These findings highlight the importance of a healthy dietary pattern in promoting an overall good quality of life.

On the other hand, several studies support the importance of physical activity in promoting a healthy lifestyle, improving quality of life and overall well-being.^{9–11} The results of a systematic review highlighted that regular physical activity was positively associated with better quality of life, greater psychological well-being, and improved mood.⁹ In another study conducted on university students, they highlighted that those who regularly participated in sports activities and had a high level of physical activity reported better health-related quality of life compared to students who had lower levels of physical activity.¹⁰ Furthermore, this study showed a positive association between sport and physical activity with aspects such as physical health, psychological well-being, vitality, and the general perception of quality of life.¹⁰ Considering these findings, it is important to encourage participation in sports activities and promote an active lifestyle to improve the quality of life in the general population.

Likewise, adequate rest, including a sufficient number of hours of sleep, has positive effects on a person's health-related quality of life, mood, and general well-being. In fact, people who experience compensatory sleep on weekends have a better health-related quality of life compared to those who do not.¹² Also, significant positive impacts on physical health, emotional well-being, and vitality are observed in those who achieve adequate sleep during the weekend.¹² Another study conducted in university students in northeast China revealed that shorter sleep duration was negatively related to health-related quality of life.¹¹ Consequently, it is important to encourage the adoption of practices that promote adequate sleep, as this can contribute to improving their quality of life.

In addition, it is important to address both the adoption of healthy habits and stress management to improve health-related quality of life.^{13,14} For example, chronic and prolonged stress can have a negative impact on various aspects of life, including physical, mental, and emotional health, interpersonal relationships, work and academic performance, and overall life satisfaction.¹⁵ Excessive stress can contribute to the development of health problems such as cardiovascular disease, sleep disorders, anxiety, and depression.¹⁶ Therefore, it is important to manage stress appropriately and adopt effective coping strategies to improve quality of life. By promoting a healthy lifestyle and developing effective strategies to manage stress, one can contribute significantly to the improvement of people's health and well-being.

The scientific literature has observed a relationship between healthy habits, stress, and health-related quality of life in various contexts.^{5,6,9–11,15} However, it is important to note that there is a lack of specific knowledge in the Peruvian context. Although research has been conducted in other countries, it is necessary to carry out studies in the Peruvian context to better understand how these factors interrelate and affect the quality of life of the Peruvian population. These studies can provide relevant information to develop health promotion strategies and improve quality of life in the Peruvian context. Therefore, the aim of this study was to determine the relationship between healthy habits and stress with quality of life in Peruvian adults.

Materials and Methods

Study Design and Participants

This study was a descriptive and cross-sectional design that identifies the influence of physical activity, drug use, tobacco use, sleep habits, balanced diet, and stress as predictors of quality of life in the Peruvian population. The individuals who took part in the research came from the three geographical regions of the country: coast, highlands, and jungle. Participants were selected using a non-probability convenience sampling method. In this approach, the individuals who formed part of the sample were selected intentionally and in a manner accessible to the researchers, without following a random selection process; this type of sampling was used due to its convenience and practicality for the study in question. The inclusion criteria were as follows: a) Peruvian nationality, and b) age between 18 and 60 years old.

Foreigners residing in Peru were excluded from the study, as well as people with special needs or terminal illnesses. For data collection, Google Form was used to create the survey. Once developed, various communication channels were established with participants, using social networks (eg, Facebook and WhatsApp) and email. Through these means, potential participants were contacted and provided with the link to the online survey.

The sample size was calculated using the G*Power 3.1.9.7 program. The number of explanatory variables in multiple linear regression is 8. For an effect size of 0.10, a statistical power of $(1 - \beta)$ 0.90, and a significance level (α) of 0.05 for multiple regression analysis, the minimum sample size required was 199. Possible incomplete data were considered, so 540 validated data were analyzed.

Ethical Aspects

This study received ethical approval from the Ethics Committee of the Universidad Peruana Unión (registration number: 2022-CE-EPG-0000109) and was conducted following the guidelines of the Declaration of Helsinki. All participants were treated in accordance with these guidelines. The privacy and anonymity of the participants was ensured, and informed consent was obtained before starting the research.

Measurement Instruments

The Spanish version of the “Healthy Lifestyle Questionnaire” was used to evaluate healthy habits. This questionnaire has useful properties in adult populations; it consists of 27 items grouped into 7 factors: Balanced Diet (3 items), Respect for meal times (3 items); Sleep habits (3 items); Tobacco use (3 items); Alcohol consumption (5 items); Consumption of other drugs (5 items) and Physical activity (5 items). It shows an adequate structure, acceptable fit indices and high levels of internal consistency in each factor according to McDonald’s Omega coefficient (Balanced Diet = 0.79, Respect for meal times = 0.82; Sleep habits = 0.91; Tobacco use = 0.96; Alcohol consumption = 0.90; Consumption of other drugs = 0.91 and Physical activity = 0.90).¹⁷

The “Perceived Stress Scale” (PSS) in its short 4-item version in Spanish was used to evaluate stress. This scale assesses the degree to which people perceive a lack of control in their daily lives. The 4-item version includes two positive and two negative items. The internal consistency values were acceptable (>0.70) based on the calculation of Cronbach’s Alpha and McDonald’s Omega.¹⁸

To measure health-related quality of life, the Spanish EuroQol-5D was used, which is a generic health-related quality of life measurement instrument that can be used both in relatively healthy individuals (general population) and in groups of patients with different pathologies. The EuroQol-5D consists of five domains (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression). These can be classified into three levels of severity (no problems, some or moderate problems, and extreme situations).¹⁹ It also presents good internal consistency values (Cronbach’s Alpha = 0.65).²⁰

Statistical Analysis

In this study, descriptive statistics were used to summarize the characteristics of the participants in terms of percentage and mean with standard deviation (SD). Possible gender differences were explored through a chi-square test of independence for categorical variables. Additionally, to evaluate the relationship between the study variables, the Pearson correlation coefficient was calculated.

Subsequently, a multiple linear regression analysis was performed to identify how much explanatory power healthy habits, tobacco consumption, drug use, physical activity, sleep habits, balanced diet, and stress have on health-related quality of life. Additionally, the demographic characteristics of the participants were adjusted as dummy variables to take into account their influence on the results. The data were analyzed using the open-source software R 4.1.1.

Results

Descriptive Analysis

A total of 540 Peruvian adults participated in the study with an age range of 18 to 60 years (Mean=30.3, Standard Deviation=9.1). Table 1 shows that the distribution of marital status and income level does not present significant

Table 1 Distribution of Sociodemographic Variables

Variables		Total		Gender				p-value [‡]
				Female		Male		
		n	%	n	%	n	%	
Marital Status	Married	95	17.6	55	17.2	40	18.1	0.152
	Living Together	58	10.7	36	11.3	22	10.0	
	Divorced	6	1.1	6	1.9	0	0.0	
	Single	378	70.0	219	68.7	159	71.9	
	Widowed	3	0.6	3	0.9	0	0.0	
Education	Elementary	4	0.7	3	0.9	1	0.5	<0.001**
	Secondary	62	11.5	22	6.9	40	18.1	
	Technical	85	15.7	44	13.8	41	18.6	
	University	389	72.0	250	78.4	139	62.9	
Monthly income (PEN) ^a	1000–3000 soles	239	44.3	134	42.0	105	47.5	0.133
	1000.00–3000.00	198	36.7	128	40.1	70	31.7	
	> 3000.00	103	19.1	57	17.9	46	20.8	
Religion	Adventist	159	29.4	81	25.4	78	35.3	0.007*
	Catholic	269	49.8	177	55.5	92	41.6	
	Evangelical	44	8.1	24	7.5	20	9.0	
	Jehovah's Witness	4	0.7	4	1.3	0	0.0	
	Other	64	11.9	33	10.3	31	14.0	
Origin ^b	Coast	216	40.0	149	46.7	67	30.3	<0.001**
	Highlands	197	36.5	109	34.2	88	39.8	
	Jungle	127	23.5	61	19.1	66	29.9	

Notes: * $p < 0.05$, ** $p < 0.01$, [‡]statistically significant by chi-square, ^aThe Peruvian Sol (PEN) is the national currency of Peru. The ISO code for the Peruvian currency is PEN, a standardized 3-letter code according to the ISO-4217 currency code standard, ^bRefers to the three geographic regions of Peru ("Coast, Highlands, and Jungle").

differences between women and men ($p > 0.05$). However, significant differences ($p < 0.01$) were found in the proportions of the categories of educational level, religion, and origin between women and men.

Preliminary Analysis

Table 2 presents the correlation matrix showing a series of variables related to health and well-being, along with the means (M) and standard deviations (SD) for each of them. In this table, the internal consistencies alpha was also observed to be between the values of 0.08 and 0.62.

Multivariate Analysis

The multivariate regression analysis presents the results of a multiple regression analysis, where quality of life is used as the dependent variable and various other variables as independent variables (Table 3). Thus, physical activity ($\beta = 0.043$), rest habits ($\beta = 0.056$), and a balanced diet ($\beta = 0.051$) have a significant positive effect on quality of life ($p < 0.05$). On the other hand, drug use ($\beta = -0.054$), tobacco consumption ($\beta = -0.049$), stress ($\beta = -0.130$), and being married have

Table 2 Mean, Standard Deviation, and Correlations

Variable	M	SD	1	2	3	4	5	6	7	8
1. Physical Activity	17.78	4.03								
2. Drug Use	7.00	2.95	−0.08							
3. Alcohol Consumption	7.77	3.58	−0.09*	0.57**						
4. Tobacco Use	4.23	2.24	−0.17**	0.60**	0.62**					
5. Rest Habits	10.07	2.99	0.46**	−0.11*	−0.16**	−0.15**				
6. Meal Schedules	10.80	2.67	0.36**	−0.17**	−0.18**	−0.19**	0.52**			
7. Balanced Diet	10.48	2.26	0.47**	−0.19**	−0.21**	−0.25**	0.47**	0.49**		
8. Quality of Life	7.15	1.15	0.35**	−0.28**	−0.21**	−0.31**	0.37**	0.29**	0.35**	
9. Stress	5.34	2.66	−0.22**	0.15**	0.17**	0.16**	−0.31**	−0.30**	−0.27**	−0.44**

Notes: * $p < 0.05$. ** $p < 0.01$.

Abbreviations: M, Mean; SD, standard deviation.

Table 3 Multivariate Analysis of Related Factors in Quality of Life

Variable	Estimate	Std. Error	t	p	
(Intercept)	6.513	0.332	19.606	< 2e-16	***
Physical Activity	0.043	0.013	3.247	0.001	**
Drug Use	−0.054	0.019	−2.917	0.004	**
Tobacco Use	−0.049	0.025	−1.999	0.046	*
Sleep Habits	0.056	0.018	3.136	0.002	**
Balanced Diet	0.051	0.024	2.154	0.032	*
Stress	−0.130	0.018	−7.312	0.000	***
Marital Status (Married) ^a	−0.456	0.119	−3.847	0.000	***
Education Level (Technical) ^a	−0.202	0.124	−1.634	0.103	
Monthly income (PEN) (1000.00–3000.00) ^a	0.202	0.102	1.981	0.048	*
Monthly income (PEN) (>3000.00) ^a	0.385	0.131	2.940	0.003	**
R-squared	0.369				
Adjusted R-squared	0.354				
F (P)	24.62				

Notes: t = Test statistic; p = probability; ^aDummy coded. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. The Peruvian Sol (PEN) is the national currency of Peru. The ISO code for the Peruvian currency is PEN, a standardized 3-letter code according to the ISO-4217 currency code standard.

a significant negative effect on quality of life ($p < 0.05$). Incomes greater than 1000 soles ($\beta = 0.202$) and greater than 3000 soles ($\beta = 0.385$) also have a significant positive effect on quality of life. The other independent variables do not have a significant effect on the dependent variable. The variables analyzed in this model significantly explain 36.9% of the variability of life satisfaction ($R^2 = 36.9$, $F = 24.62$, $p = < 0.001$).

Discussion

In this study, the health status of a representative sample of the Peruvian adult population was explored using the EuroQol-5D. Partial evidence was found to support the hypothesis about the association between healthy habits and health-related quality of life. The combination of different healthy habits factors, such as a balanced diet, regulated physical activity, and effective stress management, has a positive impact on health behavior and quality of life.²¹ The practice of healthy habits and food security in the population improves quality of life and prevents adverse outcomes for mental and physical health.²²

According to our findings, a negative association was observed between being married and health-related quality of life. This finding suggests that married people may experience higher levels of responsibility, which in turn, may result in burnout and stress, negatively impacting their quality of life.^{23,24} In contrast, a significant positive association was found between income above 1000 soles and quality of life. These results support existing evidence suggesting that low socioeconomic status may contribute to inequality in quality of life. This can be attributed to factors such as lower educational level, more precarious housing conditions, and a greater occupational burden in the household, which can have a negative impact on perceived quality of life.^{23–26}

In the current study, it was also shown that physical activity had a positive effect on the quality of life of the participants. The impact of physical activity on health-related quality of life has been amply demonstrated in several studies in adult populations.^{27–29} In fact, numerous studies have consistently demonstrated the positive impact of physical activity on health-related quality of life in adult populations.^{10,30,31} Evidence supports that regular physical activity is associated with a number of physical, mental, and social health benefits, which, in turn, result in a better quality of life.^{10,30,31} Therefore, promoting regular participation in physical activities appropriate to individual abilities and preferences is critical to improving overall health and well-being. The COVID-19 pandemic has had a significant impact on health-related quality of life due to social distancing measures and restrictions imposed to contain the spread of the virus.^{16,32} These measures have led to a decrease in physical activity and a greater sedentary lifestyle in a large part of the population, which has had a negative impact on health and well-being.^{16,33} Confinement and restrictions have limited opportunities for outdoor physical activity, such as walking, running, or sports.³⁴ In addition, the closure of gyms and sports centers has made it difficult to access facilities to stay active. As a result, many people have experienced a more sedentary lifestyle; this decrease in physical activity has had multiple negative effects on health-related quality of life.^{35,36}

On the other hand, drug and tobacco consumption was negatively related to health-related quality of life in adults. As other studies have shown, the consumption of harmful substances, especially drugs and tobacco, is associated with a deterioration of health-related quality of life in adults.^{37–39} These substances can contribute to serious public health problems, such as chronic addictive disorders and cardiovascular diseases, which can negatively affect current and future quality of life.⁴⁰ However, some authors have pointed out that factors such as low income, low education levels, and depressive symptoms can predict drug and tobacco consumption.⁴¹

An important result that emerges from this research is the positive association between having adequate rest habits, such as sleeping 7 to 8 hours, with health-related quality of life. These results are consistent with other studies conducted on adult populations, where adequate rest had a positive impact on health-related quality of life.^{11,12,42} Both lack of sleep and excessive sleep have been found to be associated with significant impairment in health-related quality of life in adults with chronic diseases;⁴³ with negative effects on physical health, mood, mental health, and chronic disease management.^{11,12} In addition, sleep alterations are closely related to mental health and can be a risk factor for cognitive decline compared to adults with good sleep quality.^{44,45} Therefore, maintaining adequate sleep duration is important for preserving and improving health-related quality of life in adults.

In the present study, a positive correlation was observed between following a balanced diet and a higher health-related quality of life. This is consistent with previous research supporting the idea that adopting healthy eating habits and following balanced diets can improve quality of life in terms of physical and mental well-being.^{5,6,46,47} In fact, a balanced diet that includes a variety of healthy foods provides the body with nutrients necessary for optimal functioning, preventing chronic diseases,⁸ maintaining a healthy weight,⁴⁸ and psychological benefits,⁴⁷ such as improved mood

and self-esteem.⁴⁹ In fact, some studies have suggested that certain nutrients, such as omega-3 fatty acids and B vitamins, may have a beneficial effect on mental health.⁴⁷ In addition, healthy eating patterns are associated with a significant reduction in the risk of mortality from any cause, highlighting the importance of maintaining a healthy diet throughout life.^{32,50,51} However, inappropriate eating behaviors are related to a significant decrease in health-related quality of life.⁵²

Finally, a relationship was found between perceived stress and health-related quality of life. Other studies have demonstrated that stress has a direct negative impact on health-related quality of life.^{30,53} Moderate levels of perceived stress are correlated with multiple health indicators, such as loneliness, alcohol consumption, and the presence of anxiety and depression symptoms, and are negatively associated with quality of life.^{18,30,54} On the other hand, excessive and continuous stress has effects beyond health, triggering diseases, which demonstrates that stress-related events can affect quality of life.^{55,56}

Limitations and Future Directions

An important limitation of this study is its cross-sectional design, which prevents the establishment of a causal relationship between the variables analyzed. Being a cross-sectional study, data were only collected at a specific point in time, which limits the ability to determine the temporal sequence of events or identify the direction of the relationship between variables. Therefore, to establish stronger causal relationships, longitudinal studies are suggested to follow participants over time and assess how changes in the independent variables affect quality of life. Another important limitation of this study is the type of sampling used, which could affect the representativeness of the sample with respect to the target population. In this case, non-probability sampling was used, which implies that the participants were not randomly selected. As a result, the sample may not be fully representative of the target population, limiting the generalizability of the results to other populations or contexts; therefore, it would be advisable to use a probability sample that allows for a random selection of participants. Additionally, it is important to keep in mind that data collected through self-reported online surveys may be subject to possible bias on the part of participants. By relying on self-reporting, there is a possibility that participants may provide incorrect or biased responses due to reasons such as a desire to present themselves in a more favorable light or a lack of accuracy in self-perception. In addition, the absence of direct supervision during data collection may make it difficult to verify the veracity of responses. Therefore, results obtained from self-reported online surveys should be interpreted with caution. Finally, it is important to keep in mind that the largest proportion of the population studied in this study has a fairly young age range, between 20 and 40 years old. Therefore, the associations found in this study may not be generalizable to older adults or to other populations with different demographic characteristics. In fact, the factors that influence quality of life and other variables may vary at different stages of life, and older adults may face different challenges and circumstances that could affect their outcomes.⁵⁷ In this sense, further research including more representative and diverse samples in terms of age is required to obtain a more complete understanding of the associations between the variables studied.

Practical Implications

Despite these limitations, we believe that our research is valuable, as it is the first to use the EuroQol-5D tool to measure the health status of the Peruvian population. In addition, the results of the study highlight the importance of promoting and encouraging healthy habits, such as a balanced diet, regular physical activity, and proper stress management. These findings support the need to implement health promotion programs that emphasize the adoption of these healthy behaviors in the adult population. This could include promoting activities such as meditation, regular exercise, and seeking social support to reduce stress levels and improve quality of life.

Conclusion

The results of this study demonstrate that different healthy habits can have a positive impact on health-related quality of life in the adult population in Peru. Physical activity, proper sleep habits, and a balanced diet are associated with better health-related quality of life, while drug or tobacco use, and perceived stress are related to a decrease in the same. These results provide public and private healthcare organizations in Peru with the opportunity to develop effective policies to

promote healthy habits in the adult population, with the aim of reducing the incidence of non-communicable chronic diseases in the country.

Data Sharing Statement

Data supporting the conclusions of this research will be made available in coordination with the corresponding author.

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