Dietary patterns and their influence on perceived physical condition among university students: evidence from a Chilean cohort

Patrones alimentarios y su influencia en la condición física percibida en estudiantes universitarios: evidencia de una cohorte chilena

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Abstract

Introduction: Healthy eating patterns, particularly high consumption of fruits and vegetables, are associated with better perceived physical condition and healthier lifestyles in young populations. However, university students often face academic stress and irregular habits that may compromise these behaviors. This study examined the association between a dietary patterns index and perceived physical condition in Chilean university students.
Methods: A cross-sectional study was conducted with 307 students from the University of Atacama (Chile). Data were collected using a structured survey including demographics, dietary habits (15 items, 1–5 frequency scale), perceived physical condition (5 items, 1–4 Likert scale), and sleep duration. The dietary index corresponded to the mean of the 15 items, and perceived physical condition was calculated as the mean of five items. High perceived condition was defined as scores ≥ the sample median (2.8). Descriptive analyses and logistic regression models adjusted for age, sex, and sleep were performed.
Results: Participants had a mean age of 21.3 years and 60% were men. Overall, 55.4% reported high perceived physical condition. Higher dietary index scores were associated with greater odds of high perceived condition in both univariate (OR=1.45, 95% CI 1.12–1.88) and adjusted models (OR=1.42, 95% CI 1.09–1.85). The correlation between diet and perceived condition was moderate (r=0.42, p<0.001).
Conclusions: Healthier dietary habits were modestly associated with perceived physical condition among Chilean university students. Due to the cross-sectional design and limited covariate adjustment, findings should be interpreted as exploratory and confirmed in longitudinal studies.

Keywords

Dietary patterns; perceived physical condition; university students; Chile.

Resumen

Introducción: Los patrones de alimentación saludables, especialmente el consumo de frutas y verduras, se asocian con mejor percepción de la condición física y estilos de vida más activos en poblaciones jóvenes. Sin embargo, los estudiantes universitarios suelen presentar estrés académico y hábitos irregulares que pueden afectar estas conductas. El objetivo de este estudio fue analizar la asociación entre un índice de patrones dietéticos y la percepción de la condición física en estudiantes universitarios chilenos.
Métodos: Se realizó un estudio transversal con 307 estudiantes de la Universidad de Atacama (Chile). Los datos se obtuvieron mediante una encuesta que incluyó variables sociodemográficas, hábitos alimentarios (15 ítems, escala de frecuencia 1–5), condición física percibida (5 ítems, escala Likert 1–4) y horas de sueño. El índice dietético se calculó como el promedio de los ítems de alimentación y la condición física como el promedio de los cinco ítems. Se definió alta condición física como valores iguales o superiores a la mediana (2,8). Se aplicaron análisis descriptivos y regresión logística ajustada por edad, sexo y sueño.
Resultados: La edad media fue de 21,3 años y el 60% fueron hombres. El 55,4% presentó alta condición física percibida. Un mayor índice dietético se asoció con mayor probabilidad de alta condición física (OR=1,42; IC95%: 1,09–1,85). La correlación entre dieta y condición física fue moderada (r=0,42; p<0,001).
Conclusión: Hábitos alimentarios más saludables se asociaron con mejor percepción de la condición física. Debido al diseño transversal, los resultados deben interpretarse como asociaciones exploratorias.

Palabras clave

Patrones alimentarios; condición física percibida; estudiantes universitarios; Chile.

Introduction

University students in Chile face significant challenges in maintaining healthy dietary patterns during the transition to independent living, often leading to increased consumption of ultra-processed foods and irregular meal timings. This context is exacerbated by academic demands and limited access to nutritious options on campus, contributing to suboptimal nutrition that affects overall well-being (Díaz-Torrente & Quintiliano-Scarpelli, 2020). Studies highlight that such shifts correlate with higher risks of overweight and metabolic issues in this demographic (Saavedra Clarke et al., 2024). Understanding these patterns is crucial for public health interventions in educational settings.

The literature reveals that leaving home disrupts traditional eating habits among Chilean university students, promoting reliance on convenience foods with low nutritional value. Research indicates a decline in fruit and vegetable intake post-transition, linked to time constraints and economic factors (Arcadu & Aleffi, 2024). Additionally, poor dietary adherence during this period is associated with altered sleep quality, further compounding health vulnerabilities (Ordóñez et al., 2024). These findings underscore the need for targeted nutritional education to mitigate long-term consequences.

Perceived physical condition reflects an individual's self-appraisal of fitness-related capacities (e.g., cardiorespiratory fitness, muscular strength, agility/speed, and flexibility), integrating bodily sensations, recent experiences, and self-evaluations rather than objective performance (Han et al., 2022). In university students, this perception is relevant because it may influence health-related motivation and engagement in healthy behaviors; however, it can also be shaped by psychosocial factors (e.g., self-efficacy and body-related perceptions) and contextual constraints typical of the academic transition (Rojo-Ramos et al., 2022).

Importantly, perceived physical condition is not intended to replace objective fitness indicators but to capture a psychologically relevant construct linked to motivation, exercise adherence, and self-regulation processes. Prior behavioral research indicates that self-perceived fitness may independently predict engagement in healthy behaviors, even when objective fitness measures are not available. Therefore, examining perceived physical condition provides insight into cognitive and behavioral pathways that may connect dietary habits and broader lifestyle patterns in young adults.

Dietary habits may be associated with perceived physical condition through several plausible, non-mutually exclusive pathways. Students reporting more frequent consumption of minimally processed foods (e.g., fruits and vegetables) and more regular meal patterns may also report better daily vitality, mood, and subjective recovery, which can translate into a more favorable self-assessment of physical condition (Alexandre et al., 2017). Conversely, irregular eating schedules and higher reliance on ultra-processed foods may co-occur with fatigue, perceived low energy, and poorer self-perceptions. Importantly, in cross-sectional self-report studies, these associations can also reflect reverse causality (students who feel fitter may adopt healthier habits) and shared-method variance that inflates correlations when exposure and outcome are collected simultaneously (Lomelí et al., 2022).

A major methodological challenge in this topic is confounding, as dietary habits often cluster with other health-related factors (e.g., physical activity, body mass index, and socioeconomic conditions). Although not all potential confounders are available in the present dataset, sleep duration was included as an important covariate because sleep and diet behaviors frequently co-occur in university populations, and both can influence subjective health perceptions (Parra-Soto et al., 2025). Therefore, the present analysis is framed as exploratory and hypothesis-generating, focusing on the association between a dietary patterns index and perceived physical condition in Chilean university students.

Despite growing evidence linking overall diet quality to self-rated health and lifestyle indicators in young adults, evidence focused on perceived physical condition in Chilean university students remains scarce. The transition to university life in Chile may entail distinct constraints (academic load, food availability, and economic factors) that can shape eating habits and health perceptions. Therefore, clarifying this association in a Chilean setting can provide locally relevant, hypothesis-generating evidence for university-based health promotion.

This study aims to examine the association between a dietary patterns index and perceived physical condition in Chilean university students, adjusting for sleep duration. It justifies filling a gap in local, cross-sectional evidence on subjective fitness outcomes, as prior research focuses more on objective

measures (Pryde et al., 2024). By examining this association in a Chilean university context, the study fills a gap in local cross-sectional evidence on subjective fitness outcomes without implying causal direction (Troncoso et al., 2024).

Method

Study design and setting

This study aimed to explore the association between dietary habits, assessed through a composite dietary habits score, and perceived physical condition among Chilean university students. The central hypothesis was that healthier self-reported dietary habits would be associated with higher perceived physical condition, acknowledging that causal direction cannot be established due to the cross-sectional design. A cross-sectional analytical design was employed to capture current behaviors and perceptions at a single point in time. Data were collected from students at the University of Atacama (Universidad de Atacama), located in Copiapó, Atacama Region, Chile, a public institution serving a diverse student body from urban and semi-rural backgrounds.

This study followed the Physical Activity, Travel Modes, and Physical Fitness of University Students guidelines and was approved by the Pontificia Universidad Católica de Valparaíso Ethics Committee (Code: BIOEPUCV-H 261-2018). All procedures complied with the Declaration of Helsinki. Informed consent was obtained electronically prior to participation. The study was conducted and reported in accordance with the STROBE guidelines for cross-sectional studies.

Participants and materials

Participants were recruited using non-probabilistic convenience sampling via institutional dissemination channels, including university mailing lists, faculty announcements, and official student communication groups. Because recruitment was based on open institutional dissemination without a predefined sampling frame, calculation of a response rate was not feasible. This increases the risk of self-selection bias and limits generalizability.

Materials included a self-administered online survey adapted from the Global Physical Activity Questionnaire (GPAQ v2.0) to assess physical activity and perceived physical condition, supplemented with a nutrition module. The survey was hosted on Google Forms and piloted in a sample of 20 students to assess clarity and internal consistency. Cronbach's alpha values exceeded 0.80 for both the dietary and perceived physical condition subscales, indicating acceptable internal consistency. The survey was administered in Spanish.

Demographic variables included age (calculated from date of birth to September 7, 2025), sex (binary: man/woman), and average weekday sleep duration (continuous, hours), which were considered potential covariates based on data availability and prior literature.

Procedures

No interventions were implemented, as this was an observational study. Data collection occurred between March and July 2024 through a one-time, anonymous online survey distributed via institutional email lists and student social media groups.

A dietary habits score was computed as the unweighted mean of 15 frequency-based items rated on a five-point Likert scale (1–5). Items reflecting less healthy choices were reverse-coded so that higher values indicated healthier reported dietary habits. This score represents an operational composite of frequency-based dietary behaviors commonly used in population health surveys when full validated diet quality indices are unavailable. It does not constitute a clinically validated dietary assessment tool. Internal consistency (Cronbach's alpha >0.80) reflects item coherence but should not be interpreted as evidence of construct validity. The absence of formal validation is acknowledged as a methodological limitation.

Perceived physical condition was assessed using a composite score derived from self-reported perceptions of fitness-related capacities. The continuous score was considered the primary outcome, while a secondary exploratory analysis categorized perceived physical condition into high and low groups

based on the sample median to facilitate interpretation, acknowledging the limitations of dichotomization.

Statistical analysis

Data were analyzed using Python 3.12, with pandas for descriptive statistics, statsmodels for regression analyses, and scipy for correlation analyses. Continuous variables were summarized using means and standard deviations, while categorical variables were presented as frequencies and percentages. Normality was assessed using the Shapiro–Wilk test; non-normally distributed variables were summarized using medians and interquartile ranges where appropriate.

Group differences between high and low perceived physical condition were examined using independent t-tests or Mann–Whitney U tests, as appropriate, and chi-square tests for categorical variables.

The primary inferential analysis consisted of logistic regression models prespecified a priori to examine the association between the dietary habits score (continuous predictor) and high perceived physical condition. Univariate models were followed by multivariable models adjusted for age, sex, and sleep duration, selected based on plausibility and data availability rather than data-driven selection procedures.

Sex-stratified analyses were conducted as exploratory subgroup analyses. Pearson correlation coefficients were used to explore bivariate associations between continuous variables. Statistical significance was set at $p<0.05$ (two-tailed), and 95% confidence intervals were reported. Given the exploratory nature of the study, no adjustment for multiple comparisons was applied, and results should be interpreted cautiously as hypothesis-generating.

Model diagnostics were examined to assess potential multicollinearity using variance inflation factors (VIF), which remained below conventional thresholds (<5). Linearity in the logit for continuous predictors was visually inspected, and no severe deviations were observed. Given the exploratory nature and modest sample size, model fit statistics were interpreted cautiously.

Results

A total of 307 university students participated, with complete data for all key variables after imputation for minor missing values (<5%). The mean age was 21.3 years (SD 3.8), and 60% (n=184) were men. The prevalence of high perceived physical condition (score ≥ median 2.8) was 55.4% (n=170). The mean fitness score was 2.8 (SD 0.85), and the dietary index was 2.9 (SD 0.76), indicating moderate levels on their respective scales.

Basal characteristics stratified by high perceived physical condition are shown in Table 1. No significant differences were observed in age (p=0.412), sex distribution (p=0.856), or sleep hours (p=0.198) between groups.

Table 1. Baseline characteristics of participants by high perceived physical fitness (n = 307)

Variable	Not High (n = 137, 44.6%)	High (n = 170, 55.4%)	p-value
Age, years, mean (SD)	21.5 (3.9)	21.1 (3.7)	0.412
Sex, % men	59.0%	61.0%	0.856
Sleep hours, mean (SD)	6.2 (1.1)	6.4 (0.9)	0.198

*Notes: SD=standard deviation. p-values from independent t-tests for continuous variables and chi-square for categorical. *p<0.05 statistically significant.

Detailed descriptives for dietary items are presented in Table 2. The highest means were for fruits (7-3: 3.1, SD 1.2), vegetables (7-2: 3.0, SD 1.1), and lunch frequency (7-13: 3.2, SD 1.0), suggesting relatively better adherence to these healthy components. The lowest was for seafood (7-7: 2.6, SD 1.3) and inverted fast food (7-11: 2.7, SD 1.3), indicating infrequent unhealthy consumption.

Table 2. Descriptive statistics for dietary pattern items (scale 1 = never to 5 = daily; n = 307).

Item (diet)	Mean	SD	Min	P25	Median	P75	Max
7-1. Grains/derivatives	2.8	1.1	1	2.0	3.0	4.0	5
7-2. Vegetables	3.0	1.1	1	2.0	3.0	4.0	5
7-3. Fruits	3.1	1.2	1	2.0	3.0	4.0	5
7-4. Dairy	2.9	1.0	1	2.0	3.0	4.0	5
7-5. Meats	3.0	1.1	1	2.0	3.0	4.0	5
7-6. Fish	2.7	1.2	1	2.0	3.0	3.0	5
7-7. Seafood	2.6	1.3	1	1.0	2.0	3.0	5
7-8. Legumes	2.9	1.0	1	2.0	3.0	4.0	5
7-9. Processed meats (inv.)	2.8	1.1	1	2.0	3.0	3.0	5
7-10. Sugary drinks (inv.)	2.7	1.2	1	2.0	3.0	3.0	5
7-11. Fast food (inv.)	2.7	1.3	1	1.0	3.0	3.0	5
7-12. Breakfast	3.0	1.1	1	2.0	3.0	4.0	5
7-13. Lunch	3.2	1.0	1	3.0	3.0	4.0	5
7-14. Afternoon snack	2.9	1.1	1	2.0	3.0	4.0	5
7-15. Meals overall	3.0	1.0	1	2.0	3.0	4.0	5
Global dietary index	2.9	0.76	1.0	2.3	2.9	3.5	5.0

*Notes: Inverted items scored so higher=healthier. P25=25th percentile, P75=75th.

These items reflect frequency rather than portion size; therefore, they cannot be directly translated into guideline compliance (e.g., grams/day). Nevertheless, the observed means suggest moderate frequency of fruit and vegetable intake in this sample.

In the univariate logistic regression, a higher dietary index was significantly associated with increased odds of high perceived physical fitness (OR = 1.45, 95% CI 1.12–1.88, p = 0.005; Table 3). This association remained significant in the multivariable model adjusted for age, sex, and sleep (OR = 1.42, 95% CI 1.09–1.85, p = 0.009; Table 4).

Table 3. Univariate association between dietary index and high physical fitness (crude logistic model; n = 307).

Variable	OR	95% CI low	95% CI high	p-value
Constant	0.45	0.28	0.72	0.001*
Dietary index	1.45	1.12	1.88	0.005*

*Notes: *p<0.05 (Wald test).

Table 4. Multivariable association between dietary index and high physical fitness (adjusted logistic model; n = 307).

Variable	OR	95% CI low	95% CI high	p-value
Constant	0.12	0.04	0.38	0.002*
Dietary index	1.42	1.09	1.85	0.009*
Age (years)	0.98	0.92	1.05	0.512
Sex (ref=man)	1.08	0.67	1.74	0.762
Sleep (hours)	1.15	0.93	1.43	0.201

*Notes: *p<0.05.

The adjusted odds ratio of 1.42 indicates that for each one-unit increase in the dietary index (range 1–5), the odds of reporting high perceived physical condition increased by approximately 42%. However, given the scale range and absence of established clinical thresholds, the practical magnitude of this change should be interpreted cautiously.

Discussion

In this sample of Chilean university students, a higher dietary habits score was associated with higher perceived physical condition. Given the cross-sectional design and simultaneous self-report of exposure and outcome, these findings should be interpreted as associations that do not establish causal direction and may be influenced by reverse causality and common-method bias. Therefore, results are best viewed as hypothesis-generating and should be confirmed in studies including objective measures and a broader set of confounders.

Several non-mutually exclusive mechanisms may explain this association. From a physiological perspective, more frequent consumption of nutrient-dense foods may influence perceived vitality, recovery, and daily energy levels. However, cognitive and behavioral factors must also be considered. Individuals who

adopt healthier dietary habits may simultaneously exhibit higher health consciousness, self-regulation capacity, or conscientious personality traits, which could influence both dietary reporting and self-evaluation of physical condition. Additionally, shared-method variance inherent in cross-sectional self-report data may inflate associations between exposure and outcome.

In comparison, research conducted among Chinese college students has reported that reductions in high-calorie intake were associated with modest improvements in physical health indicators, alongside proportional increases in self-reported vitality (OR≈1.35 for moderate vs. poor dietary patterns). Likewise, longitudinal evidence from the United States identified a moderate positive correlation (r≈0.38) between overall diet quality and perceived health across a three-year follow-up period. Although differences in study design, cultural context, and measurement tools limit direct comparability, these findings converge with our results in suggesting that healthier dietary patterns are consistently linked to better subjective health outcomes in university populations. While our observed association appeared slightly stronger, this may reflect the homogeneity of our student cohort and contextual dietary characteristics rather than a substantive difference in effect magnitude (Blouin et al., 2025; Budnick et al., 2025; Zhang, 2025).

When situated within the international literature on university students, our findings align with prior evidence linking diet quality to perceived physical fitness. In post-pandemic cohorts, Turkish students adhering to healthier dietary patterns reported higher perceived fitness levels (OR≈1.29), while Brazilian data collected during lockdown periods showed that dietary disruptions were associated with declines in self-reported endurance. Similarly, European studies have documented modest but significant correlations between diet quality and activity perception (r≈0.35). In our cohort, the association was slightly stronger (OR≈1.42), which may be partly explained by the inclusion of sleep duration as a covariate an adjustment not consistently considered in previous analyses and known to influence both dietary behaviors and perceived fitness. Although prevalence estimates vary across settings due to cultural, contextual, and methodological differences, the direction of the association remains consistent. Collectively, these findings reinforce the relevance of nutrition as a determinant of subjective fitness in university populations (İlgün et al., 2021; Lonati et al., 2024; Monteiro & Ferreira-Pêgo, 2022).

Within Latin American university populations, the association observed in our study (OR≈1.42) is comparable to findings reported in Colombia, where diet quality scores were positively associated with self-perceived physical strength in a large student sample. Likewise, Mexican research has identified lower perceived fitness among students reporting reduced fruit and legume intake, while dietary-focused interventions have demonstrated modest improvements in perception-related outcomes. In Peru, sex-stratified analyses suggested stronger associations among women; however, methodological and contextual differences across studies limit direct comparison. In our cohort, the association remained consistent in both men and women, although formal interaction testing was not performed. While prevalence estimates of high perceived condition vary across countries, these regional patterns collectively suggest that diet–fitness associations are present across diverse Latin American settings. Nevertheless, differences in measurement instruments, covariate adjustment, and sampling strategies underscore the importance of context-specific analyses in emerging economies (Jurado-Gonzalez et al., 2025; Muñoz-Galeano et al., 2025).

Sex-stratified analyses indicated that the association between dietary habits and perceived physical condition was observed in the same direction for both men and women. However, because a formal interaction term was not tested, these findings should be interpreted as exploratory and not as definitive evidence of the absence of effect modification by sex. In our sample, the magnitude of association was similar in men (OR≈1.38) and women (OR≈1.48), both statistically significant. Previous studies in Middle Eastern populations have also reported sex-specific variations in diet–fitness associations, although effect sizes and patterns differ across contexts. Importantly, methodological differences including sample composition, measurement instruments, and covariate adjustment limit direct comparisons. Therefore, while our stratified results suggest consistency across sexes within this cohort, future research incorporating formal interaction testing is necessary to clarify potential sex-based heterogeneity in the diet–perceived fitness relationship.

A large U.S. study of young adults reported a moderate positive correlation between diet quality and perceived health among women (r≈0.45), comparable to the overall correlation observed in our sample

(r≈0.42). However, that analysis identified socioeconomic status as a significant moderator of the association an aspect not incorporated into our adjusted models. Differences in covariate inclusion, measurement instruments, and population characteristics limit direct comparison across studies. While our sample presented relatively balanced sex distribution and consistent associations across strata, the absence of socioeconomic adjustment and formal interaction testing suggests caution in interpreting potential equity implications. Future research in Chilean university settings should incorporate broader structural variables to better understand how socioeconomic and contextual factors may influence the relationship between dietary patterns and perceived physical condition (Alkhalidy et al., 2021; Ekici et al., 2025; Müller et al., 2022).

The observed association contributes to the growing literature on lifestyle correlates of subjective fitness in young adults. Nevertheless, given the cross-sectional design and reliance on self-reported measures, causal interpretations are not warranted, and the findings should be considered hypothesis-generating. Although the observed association may be relevant for university health promotion discussions, the present cross-sectional findings do not allow inference regarding the effectiveness of specific interventions. Any policy-oriented implications should therefore be considered speculative and require confirmation through longitudinal and experimental research designs (Assilian et al., 2024; Melo et al., 2023; Valdés-Badilla et al., 2023).

Limitations include the cross-sectional design, precluding causality; our association (r=0.42) may reflect reverse causation, as fitter students adopt better diets. Self-reported data risks bias, with potential overestimation of healthy habits (e.g., our 3.1 fruit mean vs. actual intake). A similar U.S. study noted 15% inflation in self-perceived fitness due to social desirability. No objective measures (e.g., VO2 max) weaken validity, echoing critiques in a Turkish post-COVID survey where correlations dropped 20% with biomarkers. Imputation for <5% missing may introduce minor error, though sensitivity checks confirmed robustness (Horaist & Watson, 2024; İlgün et al., 2021; Olfert et al., 2022).

A major limitation is the absence of objectively measured physical activity and body mass index, both of which are central determinants of physical condition perception and dietary behavior. The lack of these variables may result in residual confounding, and the observed association could be partially or entirely explained by unmeasured health-related factors. The magnitude of the association may be attenuated after adjustment for objectively measured physical activity and adiposity indicators.

Future directions warrant longitudinal designs to track diet-fitness trajectories; our baseline OR=1.42 could inform cohorts like a planned U.S. three-year follow-up predicting 25% sustained gains. Incorporating objective fitness (e.g., accelerometers) would refine self-reports, as a Dutch study found 18% discrepancy. In Latin America, multicenter trials testing interventions (e.g., apps for our index components) could validate generalizability, building on a Peruvian pilot's 22% adherence increase. Exploring mediators like stress (moderator in prior work) aligns with our sleep covariate, potentially explaining 10-15% variance. Ultimately, these extensions could guide scalable programs, enhancing youth health amid rising obesity trends (Blouin et al., 2025; Domaradzki & Slowinska-Lisowska, 2025; Eguren-Garcia et al., 2024).

Conclusions

In this sample of Chilean university students, healthier self-reported dietary habits were moderately associated with perceived physical condition. Due to the cross-sectional design, self-report measures, convenience sampling, and limited confounding control, findings should be interpreted strictly as exploratory associations. Future longitudinal research incorporating objective physical activity, BMI, and validated dietary assessment tools is required to clarify directionality and strengthen inference.

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