Self-Reported Nutritional Status and Breakfast Characterization in Latin American University Students

Silvana Saavedra Clarke, Solange Parra-Soto, Gabriela Murillo, Valeria Carpio-Arias, Leslie Landaeta-Díaz, Edna J. Nava-González, Israel Ríos-Castillo, Beatriz Elizabeth Nuñez-Martínez, Georgina Gómez, Jacqueline Araneda-Flores, Brian M. Cavagnari, Gladys Morales, Eliana Romina Meza Miranda, Jhon Jairo Bejarano-Roncancio, Saby Mauricio-Alza, Karla Cordón-Arrivillaga & Samuel Durán-Agüero

Published online: 06 Oct 2023.

Submit your article to this journal ↗

Article views: 92

View related articles ↗

View Crossmark data ↗

Taylor & Francis
Taylor & Francis Group

Check for updates

Self-Reported Nutritional Status and Breakfast Characterization in Latin American University Students

Silvana Saavedra Clarke[a] (ID), Solange Parra-Soto[b,c] (ID), Gabriela Murillo[d] (ID), Valeria Carpio-Arias[e] (ID), Leslie Landaeta-Díaz[f,g] (ID), Edna J. Nava-González[h] (ID), Israel Ríos-Castillo[i,j] (ID), Beatriz Elizabeth Nuñez-Martínez[k] (ID), Georgina Gómez[d] (ID), Jacqueline Araneda-Flores[b] (ID), Brian M. Cavagnari[l] (ID), Gladys Morales[m] (ID), Eliana Romina Meza Miranda[n] (ID), Jhon Jairo Bejarano-Roncancio[o] (ID), Saby Mauricio-Alza[p] (ID), Karla Cordón-Arrivillaga[q] (ID), and Samuel Durán-Agüero[r] (ID)

aCarrera de Nutrición y Dietética, Facultad de Ciencias de la Salud, Universidad Autónoma de Chile, Providencia, Chile; bDepartamento de Nutrición y Salud Pública, Facultad de Ciencias de la Salud y de los Alimentos, Universidad del Bío-Bío, Chillán, Chile; cSchool of Cardiovascular and Metabolic Health, University of Glasgow, Glasgow, UK; dDepartment of Biochemistry, School of Medicine, University of Costa Rica, San Pedro, Costa Rica; eGrupo de Investigación en Alimentación y Nutrición Humana (GIANH), Facultad de Salud Pública, Escuela Superior Politécnica de Chimborazo, Riobamba, Ecuador; fEscuela de Nutrición y Dietética, Facultad de Salud y Ciencias Sociales, Universidad de Las Américas, Santiago, Chile; gNúcleo en Ciencias Ambientales y Alimentarias (NCAA), Universidad de las Américas, Santiago, Chile; hFacultad de Salud Pública y Nutrición, Universidad Autónoma de Nuevo León, Monterrey, México; iOrganización de las Naciones Unidas para la Alimentación y la Agricultura (FAO), Oficina Subregional de la FAO para Mesoamérica, Ciudad de Panama, Panama; jEscuela de Nutrición, Facultad de Medicina, Universidad de Panamá, Ciudad de Panama, Panama; kCoordinación de Investigación e Innovación Universidad María Auxiliadora, Mariano Roque Alonso, Paraguay; lEscuela de Nutrición, Facultad de Ciencias Médicas, Pontificia Universidad Católica Argentina, Buenos Aires, Argentina; mDepartamento de Salud Pública, Facultad de Medicina, Universidad de La Frontera, Temuco, Chile; nUniversidad Nacional de Asunción - Centro Multidisciplinario de Investigaciones Tecnológicas, San Lorenzo, Paraguay; oDepartamento de Nutrición Humana, Facultad de Medicina, Universidad Nacional de Colombia, Sede Bogotá, Colombia; pUniversidad Privada Norbert Wiener, Lima, Perú; qUnidad de Investigación en Seguridad Alimentaria y Nutricional (UNISAN), Escuela de Nutrición, Facultad de Ciencias Químicas y Farmacia, Universidad de San Carlos de Guatemala, Ciudad de Guatemala, Guatemala; rEscuela de Nutrición y Dietética, Facultad de Ciencias para el Cuidado de la Salud, Universidad San Sebastian, Chile

ABSTRACT

Objective: To associate breakfast consumption frequency with self-reported nutritional status and dietary patterns of Latin American university students by human development.

Material and methods: This was a cross-sectional, multicenter observational study. University students from 11 Latin American countries (Argentina, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Peru, Paraguay, Panama and Uruguay) were invited to participate by answering an online self-administered questionnaire on food consumption and sociodemographic indicators, associations were investigated using logistic regression.

Results: The logistic regression analysis showed significant associations between breakfast consumption and the crude model, models 2 and 3 in countries with very high and upper-middle/high human development. However, after adjustment in the most comprehensive model, the association is no longer statistically significant. In the fully adjusted model of the variables, a significant relationship was observed between breakfast consumption and both healthy and unhealthy dietary patterns. Specifically, students who typically consume breakfast exhibit greater consumption of oatmeal and fruits, as well as healthier dinner choices. Conversely, they exhibit lower consumption of fast food, sugary drinks, and juices. In particular, in highly developed countries, along with the mentioned foods, consumption of dairy was linked to breakfast consumption in a positive way, while alcohol consumption was negatively associated.

Conclusion: University students who eat breakfast on a regular basis maintain a healthier diet in comparison to those who do not, irrespective of their country's level of human development.

Introduction

Breakfast is considered one of the key meal times for healthy eating, as it has been associated with better body weight control, better cognitive performance, and lower incidence and control of cardiovascular disease (1). The Association of Dietitians of the United Kingdom and the American Academy of Nutrition and Dietetics of the United States are the only organizations that have a policy to promote the use of diet as a nutritional supplement in the United States. The U.S. Food and Drug Administration recommends that breakfast should be a nutritious and balanced meal, with the presence of foods rich in fiber,

protein, fruits and vegetables (2). In addition, it should provide between 15% and 20% of the total energy ingested during a day (3). A meta-analysis conducted in 2020, which included 45 observational studies, confirmed that not eating breakfast increased the risk of obesity, regardless of age, sex and place of residence (4).

Studies among university students show that the main changes in their diet occur due to difficulties in preparing their traditional meals, for various reasons, such as: lack of time, lack of access to kitchens, difficulties in finding some foods and lack of knowledge to make traditional preparations. Many of the university students state that it is easier, faster and more convenient to eat foods that are marketed in the vicinity of their place of study, which are not always healthy options. In a systematic review in which students selected 11 items, participants concluded that their food choices are determined by taste, price-quality ratio, and access to food and soft drinks (5). In addition, there are studies showing that college students decrease the consumption of fruits and vegetables, increasing the intake of food available in the university environment, which often lack these food groups (6, 7).

An unfavorable food environment causes college students to gain weight during the first year of college (5, 8). In addition, unhealthy behaviors acquired during college persist and carry over to later ages (9).

Although there are many studies on breakfast consumption with different associations, such as nutritional status, there are few studies that relate it to dietary patterns and none conducted in Latin America (10, 11). In addition, in this study we analyze separately the Latin American countries of very high and high/medium human development. Therefore, the present work aims to associate breakfast consumption frequency with self-reported nutritional status and dietary patterns of Latin American university students by human development.

Materials and methods

Study design

A cross-sectional, multicenter, observational study was conducted in university students from eleven Latin American countries (Argentina, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Panama, Paraguay, Peru, and Uruguay). In order to participate in the study, the inclusion criteria were: subjects of both sexes aged 18 years or older, as well as active enrollment in a higher education institution in Latin America. Exclusion criteria were: undergraduate students who partially responded to the survey and graduate students. University students were invited to participate in the study (between November and December 2020) through institutional social networks where they completed a voluntary, self-administered online digital survey.

Sociodemographic variables

The survey included information on area of study, current year, education of the head of household, profession of the head of household, physical activity, hours of sitting, hours of sleep and smoking.

Evaluation of breakfast and other food consumption

A validated dietary habits survey was administered to the total sample, which is detailed in a previously published study (12). Briefly, the survey consisted of two parts: consumption of healthy foods (9 questions) and unhealthy foods (6 questions). The two parts are scored using a Likert-type scale ranging from 1 to 5. For the assessment of breakfast consumption, the question "Do you currently eat breakfast?" was used and the possible answers were: Never; 1-3 times per week; 4-6 times per week; and, every day. These four alternatives were assigned a category, where the option "Every day" was the "Optimal" category, the option "1-3 times per week" and "4-6 times per week" were grouped in the "Not optimal" category and the option "Never" kept its name in the category. The consumption of fruits, vegetables, dairy products, healthy dinner, oatmeal, homemade food and fish was considered healthy behaviors, and the consumption of sugary drinks, alcohol, fast food, sweet or salty snacks, and the addition of salt were considered unhealthy.

Self-reported nutritional status

To assess the perception of the nutritional status of university students, the question "Currently what is your self-reported nutritional status?" was used and the possible answers were: Underweight; Normal weight; Overweight; and Obesity.

Human development report

The Human Development Report 2021/2022 was used, remaining in the group of very high human development: Argentina, Chile, Costa Rica and Panama, in the countries of high and medium human development: Colombia, Peru, Mexico, Paraguay, Ecuador and Guatemala (the only country with medium human development, and which joined the group of high human development) (13).

Ethical considerations

The research protocol was developed in accordance with the guidelines of the Declaration of Helsinki regarding research on human subjects and was approved by the Scientific Ethics Committee of the Universidad de Las Américas, Chile. Resolution number 2020001, each participant gave informed consent before completing the survey.

Statistical analysis

Qualitative values were expressed as absolute value (frequency) and relative value (percentages). For the association between types of breakfasts and perception of nutritional status, consumption of healthy and unhealthy foods, the Chi-square test (χ^2) was used. For the logistic regression, the

breakfast variable was dichotomized as follows: Optimal breakfast, those who consume breakfast every day, were assigned the category "0 = Yes". Non-optimal breakfast, those who do not eat breakfast every day, were assigned the category "No =1". The logistic regression model was used, and the following adjustments were made: Raw model: No adjustments (model 1). For model 2, self-reporting of nutritional status, foods, and healthy and unhealthy eating behaviors were added. In model 3, we adjusted for perception of nutritional status, food consumption and healthy and unhealthy eating behaviors, sex, area of study, current year of study, education of the head of household and profession of the head of household. For model 4, we adjusted for perception of nutritional status, food consumption and healthy and unhealthy eating behaviors, sex, area of study, current year, education of the head of household, profession of the head of household, physical activity, hours of sitting, hours of sleep and smoking. A value of $p < 0.05$ was considered significant. To determine the association, the OR values and 95% confidence interval (95%CI) are presented. The R software package "Library (Rcmdr)" was used to perform all the analyses.

Results

A total of 4880 university students from the different countries involved in the study participated. Of the total sample, the majority (73.7%) were women and the average age was 22 years. Of the participants, 67% reported a frequency of breakfast consumption every day and 71% were self-reported as having a normal nutritional status (Table 1).

As shown in Table 2, a significant association ($p < 0.001$) was observed between the nutritional status of university students and the frequency of breakfast intake. Of those who consumed breakfast daily, 63.7% were in normal nutritional status, while students with overweight and obese reach 26.4% and 4.2%, respectively.

Table 3 shows a significant association ($p < 0.001$) between the frequency of breakfast intake and all healthy foods and meals (consumption of oatmeal/whole grain breads, fruits, vegetables, dairy, fish, legumes, dinner and home-cooked meals).

Table 4 shows a significant association ($p < 0.001$) between the frequency of breakfast intake and a lower consumption of unhealthy foods, except for the addition of salt to meals. In other words, having an optimal breakfast frequency decreases the intake of unhealthy foods.

In Table 5, it is observed that the frequency of breakfast intake was significantly associated with the perception of nutritional status, in model 1 (OR = 0.71 (0.62–0.80)), model 2 and 3 (OR = 0.82 (0.72 – 0.93)), and then in model 4, this association only remains as a trend.

Regarding the associations between breakfast consumption and healthy and unhealthy dietary patterns in participants of countries in very high human development (Table 5), a significant association was observed in model 4 (highest fit), between daily breakfast consumption and higher oat consumption (OR: 0.78 (0.69–0.90)), dairy (OR: 0.71 (0.52–0.97)), fruits (OR: 0.73 (0.62–0.85)) and healthy dinner (OR:

0,47 (0,40–0,54)). In unhealthy eating patterns, a significant association was observed in the best-fit model between breakfast consumption and lower fast-food consumption (OR: 0.73 (0.59–0.90)), sugary drinks and juices (OR: 0.80 (0.68-0.93)) and alcoholic beverages (OR: 0,83 (0,72–0,95)). Finally in other variables physical activity (OR:0.76 (0.66–1.00), sleep (OR:0.69 (0.61–0.79)) and tobacco (OR:0.71 (0.56–0.91).

In Table 6, the frequency of breakfast consumption was significantly associated with perceived nutritional status in model 1 (OR = 0.76 (0.65–0.89)), model 2 (OR = 0.88 (0.74–1.03)), and then in model 3 and 4, this association remains only as a trend.

Finally, the associations between breakfast consumption and healthy and unhealthy dietary patterns in participants from countries with medium-high human development (Table 6), a significant association was observed in model 4 (highest fit), between consumption and higher consumption of oats (OR: 0.79 (0.67-0.94)), fruits (OR: 0.69 (0.57-0.83)) and healthy dinner (OR: 0.39 (0.32-0.47)). For unhealthy dietary patterns, a significant association was observed in the best-fit model between breakfast consumption and lower consumption of fast food (OR: 0.77 (0.59-0.99)) and sugary drinks and juices (OR: 0.80 (0.68-0.93)). Finally, other variables included physical activity (OR: 0.82 (0.68-0.99)), sleep (OR: 0.67 (0.57-0.78)), and tobacco (OR: 0.74 (0.56-0.98).

Discussion

This study aimed to investigate the association of breakfast consumption frequency with self-reported nutritional status and dietary patterns in Latin American university students. The results of the study show that there is a significant association between the frequency of breakfast among university students and the perception of nutritional status, this significance is maintained in the crude model and in the adjusted models 2 and 3, but only remains as a trend in the model adjusted for lifestyle variables, while breakfast consumption had a significant association with healthy and unhealthy dietary patterns. An important difference among participants from very high-income countries was that, in this group, dairy consumption was associated with breakfast consumption, whereas alcohol consumption appeared as a factor negatively associated with breakfast (14, 15). This is probably due to the fact that in the case of dairy products, very high-income countries such as Argentina, Chile and Costa Rica have higher consumption, and in the case of alcohol, also high-income countries such as Argentina and Chile, university students are exposed to higher consumption (16).

Several studies show that a low frequency of breakfast intake is associated with unhealthy eating (4, 17). In addition, observational studies in schoolchildren (18), adolescents (18–22), university students (23, 24) and adults (25, 26) have found that not consuming breakfast daily is associated with a nutritional status of excess malnutrition. Systematic reviews and observational studies show that the timing of food intake is also related to nutritional status, associating late feeding times and not eating breakfast with

Table 1. Demographic Characteristics of the Sample.

		Types of breakfasts		
	General	Optimum	Non-optimal	Never
n (%)	4880 (100)	3290 (67.4)	1402 (28.7)	188 (3.8)
Age	22,3	22,5 (4.4)	21,9 (3.8)	22,7 (5.0)
Sex				
Female	3599 (73,7)	2466 (74.9)	1016 (72.5)	117 (62.2)
Male	1281 (26.3)	824 (25.1)	386 (27.5)	71 (37.8)
Country of origin				
Argentina	503 (10.0)	323 (9.8)	147 (10.5)	33 (17.6)
Colombia	275 (5.6)	201 (6.1)	68 (4.9)	6 (3.2)
Chile	378 (7.7)	247 (7.5)	110 (7.9)	21 (11.2)
Costa Rica	586 (12)	432 (13.1)	134 (9.6)	20 (10.6)
Ecuador	674 (13.8)	491 (14.9)	169 (12.1)	14 (7.5)
Guatemala	376 (7.7)	277 (8.4)	90 (6.4)	9 (4.8)
Mexico	1242 (25,4)	746 (22.7)	443 (31.6)	53 (28.2)
Panama	293 (6.0)	191 (5.8)	90 (6.4)	12 (6.4)
Paraguay	257 (5.2)	165 (5.0)	79 (5.6)	13 (6.9)
Peru	283 (5.8)	207 (6.3)	70 (5.0)	6 (3.2)
Uruguay	13 (0.3)	10 (0.3)	2 (0.1)	1 (0.5)
Study area				
Art, architecture and design	66 (1.3)	39 (1.2)	22 (1.6)	5 (2.7)
Agricultural and biological sciences	207 (4.2)	151 (4.6)	47 (3.4)	9 (4.8)
Management sciences and economics	156 (3.2)	98 (3.0)	48 (3.4)	10 (5.3)
Health sciences	3110 (63.7)	2143 (65.1)	867 (61.8)	100 (53.2)
Education, social sciences and humanities	198 (4.0)	114 (3.5)	69 (4.9)	15 (8.0)
Engineering and other exact sciences	882 (18.0)	574 (17.5)	271 (19.3)	37 (19.7)
Other	261 (5.3)	171 (5.2)	78 (5.6)	12 (6.4)
Current year				
First year	958 (19.6)	636 (19.3)	283 (20.2)	39 (20.7)
Second year	1223 (25.0)	799 (24.3)	366 (26.1)	58 (30.9)
Third year	966 (19.8)	671 (20.4)	262 (18.7)	33 (17.6)
Fourth year	769 (15.8)	507 (15.4)	235 (16.8)	27 (14.4)
Fifth year or more	964 (19.8)	677 (20.6)	256 (18.3)	31 (16.5)
Study head of household				
Basic/Incomplete elementary school or lower	327 (6.7)	225 (6.8)	86 (6.1)	16 (8.5)
Basic/complete elementary school	403 (8.3)	263 (8.0)	128 (9.1)	12 (6.4)
Middle school/high school incomplete	400 (8.2)	248 (7.5)	131 (9.3)	21 (11.2)
Middle school/high school complete / incomplete technical education	1048 (21.5)	668 (20.3)	335 (23.9)	45 (23.9)
Incomplete university/complete technical	820 (16.8)	566 (17.2)	227 (16.2)	27 (14.4)
Full university education	1253 (25.7)	893 (27.1)	318 (22.7)	42 (22.3)
Postgraduate degree (master's, doctorate)	629 (12.9)	427 (13)	177 (12.6)	25 (13.3)
Occupation head of household				
Minor casual or informal work	281 (5.8)	180 (5.5)	90 (6.4)	11 (5.0)
Unskilled minor/unskilled laborer	697 (14.3)	454 (13.8)	210 (15.0)	33 (17.6)
Skilled worker/micro-entrepreneur	876 (18.0)	564 (17.1)	272 (19.4)	40 (21.3)
Administrative employee/freelance professional	1612 (33.0)	1112 (33.8)	461 (32.9)	39 (20.7)
Medium executive	1226 (25.1)	856 (26.0)	311 (22.2)	59 (31.4)
Senior executive	188 (3.9)	124 (3.8)	58 (4.1)	6 (3.2)
Physical activity				
Yes	1624 (33.3)	1216 (37.0)	364 (26.0)	44 (23.4)
No	3256 (66.7)	2074 (63.0)	1038 (74.0)	144 (76.6)
Sitting hours		8,53 (3.20)	8,84 (3.27)	8,92 (3.50)
Sleep (hrs)		7,04 (1.35)	6,82 (1.50)	6,94 (2.05)
Tobacco use				
Yes	352 (7.2)	193 (5.9)	140 (10.0)	19 (10.1)
No	4528 (92.8)	3097 (94.1)	1262 (90.0)	169 (89.9)
Self-reported nutritional status perception				
Low weight	317 (6.5)	187 (5.7)	118 (8.4)	12 (6.4)
Normal	2948 (60.4)	2096 (63.7)	757 (54.0)	95 (50.5)
Overweight	1390 (28.5)	870 (26.4)	453 (32.3)	67 (35.6)
Obesity	225 (4.6)	137 (4.2)	74 (5.3)	14 (7.5)

Table 2. Association between the Intake of Different Types of Breakfast and the Perception of Nutritional Status and Nutritional Status According to BMI.

	Types of breakfast frequency			
Perception of nutritional status	Optimum	Non-optimal	Never	P-value
Low weight	187 (5.7)	118 (8.4)	12 (6.4)	<0.001
Normal	2096 (63.7)	757 (54.0)	95 (50.5)	
Overweight	870 (26.4)	453 (32.3)	67 (35.6)	
Obesity	137 (4.2)	74 (5.3)	14 (7.4)	

excess malnutrition (27, 28). Das Graças et al. (23), in a study with Brazilian university students, observed a positive association between no breakfast intake and high body adiposity in adolescent females (23). In Chile, it has also been shown that university students who consume high-calorie density breakfasts are obese and have a higher percentage of body fat which indicates that the quality of this meal time is considerably important (24). Similarly, Beaudry et al. (29), in a longitudinal study in Canada, concluded that university

students during the first year of university unfavorably modify their eating patterns, decreasing healthy food intake, which alters their weight and body composition (29).

On the other hand, a significant association was observed in the present study between the frequency of breakfast intake and the consumption of oatmeal, dairy products, fruits and healthy dinner, considered healthy foods or preparations. For example, oat consumption decreases gastric emptying, providing a low response to the glycemic index and increases the presence of β-glucans, thus contributing to the sensation of satiety (30). High satiety promotes adequate food intake at later times and control of weight gain. Oats also protect the intestinal mucosal barrier, inhibiting intestinal and arterial inflammation, decreasing the appearance of atheroma plaque

(31). Several studies in Latin America show a low frequency of breakfast intake in the young adult population (32, 33), even showing that university students have a higher intake of milk in the first year of university, which decreases in the sixth year, with a significant increase in the intake of coffee and alcoholic beverages (34). Adequate fruit intake is associated with lower risk of overweight in college students (35). Díaz-Torrente et al. (36) showed that only 31.5% of Chilean university students consumed a portion of fruit at breakfast, with higher consumption among women (36).

In relation to unhealthy eating patterns, a significant association was found between breakfast intake and lower consumption of fast food, sugary drinks and juices, and alcoholic beverages. So-called fast food is characterized by being rich in saturated fat, trans fat, simple sugars and sodium; the presence of saturated and trans fat may be due to the presence of fried foods (French fries, nuggets, fried hamburgers, pizza, etc.). The meta-analysis by Qin et al. (30), shows that fried food intake increases the risk of cardiovascular disease (30). In the case of sugary drinks and juices, high consumption of which is associated with excess malnutrition, as has been observed in studies with children and young people (37, 38). Studies show that a high intake of sugar-sweetened beverages is associated with lower educational levels and male adults (39). Latin America and the

Table 3. Association between the Frequency of Breakfast Intake and Healthy Foods.

Intake	Types of breakfast frequency			P-value
	Optimum	Non-optimal	Never	
Oatmeal/whole grain breads				
3 servings/day	229 (7.0)	55 (3.9)	4 (2.1)	<0.001
2 servings/day	605 (18.4)	175 (12.5)	18 (9.6)	
1 serving/day	980 (29.8)	388 (27.7)	46 (24.5)	
< 3 times/week	948 (28.8)	460 (32.8)	52 (27.7)	
Does not consume	528 (16.0)	324 (23.1)	68 (36.2)	
Home cooking				
3 servings/week	2379 (72.3)	975 (69.5)	128 (68.1)	<0.001
2 servings/week	327 (9.9)	188 (13.4)	18 (9.6)	
1 serving/week	329 (10.0)	132 (9.4)	21 (11.2)	
< 1 time/week	181 (5.5)	81 (5.8)	9 (4.8)	
Does not consume	74 (2.2)	26 (1.9)	12 (6.4)	
Healthy dinner				
Every day	1387 (42.2)	321 (22.9)	63 (33.5)	< 0.001
4-6 times/week	336 (10.2)	201 (14.3)	12 (6.4)	
1-3 times/week	702 (21.3)	401 (28.6)	42 (22.3)	
<1 time/week	454 (13.8)	281 (20.0)	27 (14.4)	
Never	411 (12.5)	198 (14.1)	44 (23.4)	
Fruit				
3 servings/day	440 (13.4)	91 (6.5)	12 (6.4)	< 0.001
2 servings/day	906 (27.5)	275 (19.6)	23 (12.2)	
1 serving/day	1102 (33.5)	434 (31.0)	55 (29.3)	
< 1 time/day	763 (23.2)	538 (38.4)	71 (37.8)	
occasional use	0 (0.0)	0 (0.0)	1 (0.5)	
Does not consume	79 (2.4)	64 (4.6)	26 (13.8)	
Dairy				
3 servings/day	217 (6.6)	56 (4.0)	7 (3.7)	< 0.001
2 servings/day	860 (26.1)	242 (17.3)	23 (12.2)	
1 serving/day	1286 (39.1)	498 (35.5)	41 (21.8)	
Less than 1 time/day	0 (0.0)	0 (0.0)	1 (0.5)	
occasional use	795 (24.2)	523 (37.3)	79 (42.0)	
Does not consume	132 (4.0)	83 (5.9)	37 (19.7)	
Legumes				
3 servings/week	1096 (33.3)	392 (28.0)	43 (22.9)	< 0.001
2 servings/week	855 (26.0)	362 (25.8)	31 (16.5)	
1 serving/week	755 (22.9)	324 (23.1)	46 (24.5)	
< 1 time/week	441 (13.4)	237 (16.9)	30 (16.0)	
Does not consume	143 (4.3)	87 (6.2)	38 (20.2)	
Fish				
3 servings/week	79 (2.4)	25 (1.8)	4 (2.1)	<0.001
2 servings/week	250 (7.6)	105 (7.5)	4 (2.1)	
1 serving/week	760 (23.1)	253 (18.0)	29 (15.4)	
< 1 time/week	1091 (33.2)	464 (33.1)	54 (28.7)	
Does not consume	1110 (33.7)	555 (39.6)	97 (51.6)	
Vegetables				
2 servings/day	1082 (32.9)	322 (23.0)	40 (21.3)	< 0.001
1 serving/day	1073 (32.6)	379 (27.0)	55 (29.3)	
½ portion/day	525 (16.0)	299 (21.3)	34 (18.1)	
< 1 time/day	0 (0.0)	1 (0.1)	0 (0.0)	
occasional use	512 (15.6)	339 (24.2)	41 (21.8)	
Does not consume	98 (3.0)	62 (4.4)	18 (9.6)	

Table 4. Association between the Frequency of Breakfast Intake and Unhealthy Foods.

Intake	Types of breakfast frequency			P-value
	Optimum	Non-optimal	Never	
Sugary drinks or juices				
3 servings/day	71 (2.2)	59 (4.2)	17 (9.0)	< 0.001
2 servings/day	150 (4.6)	126 (9.0)	20 (10.6)	
1 serving/day	401 (12.2)	239 (17.0)	25 (13.3)	
< 1 time/day	0 (0.0)	1 (0.1)	0 (0.0)	
occasional use	1370 (41.6)	579 (41.3)	61 (32.4)	
Does not consume	1298 (39.5)	398 (28.4)	65 (34.6)	
Alcoholic beverages				
3 servings/day	10 (0.3)	12 (0.9)	6 (3.2)	<0.001
2 servings/day	20 (0.6)	9 (0.6)	3 (1.6)	
1 serving/day	46 (1.4)	34 (2.4)	11 (5.9)	
< 1 portion/day	0 (0.0)	1 (0.1)	0 (0.0)	
occasional use	1212 (36.8)	590 (42.1)	69 (36.7)	
Does not consume	2002 (60.9)	756 (53.9)	99 (52.7)	
Fast Food				
3 servings/day	22 (0.7)	11 (0.8)	6 (3.2)	0.001
2 servings/day	40 (1.2)	26 (1.9)	6 (3.2)	
1 serving/day	123 (3.7)	94 (6.7)	23 (12.2)	
Occasional use	2529 (76.9)	1114 (79.5)	123 (65.4)	
Does not consume	576 (17.5)	157 (11.2)	30 (16.0)	
Fried Food				
3 servings/week	235 (7.1)	157 (11.2)	29 (15.4)	<0.001
2 servings/week	314 (9.5)	154 (11.0)	15 (8.0)	
1 serving/week	361 (11.0)	187 (13.3)	17 (9.0)	
Occasional use	1925 (58.5)	763 (54.4)	94 (50.0)	
Does not consume	455 (13.8)	141 (10.1)	33 (17.6)	
Salt				
I always add	476 (14.5)	189 (13.5)	32 (17.0)	0.3507
I add occasionally	1065 (32.4)	489 (34.9)	57 (30.3)	
I do not add	1749 (53.2)	724 (51.6)	99 (52.7)	
Sweet snack				
3 servings/day	77 (2.3)	25 (1.8)	12 (6.4)	<0.001
2 servings/day	303 (9.2)	133 (9.5)	11 (5.9)	
1 serving/day	865 (26.3)	327 (23.3)	38 (20.2)	
< 1 time/day	0 (0.0)	1 (0.1)	0 (0.0)	
occasional use	1370 (41.6)	649 (46.3)	75 (39.9)	
Does not consume	675 (20.5)	267 (19.0)	52 (27.7)	

Table 5. Association of Breakfast with Perception of Nutritional Status, Healthy and Unhealthy Foods and General Characteristics of the Sample (Very High Human Development, $n = 1670$).

	Raw model 1 OR (95% IC)	Model 2 OR (95% IC)	Model 3 OR (95% IC)	Model 4 OR (95% IC)
Perception IN	0,76 (0.66–0.86) ***	0,87 (0.76–0.99) *	0,87 (0.76–1.00) *	0,95 (0.83–1.09)
Oatmeal/whole grain breads		0,77 (0.68–0.88) ***	0,74 (0.67–0.88) ***	0,78 (0.69–0.90) ***
Dairy		0,73 (0.53–0.99) .	0,74 (0.54–1.00) .	0,71 (0.52–0.97) *
Fruits		0,69 (0.59–0.80) ***	0,68 (0.59–0.80) ***	0,73 (0.62–0.85) ***
Vegetables		0,90 (0.76–1.05)	0,90 (0.77–1.06)	0,93 (0.79–1.09)
Fish		1,27 (1.01–1.58) *	1,27 (1.01–1.59) *	1,29 (1.02–1.61) *
Legumes		0,98 (0.86–1.12)	0,98 (0.86–1.12)	0,98 (0.86–1.12)
Homemade food		0,92 (0.80–1.07)	0,93 (0.80–1.07)	0,90 (0.77–1.04)
Healthy dinner		0,45 (0.39–0.52) ***	0,46 (0.39–0.53) ***	0,47 (0.40–0.54) ***
Fast Food		0,73 (0.59–0.90) **	0,73 (0.59–0.90) **	0,73 (0.59–0.90) **
Sweetened beverages/juices		0,82 (0.69–0.92) **	0,80 (0.68–0.92) **	0,80 (0.68–0.93) **
OH		0,79 (0.71–0.93) **	0,81 (0.72–0.92) **	0,83 (0.72–0.95) **
Fried food		0,95 (0.76–1.19)	0,95 (0.76–1.18)	0,99 (0.79–1.24)
Salt		1,01 (0.89–1.15)	1,01 (0.89–1.15)	1,02 (0.89–1.16)
Sweet Snack		0,97 (0.82–1.15)	0,97 (0.82–1.14)	0,95 (0,81–1,19)
Sex			1,02 (0.87–1.18)	1,02 (0.88–1.19)
Area of study			1,06 (0.92–1.22)	1,03 (0.89–1.19)
Current year			1,00 (0.87–1.15)	1,00 (0.87–1.15)
Studies head of household			0,91 (0.77–1.07)	0,91 (0.77–1.07)
Occupation head of household			0,96 (0.80–1.14)	0,97 (0.81–1.16)
Physical activity				0,76 (0.66–1.00) ***
Sitting hours				0,99 (0.97–1.01)
Sleep				0,69 (0.61–0.79) ***
Tobacco				0,71 (0.56–0.91) **

Signif. codes: '***`: <0.001 '**`: <0.01 '*`: <0.05 '.`: 0.1.
Raw model: Perception of nutritional status. Model 2: Perception of nutritional status, food and healthy eating behaviors. Model 3: Perception of nutritional status, food and healthy eating behaviors, sex, area of study, current year, education of head of household and profession of head of household. Model 4: Model 3 + physical activity, hours of the day sitting, hours of sleep and smoking.

Table 6. Association of Breakfast with Perception of Nutritional Status, Healthy and Unhealthy Foods and General Characteristics of the Sample (Medium/High Human Development, $n = 3210$).

	Raw model 1 OR (95% IC)	Model 2 OR (95% IC)	Model 3 OR (95% IC)	Model 4 OR (95% IC)
Perception IN	0,76 (0.65–0.89) ***	0,88 (0.74–1.03) *	0,87 (0.74–1.03)	0.94 (0.80–1.12)
Oatmeal/whole grain breads		0,78 (0.66–0.92) **	0,78 (0.66–0.92) **	0.79 (0.67–0.94) **
Dairy		0,81 (0.53–1.20)	0,80 (0.53–1.19)	0,77 (0.50–1.15)
Fruits		0,65 (0.54–0.78) ***	0,65 (0.54–0.78) ***	0.69 (0.57–0.83) ***
Vegetables		0,94 (0.77–1.15)	0,96 (0.78–1.17)	0.98 (0.80–1.20)
Fish		1,34 (1.01–1.76) *	1,36 (1.03–1.78) *	1.37 (1.04–1.81) *
Legumes		0,97 (0.82–1.14)	0,97 (0.82–1.15)	0.96 (0.82–1.14)
Homemade food		0,96 (0.81–1.13)	0,97 (0.82–1.15)	0.94 (0.79–1.11)
Healthy dinner		0,38 (0.31–0.46) ***	0,38 (0.31–0.46) ***	0.39 (0.32–0.47) ***
Fast food		0,77 (0.59–0.99) *	0,76 (0.59–0.98) *	0.77 (0.59–0.99) *
Sweetened beverages/juices		0,79 (0.65–0.95) *	0,80 (0.66–0.97) *	0.80 (0.68–0.93) *
OH		0,84 (0.72–0.99) *	0,84 (0.71–0.99) *	0.87 (0.73–1.03) .
Fried food		1,03 (0.78–1.37)	1,02 (0.76–1.35)	1.03 (0.77–1.38)
Salt		1,03 (0.88–1.21)	1,03 (0.88–1.21)	1.04 (0.89–1.22)
Sweet snack		0,98 (0.80–1.19)	0,97 (0,79–1,18)	0.94 (0.76–1.15)
Sex			1,07 (0.89–1.28)	1.07 (0.89–1.28)
Area of study			1,00 (0.84–1.20)	0.95 (0.80–1.14)
Current year			1,01 (0.85–1.19)	1.01 (0.86–1.20)
Studies head of household			0,98 (0.80–1.20)	0.98 (0.80–1.20)
Occupation head of household			0,86 (0.69–1.09)	0.87 (0.69–1.09)
Physical activity				0.82 (0.68–0.99) *
Sitting hours				0.99 (0.97–1.02)
Sleep				0.67 (0.57–0.78) ***
Tobacco				0.74 (0.56–0.98) *

Signif. codes: '***`: <0.001 '**`: <0.01 '*`: <0.05 '.`: 0.1.
Raw model: Perception of nutritional status. Model 2: Perception of nutritional status, food and healthy eating behaviors. Model 3: Perception of nutritional status, food and healthy eating behaviors, sex, area of study, current year, education of head of household and profession of head of household. Model 4: Model 3 + physical activity, hours of the day sitting, hours of sleep and smoking.

Caribbean, especially Mexico, Chile and Argentina, have the highest consumption of sugar-sweetened beverages worldwide (40), due to this, some of these countries have applied a tax on these foodstuffs and use frontal warning seals to discourage their consumption (41). With respect to alcohol consumption, it was found in a multicenter Latin American study that alcohol intake was associated with increased body weight (42), waist circumference and neck circumference, so

it is considered an obesogenic factor (43); it is also associated with liver damage (44, 45) and an increased risk of some types of cancers (46), such as stomach (47), breast (48, 49), liver, and esophageal cancer (50). The meta-analysis by Wood et al. (51), reports that an intake above 100 mg of alcohol per week was associated with an increased risk of cardiovascular disease (51). In addition, a descriptive, cross-sectional study conducted in Chilean university students from five universities showed an association between students who consumed alcoholic beverages on weekends and unhealthy dietary patterns, such as a higher intake of fried snacks, pizzas, and cookies (52).

Troncoso et al. (53), in a study of Chilean university students showed that they perceive that they do not have a healthy diet, stating that the reasons are: inadequate food selection and lack of economic resources allocated for this item (53). Espinoza et al. (54), in a study with Chilean university students, mentioned that at the time of selecting food, students choose unhealthy options, often independently of the economic value, since dairy products or fruits have a lower cost than soft drinks or foods such as candy, empanadas and hot dogs, which are sold in university cafeterias or in the vicinity of these (54).

Another noteworthy finding in our study is the association between breakfast consumption, physical activity, sufficient sleep, and lower tobacco use, all of which are risk-reducing factors for chronic diseases (55).

Among the strengths of the study, we can highlight the participation of 11 Latin American countries, which provides population diversity and broad scope of the study. Validated surveys were used, allowing comparison with other studies. The large sample of 4,880 university students had similar baseline characteristics, which homogenized the sample studied. The survey incorporated several questions, allowing the analysis of different variables.

Some limitations of the study were that it did not evaluate the type of breakfast in university students or the foods present at this meal time, which may vary in each country, that the nutritional status is self-reported, as well as the low participation of men (26%), due to the fact that women are the ones who generally respond more surveys. As this was an online survey, students without internet access could have been excluded. As it is a cross-sectional study, only associations and not causalities can be studied.

Conclusion

University students who consume breakfast daily report a nutritional status within the normal range, according to self-reported BMI (crude model, 2 and 3 of the study) and also have a healthier diet, defined by a higher intake of oatmeal, fruits and healthy dinner, as well as a lower intake of unhealthy foods, sugary drinks and juices and fast food. Only in countries with high human development, dairy consumption was positively associated, while alcohol consumption was negatively associated. Therefore, it is suggested that nutritional interventions be carried out in universities to promote healthy behaviors, such as eating breakfast.

ORCID

Silvana Saavedra Clarke 🄳 http://orcid.org/0009-0001-5508-7049
Solange Parra-Soto 🄳 http://orcid.org/0000-0002-8443-7327
Gabriela Murillo 🄳 http://orcid.org/0000-0003-0155-9343
Valeria Carpio-Arias 🄳 http://orcid.org/0000-0003-2989-1751
Leslie Landaeta-Díaz 🄳 http://orcid.org/0000-0001-8970-1150
Edna J. Nava-González 🄳 http://orcid.org/0000-0001-8818-2600
Israel Ríos-Castillo 🄳 http://orcid.org/0000-0001-9443-3189
Beatriz Elizabeth Nuñez-Martínez 🄳 http://orcid.org/0000-0001-6585-9607
Georgina Gómez 🄳 http://orcid.org/0000-0003-3514-2984
Jacqueline Araneda-Flores 🄳 http://orcid.org/0000-0002-0415-2920
Brian M. Cavagnari 🄳 http://orcid.org/0000-0002-4360-4686
Gladys Morales 🄳 http://orcid.org/0000-0001-7194-8833
Eliana Romina Meza Miranda 🄳 http://orcid.org/0000-0001-9791-8835
Jhon Jairo Bejarano-Roncancio 🄳 http://orcid.org/0000-0003-2527-3753
Saby Mauricio-Alza 🄳 http://orcid.org/0000-0001-7921-7111
Karla Cordón-Arrivillaga 🄳 http://orcid.org/0000-0003-3825-739X
Samuel Durán-Agüero 🄳 http://orcid.org/0000-0002-0548-3676

Data availability statement

Data are available upon request to the principal investigator.

References

1. Gibney MJ, Barr SI, Bellisle F, Drewnowski A, Fagt S, Livingstone B, Masset G, Varela Moreiras G, Moreno LA, Smith J, et al. Breakfast in human nutrition: the international breakfast research initiative. Nutrients. 2018;10(5):559. doi:10.3390/nu10050559.
2. Ellis E.MS, RDN, LDN. Power up with breakfast 2019. Available from: https://www.eatright.org/food/planning/meals-and-snacks/power-up-with-breakfast
3. St-Onge M-P, Ard J, Baskin ML, Chiuve SE, Johnson HM, Kris-Etherton P, Varady K; American Heart Association Obesity Committee of the Council on Lifestyle and Cardiometabolic Health; Council on Cardiovascular Disease in the Young; Council on Clinical Cardiology; and Stroke Council. Meal timing and frequency: implications for cardiovascular disease prevention: a scientific statement from the american heart association. Circulation. 2017;135(9):e96–121–e121. doi:10.1161/CIR.0000000000000476.
4. Ma X, Chen Q, Pu Y, Guo M, Jiang Z, Huang W, Long Y, Xu Y. Skipping breakfast is associated with overweight and obesity: a systematic review and meta-analysis. Obes Res Clin Pract. 2020;14(1):1–8. doi:10.1016/J.ORCP.2019.12.002.
5. Li X, Braakhuis A, Li Z, Roy R. How does the university food environment impact student dietary behaviors? A systematic review. Front Nutr. 2022;9:840818. doi:10.3389/fnut.2022.840818.
6. Alakaam A, Willyard A. Eating habits and dietary acculturation effects among international college students in the United States. AIMS Public Health. 2020;7(2):228–40. doi:10.3934/publichealth.2020020.
7. Mensah FZ, Lane KE, Richardson LD. Determinants of eating behaviour in Black, Asian and Minority Ethnic (BAME) univer-

sity students when living at and away from home: with a focus on the influence of food enculturation and food acculturation. Appetite. 2022;171:105932. doi:10.1016/J.APPET.2022.105932.

8. Hilger J, Loerbroks A, Diehl K. Eating behaviour of university students in Germany: dietary intake, barriers to healthy eating and changes in eating behavior since the time of matriculation. Appetite. 2017;109:100–7. doi:10.1016/J.APPET.2016.11.016.

9. Hilger-Kolb J, Diehl K. Oh god, i have to eat something, but where can i get something quickly?'-A qualitative interview study on barriers to healthy eating among university students in Germany. Nutrients. 2019;11(10):2440. doi:10.3390/nu11102440.

10. Hernández-Segura N, Botella-Juan L, Amezcua-Prieto C, Morales-Suárez-Varela M, Mateos-Campos R, Fernández-Villa T, Ortiz-Moncada R, Almaraz A, Narciso-Rufo A, Ayán-Pérez C, et al. Excess weight in relation to lifestyle habits in spanish first-year university students: differences between pre- and post-COVID-19-A serial cross-sectional study based on uniHcos project. Healthcare (Basel). 2023;11(11):1547. doi:10.3390/healthcare11111547.

11. Matsumura Y, Yamamoto R, Shinzawa M, Matsushita T, Yoshimura R, Otsuki N, Mizui M, Matsui I, Kaimori J, Sakaguchi Y, et al. Skipping breakfast and incidence of frequent alcohol drinking in university students in japan: a retrospective cohort study. Nutrients. 2022;14(13):2657. doi:10.3390/nu14132657.

12. Durán S, Valdés P, Godoy A, Herrera T. Eating habits and physical condition of physical education students. Rev Chil Nutr. 2014;41(3):251–9. doi:10.4067/S0717-75182014000300004.

13. Human Development Report. 2021/2022. United Nations development programme. https://hdr.undp.org/system/files/documents/global-report-document/hdr2021-22pdf_1.pdf.

14. Smith KJ, Breslin MC, McNaughton SA, Gall SL, Blizzard L, Venn AJ. Skipping breakfast among Australian children and adolescents; findings from the 2011-12 National Nutrition and Physical Activity Survey. Aust N Z J Public Health. 2017;41(6):572–8. doi:10.1111/1753-6405.12715.

15. Situación de la Cadena Láctea en América Latina en el. Federación Panamericana de Lechería. (FEPALE). 2018. https://fepale.org/site/wp-content/uploads/2021/04/Informe_Observatorio_Cadena_Lactea_ALC_2018.pdf.

16. Kovalskys I, Rigotti A, Koletzko B, Fisberg M, Gómez G, Herrera-Cuenca M, Cortés Sanabria LY, Yépez García MC, Pareja RG, Zimberg IZ, et al. Latin American consumption of major food groups: results from the ELANS study. PLoS One. 2019;14(12):e0225101. doi:10.1371/journal.pone.0225101.

17. Informe Sobre la Situación Mundial del Alcohol y la Salud. Global status report on alcohol and health 2018: executive summary. 2018. https://iris.paho.org/bitstream/handle/10665.2/51352/OPSNMH19012_spa.pdf?sequence=.

18. Tee ES, Nurliyana AR, Norimah AK, Mohamed HJBJ, Tan SY, Appukutty M, Hopkins S, Thielecke F, Ong MK, Ning C, et al. Breakfast consumption among Malaysian primary and secondary school children and relationship with body weight status - Findings from the MyBreakfast Study. Asia Pac J Clin Nutr. 2018;27(2):421–32. doi:10.6133/apjcn.062017.12.

19. Gotthelfa SJ, Tempesttia CP. Breakfast, nutritional status, and socioeconomic outcome measures among primary school students from the City of Salta. A cross-sectional study. Arch Argent Pediatr. 2017;115:424–31. doi:10.5546/aap.2017.424.

20. Wadolowska L, Hamulka J, Kowalkowska J, Ulewicz N, Gornicka M, Jeruszka-Bielak M, Kostecka M, Wawrzyniak A. Skipping breakfast and a meal at school: its correlates in adiposity context. report from the ABC of healthy eating study of polish teenagers. Nutrients. 2019;11(7):1563. doi:10.3390/nu11071563.

21. Olatona FA, Oloruntola O, Adeniyi O, Amu E. Association between breakfast consumption and anthropometrically determined nutritional status of secondary-school adolescents in lagos, south-west nigeria. Int J MCH AIDS. 2022;11(1):e503. doi:10.21106/ijma.503.

22. Cacau LT, De Miguel-Etayo P, Santaliestra-Pasías AM, Giménez-Legarre N, Marchioni DM, Molina-Hidalgo C, Censi L, González-Gross M, Grammatikaki E, Breidenassel C, et al. Breakfast dietary pattern is inversely associated with overweight/obesity in european adolescents: the helena study. Children (Basel). 2021;8(11):1044. doi:10.3390/children8111044.

23. Das Graças Ferreira Passos Santana K, Bragança MLBM, De Oliveira BR, Da Silva Coelho CCN, Da Silva AAM. Sociodemographic, dietary, and lifestyle factors associated with increased body fat in adolescents of São Luís, Maranhão State, Brazil. Cad Saude Publica. 2021;37(10):e00088320. doi:10.1590/0102-311X00088320.

24. Concha C, González G, Piñuñuri R, Valenzuela AC. [Relationship between feeding schedule, nutritional composition of breakfast and nutritional status among university students in Valparaíso, Chile. Rev Chil Nutr. 2019;46(4):400–8. doi:10.4067/S0717-75182019000400400.

25. Altamimi JZ, Alshwaiyat NM, Alkhalidy H, Alfaris NA, Alkehayez NM, Alagal RI. Breakfast skipping among a multi-ethnic population of young men and relationship with sociodemographic determinants and weight status. Int J Environ Res Public Health. 2022;19(5):2903. doi:10.3390/ijerph19052903.

26. Okada C, Imano H, Muraki I, Yamada K, Iso H. The association of having a late dinner or bedtime snack and skipping breakfast with overweight in Japanese women. J Obes. 2019;2019:2439571–5. doi:10.1155/2019/2439571.

27. Maukonen M, Kanerva N, Partonen T, Männistö S. Chronotype and energy intake timing in relation to changes in anthropometrics: a 7-year follow-up study in adults. Chronobiol Int. 2019;36(1):27–41. doi:10.1080/07420528.2018.1515772.

28. van der Merwe C, Münch M, Kruger R. Chronotype differences in body composition, dietary intake and eating behavior outcomes - a scoping systematic review. Adv Nutr. 2022;13(6):2357–405. doi:10.1093/advances/nmac093.

29. Beaudry KM, Ludwa IA, Thomas AM, Ward WE, Falk B, Josse AR. First-year university is associated with greater body weight, body composition and adverse dietary changes in males than females. PLoS One. 2019;14(7):e0218554. doi:10.1371/journal.pone.0218554.

30. Qin P, Zhang M, Han M, Liu D, Luo X, Xu L, Zeng Y, Chen Q, Wang T, Chen X, et al. Fried-food consumption and risk of cardiovascular disease and all-cause mortality: a meta-analysis of observational studies. Heart. 2021;107(19):1567–75. doi:10.1136/heartjnl-2020-317883.

31. Mackie AR, Bajka BH, Rigby NM, Wilde PJ, Alves-Pereira F, Mosleth EF, Rieder A, Kirkhus B, Salt LJ. Oatmeal particle size alters glycemic index but not as a function of gastric emptying rate. Am J Physiol Gastrointest Liver Physiol. 2017;313(3):G239–G246. doi:10.1152/ajpgi.00005.2017.

32. Gao H, Song RJ, Jiang H, Zhang W, Han SF. Oat fiber supplementation alleviates intestinal inflammation and ameliorates intestinal mucosal barrier via acting on gut microbiota-derived metabolites in LDLR-/- mice. Nutrition. 2022;95:111558. doi:10.1016/J.NUT.2021.111558.

33. Lara M, Sisa I, Yepez MC, Group E. Breakfast skipping, nutritional status, and physical activity in a middle-aged Latin American population: a population-based study from Ecuador. Nutr Hosp. 2019;36(5):1123–32. doi:10.20960/nh.02393.

34. Torres-Mallma C, Trujillo-Valencia C, Urquiza-Díaz AL, Salazar-Rojas R, Taype-Rondán A. Eating habits in first and sixth year medical students of a private university in Lima, Peru. Rev Chil Nutr. 2016;43(2):6. doi:10.4067/S0717-75182016000200006.

35. Guedes DP, Silva ALDS. Exercise and fruit/vegetable intake, and their associations with body weight status in university students. Nutr Hosp. 2021;38(3):545–54. doi:10.20960/nh.03258.

36. Díaz-Torrente X, Quintiliano-Scarpelli D. Dietary patterns of breakfast consumption among Chilean university students. Nutrients. 2020;12(2):552. doi:10.3390/nu12020552.

37. Sánchez DC, Betancur VDC, Gil SF, Herrera DMS, Correa LMM. Consumption of sugary drinks and sugar added to beverages and their relationship with anthropometric indicators in young people

from medellín (Colombia). Nutr Hosp. 2019;36:1346–53. doi:10.20960/nh.02671.

38. Gui Z-H, Zhu Y-N, Cai L, Sun F-H, Ma Y-H, Jing J, Chen Y-J. Sugar-sweetened beverage consumption and risks of obesity and hypertension in Chinese children and adolescents: a national cross-sectional analysis. Nutrients. 2017;9(12):1302. doi:10.3390/nu9121302.

39. Miranda EM, Martínez BN, Agüero SD, Armijo PP, Cavagnari BM, Arrivillaga KC, et al. Sugar-sweetened beverage consumption during the covid-19 pandemic in twelve ibero-American countries: a cross-sectional study. Rev Chil Nutr. 2021;48:569–77. doi:10.4067/S0717-75182021000400569.

40. Singh GM, Micha R, Khatibzadeh S, Shi P, Lim S, Andrews KG, Engell RE, Ezzati M, Mozaffarian D; Global Burden of Diseases Nutrition and Chronic Diseases Expert Group (NutriCoDE). Global, regional, and national consumption of sugar-sweetened beverages, fruit juices, and milk: a systematic assessment of beverage intake in 187 countries. PLoS One. 2015;10(8):e0124845. doi:10.1371/journal.pone.0124845.

41. Sandoval RC, Roche M, Belausteguigoitia I, Alvarado M, Galicia L, Gomes FS, Paraje G. Selective consumption taxes on sugar-sweetened beverages in Latin America and the Caribbean. Pan Am J Public Health. 2021;45:1. doi:10.26633/rpsp.2021.124.

42. Souza LPSE, Hermsdorff HHM, Miranda AdS, Bressan J, Pimenta AM. Alcohol consumption and overweight in Brazilian adults – cume project. Cien Saude Colet. 2021;26(suppl 3):4835–48. doi:10.1590/1413-812320212611.3.20192019.

43. Brenes, JC, Gómez, G, Quesada, D, Kovalskys, I, Rigotti, A, Cortés, LY, Yépez García, MC, Liria-Domínguez, R, Herrera-Cuenca, M, Guajardo, V, et al. Alcohol contribution to total energy intake and its association with nutritional status and diet quality in eight Latin American countries. Int J Environ Res Public Health. 2021;18(24):13130. doi:10.3390/ijerph182413130.

44. Sogabe M, Okahisa T, Kurihara T, Kagawa M, Ueda H, Kawaguchi T, Fukuya A, Kagemoto K, Tanaka H, Kida Y, et al. Comparison of the role of alcohol consumption and qualitative abdominal fat on NAFLD and MAFLD in males and females. Sci Rep. 2022;12(1):16048. doi:10.1038/s41598-022-20124-8.

45. Sasaki-Tanaka R, Ray R, Moriyama M, Ray RB, Kanda T. Molecular changes in relation to alcohol consumption and hepatocellular carcinoma. Int J Mol Sci. 2022;23(17):9679. doi:10.3390/ijms23179679.

46. Rumgay H, Murphy N, Ferrari P, Soerjomataram I. Alcohol and cancer: epidemiology and biological mechanisms. Nutrients. 2021;13(9):3173. doi:10.3390/nu13093173.

47. Deng W, Jin L, Zhuo H, Vasiliou V, Zhang Y. Alcohol consumption and risk of stomach cancer: a meta-analysis. Chem Biol Interact. 2021;336:109365. doi:10.1016/J.CBI.2021.109365.

48. Zeinomar N, Knight JA, Genkinger JM, Phillips K-A, Daly MB, Milne RL, Dite GS, Kehm RD, Liao Y, Southey MC, et al. Alcohol consumption, cigarette smoking, and familial breast cancer risk: findings from the Prospective Family Study Cohort (ProF-SC). Breast Cancer Res. 2019;21(1):128. doi:10.1186/s13058-019-1213-1.

49. Miller ER, Wilson C, Chapman J, Flight I, Nguyen A-M, Fletcher C, Ramsey I. Connecting the dots between breast cancer, obesity and alcohol consumption in middle-aged women: ecological and case control studies. BMC Public Health. 2018;18(1):460. doi:10.1186/s12889-018-5357-1.

50. Rumgay H, Shield K, Charvat H, Ferrari P, Sornpaisarn B, Obot I, Islami F, Lemmens VEPP, Rehm J, Soerjomataram I, et al. Global burden of cancer in 2020 attributable to alcohol consumption: a population-based study. Lancet Oncol. 2021;22(8):1071–80. doi:10.1016/S1470-2045(21)00279-5.

51. Wood AM, Kaptoge S, Butterworth AS, Willeit P, Warnakula S, Bolton T, Paige E, Paul DS, Sweeting M, Burgess S, et al. Risk thresholds for alcohol consumption: combined analysis of individual-participant data for 599 912 current drinkers in 83 prospective studies. Lancet. 2018;391(10129):1513–23. doi:10.1016/S0140-6736(18)30134-X.

52. Crovetto M, Valladares M, Oñate G, Fernández M, Mena F, Durán Agüero S, Espinoza V. Association of weekend alcohol consumption with diet variables, body mass index, cardiovascular risk and sleep. Human Nutrition and Metabolism. 2022;27:200140. doi:10.1016/j.hnm.2022.ff200140.

53. Troncoso P C, Doepking M C, Zúñiga B C. Healthy eating in the training of students of pedagogical careers. Rev. Chil. Nutr. 2013;40(1):43–7. doi:10.4067/S0717-75182013000100007.

54. Espinoza L, Rodriguez F, Gálvez J, MacMillan N. Eating habits and physical activity in university students. Rev Chil Nutr. 2011;38:459–65. doi:10.4067/S0717-75182011000400009.

55. Mostafa SA, Mena SC, Antza C, Balanos G, Nirantharakumar K, Tahrani AA. Sleep behaviours and associated habits and the progression of pre-diabetes to type 2 diabetes mellitus in adults: a systematic review and meta-analysis. Diab Vasc Dis Res. 2022;19(3):14791641221088824. doi:10.1177/14791641221088824.