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Short Communication

Associations between Lifestyle and Sociodemographic Factors in Medical Students: A Cross Sectional Study

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Background: Identifying lifestyle characteristics in higher education can lead to effective interventions that benefit both individuals and communities.
Methods: This cross-sectional survey-based study was conducted on medical students of a private university using the Fantastic Lifestyle Questionnaire (FLQ) to assess healthy lifestyles, as well as a custom sociodemographic questionnaire. Additionally, correlations among sociodemographic factors and alcohol intake, activity, tobacco and toxins, family and friends, insight, nutrition, type of behavior, career, sleep, seatbelt, stress, and safe sex domains were assessed.
Results: This study assessed 188 lifestyle profiles, of which 148 have complete data for evaluating the total FLQ score. The majority of evaluated lifestyles were characterized as "good (42.5%)" and "very good (35.8%)", and correlations were identified between the total FLQ score and between the preclinical and later course phases, the 18-20 years and older age brackets, and any romantic relationship and being single. Additional associations were observed for the other domains with other sociodemographic factors.
Conclusion: Medical students frequently present with a lifestyle that may be improved through various targeted interventions.

Keywords: Health behavior, Healthy lifestyle, Medical students, Sociodemographic factors, Universities

INTRODUCTION

Daily habits and actions, also known as lifestyle, have a profound influence on determining health outcomes [1-4]. A clear correlation exists between never smoking, adequate body-mass index and moderate alcohol consumption with longer disability-free life expectancy and lower risk of all cause mortality [2,3]. Similarly, adherence to a diet rich in nutrient-dense foods, avoiding sedentary behavior and practicing 30 to 40 minutes of moderate-to-vigorous physical activity per day is associated with a decreased risk of death [5-7]. Physical activity and good quality sleep were shown to be tied to increased health-related quality of life, while positive affective well being in relation to life was linked with longer life expectancy and additional years without chronic disease or disability [8,9].

University is a prominent space for lifestyle improvement initiatives both for the student and the community [10,11]. As the higher-education years are formative with regards to how health behaviors will be replicated in adulthood, establishing an adequate lifestyle early on during this period allows for its continued maintenance throughout later life [10]. Additionally, considering both the complex relationship between universities and their communities along with the impact interventions have via its shockwaves through social contagion, it can be argued that lifestyle interventions not only affect students directly, but also communities and families indirectly [11,12].With respect to specific aspects of university student's lifestyle, alcohol drinking is an important domain to consider as up to more than half of university students can be classified as high-risk drinkers [13]. Almost half of students report increasing their alcohol consumption since starting university and a trend towards increasingly frequent drinking has been previously described, which places the university environment at an important role considering lifestyle change with regards to an individual's relationship with alcohol [14,15].

In relation to physical activity, it has been shown that students in higher-education show moderate levels of activity and fitness, with being universities ideal partners in promoting that such satisfactory performance is maintained throughout adult life [16]. Cigarette smoking is a notable risk factor for multiple non-transmissible diseases, and about one-twentieth to one-tenth of all students regularly do so [17,18]. In contrast, intimate relationships have an important positive impact on health and well-being, especially by the effect they have on helping promote better health practices [19].

Considering nutrition, a notable correlation between other lifestyle characteristics and diet quality has been previously described, with less healthy lifestyles leading occurring along with worse quality diets [20,21]. University students tend to report lower levels of fruits and vegetables in their diet with increased consumption of cold meats and cuts as well as sweets, with common barriers to healthy eating being related both to the convenience of unhealthy food and the difficulty with access to nutrient-dense food [21,22].

This study was done in order to explore what quality lifestyle do students enrolled in a higher-education medical program present with and what are the sociodemographic factors associated with improved lifestyle both in general and in specific domains, such as alcohol intake and nutrition.

MATERIALS AND METHODS

We performed a cross-sectional survey-based study on graduate students enrolled in the medical program at the Pontifícia Universidade Católica do Paraná with the objective of describing aspects related to a healthy lifestyle along with sociodemographic factors. An anonymous response was freely provided by medical students during the period from August 11, 2021, to September 2, 2021, with these participants being recruited from the entire student population by invitation sent simultaneously via e-mail by an oficial university communiqué and via instant messaging by the governing student body. Students received no scholarly or monetary compensation for participation. The study was approved by the Institutional Review Board of the Pontifícia Universidade Católica do Paraná (IRB no. 4.756.063). This report was produced according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [23].

Students were eligible to participate if they were 18 years or older and were to graduate in any moment after may of 2021. The only exclusion criteria was not responding to sufficient Fantastic Lifestyle Questionnaire (FLQ) items in order to provide a score for at least one domain, as these respondents would not contribute data needed to use this instrument. As this study was performed with an essentially hypothesis-generating objective, no formal sample size estimations were performed, but rough estimations based on the researchers empiric knowledge suggested that approximately 25% of the student population would fill out the electronic form.

A custom questionnaire was used to collect sociodemographic data which included: age, gender, participation in extracurricular activities, participation in paying activities, number of roommates, residence with family, phase of medical education, being sexually active, relationship status and maternal education. The FLQ, Brazilian Version was used to evaluate lifestyle [24], which allows for an evaluation of lifestyle behaviors related to physical and emotional

health, behaviors which may lead to accidental death, risk factors for early morbidity due to poor health and psychosocial protective factors [25].

The FLQ was originally developed as a instrument designed to assist healthcare providers in providing lifestyle counseling in the clinic, and was further refined into a formal survey instrument used for assessing lifestyle behaviors in nine different domains [25-27]. The questionnaire is composed of 23 multiple choice and 2 dichotomous items, which allows for a score which ranges from 0 to 100, which may be classified into five categories: "Excellent (85-100)", "Very good (70-84)", "Good (55-69)", "Regular (35-54)", and "Needing improvement (0-34)". Additionally, it is also divided into nine distinct domains, with varying ranges of scores, indicated by the acronym FANTASTIC: F, family and friends; A, (physical) activity; N, nutrition; T, tobacco and toxics; A, alcohol intake; S, sleep, seatbelts, stress, and safe sex; T, type of behavior; I, insight; C, career [24].

Therefore, the primary outcome of interest was a description of lifestyle focused on its impact on human health in a sample of university students. Secondary outcomes included identifying significant variations between subgroups defined by sociodemographic factors considering both the total FLQ score and the different FLQ domain scores.

The resulting data was described using frequencies, proportions, means, medians, ranges and interquartile ranges for each item of the electronic form. Non-parametric Mann-Whitney and Kruskal-Wallis tests were performed in order to evaluate the differences in the total lifestyle score and respective domain scores, with an alpha of 0.05. Additional post-hoc analyses using Dunn's test were performed for significant variations in questions with three or more answers, with corrections being executed using the Bonferroni-Holm method. Missing data not eligible for exclusion were not modified, and no additional sensitivity analyses were performed. All statistical analyses were performed using R version 4.0.3.

RESULTS

During the study period, all 1,080 medical students were invited to participate in the survey from email. A total of 190 responses were collected via the electronic form, with 188 being eligible for inclusion and 2 being excluded on the basis of missing data. The resulting dataset was characterized by having a similar distribution between age brackets, favoring the 18 to 20 year (32.9%) and 21 to 23 year (39.8%) brackets. Additionally, it was observed that the sample was predominantly female (73.9%) and composed of individuals that tended to participate in extracurricular activities (68%) and not in non-academic paying activities (3.1%). With regards to roommates, approximately half of respondents reported living with family members (57.9%), while a subset lived alone (25%) and another resided with four or more other individuals (14.8%).

Participation between semesters was balanced, with almost half distributed in the clinical phase (46.7%) which represents five semesters and the remaining sample in the other 7 semesters contained in the pre-clinical (25.9%) and internship (30.7%) phases. Most respondents reported being sexually active (85.1%), with a smaller proportion in any type of romantic relationship (39.1%). Maternal education was primarily represented by completed higher education (34.5%) and postgraduate education (36.7%), with less than a third reporting incomplete college (13.8%) or basic and other (14.7%) education.

Considering the performance on the FLQ instrument, available data allowed for the estimation of 148 total scores, which varied from 33 to 95, with a median total score of 68. Most responses resulted in "Good (42.5%)" or "Very good (35.8%)" ratings according to the classification scheme proposed by the inventory. All further descriptive data is shown in Table 1.

With regards to the proposed hypothesis testing for associations of sociodemographic factors with total and domain scores on the FLQ instrument, all significant associations are shown in Fig. 1, Table 2. Being in the 18 to 20 year age bracket compared with being in the 21 to 23 ($p = 0.0097$) and 24 or more ($p = 0.0122$) brackets was associated with higher total FLQ scores. Similarly, being in the pre-clinical phase when compared with the clinical ($p = 0.0022$) and internships ($p = 0.0022$) phases was also associated with higher total FLQ score. Reporting any type of romantic relationship was also correlated with total FLQ score ($p = 0.005$). Further data for total FLQ scores is available in Table 2.

Scores on the alcohol intake domain were also associated with being in a younger bracket when compared to the 21 to 23 ($p = 0.0046$) and 24 or more ($p = 0.0467$) brackets and with being in the pre-clinical phase compared to the clinical ($p = 0.0033$) and internship ($p = 0.0022$) phases. Furthermore, residing with family ($p = 0.009$) and not being sexually active ($p = 0.008$) also showed an association with higher alcohol domain scores. For the activity domain, only being sexually active ($p = 0.008$) was associated with higher scores.

On the tobacco and toxics domain, both residing with family members ($p = 0.009$) and not being sexually active ($p = 0.002$) were associated with higher scores. Additionally, being in the pre-clinical phase when compared with the clinical ($p = 0.001$) and internship ($p = 0.0012$) phases was also related to higher scores. Considering differences in numbers of roommates, the only significant difference was observed when comparing none versus three roommates, favoring living with three other individuals ($p = 0.014$).

Table 1. Characteristics of the participating medical students

Characteristic	Values
Age bracket (n = 188)	
18 to 20 yrs	62 (33.0)
21 to 23 yrs	75 (39.9)
24 years or more	51 (27.1)
Proportion of women (n = 188)	139 (73.9)
Participates in extracurricular activities (n = 188)[a]	128 (68.1)
Participates in non-academic paying activities (n = 188)[b]	6 (3.2)
Number of cohabitants (n = 176)	
No cohabitants	44 (25.0)
1 cohabitant	25 (14.2)
2 cohabitants	36 (20.5)
3 cohabitants	45 (25.6)
4 cohabitants or more	26 (14.8)
Cohabitates with family members (n = 188)	109 (58.0)
Phase of medical education* (n = 188)	
Pre-clinical	49 (26.1)
Clinical	81 (43.1)
Internship	58 (30.7)
Sexually active (n = 188)	160 (85.1)
Relationship status (n = 188)	
Single	113 (60.1)
Any type of romantic relationship	75 (39.1)
Maternal education (n = 188)	
Post-graduate	65 (34.5)
Complete college	69 (36.7)
Incomplete college	26 (13.8)
Basic and other education	28 (14.9)
Total Fantastic Lifestyle Score (n = 148)	67.15; 68 (60-75)
Fantastic Lifestyle Score Classification (n = 148)	
Needing improvement (0-34)	1 (0.7)
Regular (35-54)	21 (14.2)
Good (55-69)	63 (42.6)
Very good (70-84)	53 (35.8)
Excellent (85-100)	10 (6.8)
Domain	
Alcohol intake (n = 184)	9.85 ± 2.28
Activity (n = 183)	3.43 ± 2,46
Tobacco and toxics (n = 175)	12.37 ± 3.30
Family and friends (n = 188)	6.7 ± 1.54
Insight (n = 186)	6.52 ± 2.58
Nutrition (n = 167)	8.04 ± 2.52
Sleep, seatbelts, stress, and safe sex (n = 176)	14.27 ± 2.66
Type of behavior (n = 187)	3.42 ± 1.74
Career (n = 187)	2.62 ± 1.14

Values are presented as number (%), mean (range), or mean±standard deviation.
*Course phases are defined by three distinct periods, composed of the pre-clinical phase formed by the union of the first, second and third semesters, the clinical phase formed by the union of the fourth, fifth, sixth, seventh and eighth semesters, and the internship phase formed by the union of the ninth, tenth, eleventh and twelfth semesters.
[a]Defined as any non-curricular or non-extracurricular activity that, in some manner, provides remuneration for services or goods exchanged.
[b]Defined as partaking in one or more of the following activities: institutional programs for research (PIBIC), innovation (PIBITI) or entrepreneurship (PIBEP), teaching student programs or monitorships, paid and unpaid internships, academic interest groups, class representation, student body administration, athletic league administration, institutional activities related to business and participation in research groups.

Being in any romantic relationship was related to higher scores on the family and friends domain ($p < 0.001$). The insight domain only presented association with being in the pre-clinical phase when compared with the clinical ($p = 0.0207$), but not the internship ($p = 0.1278$) phase. The nutrition domain correlated with not living with family ($p = 0.030$)

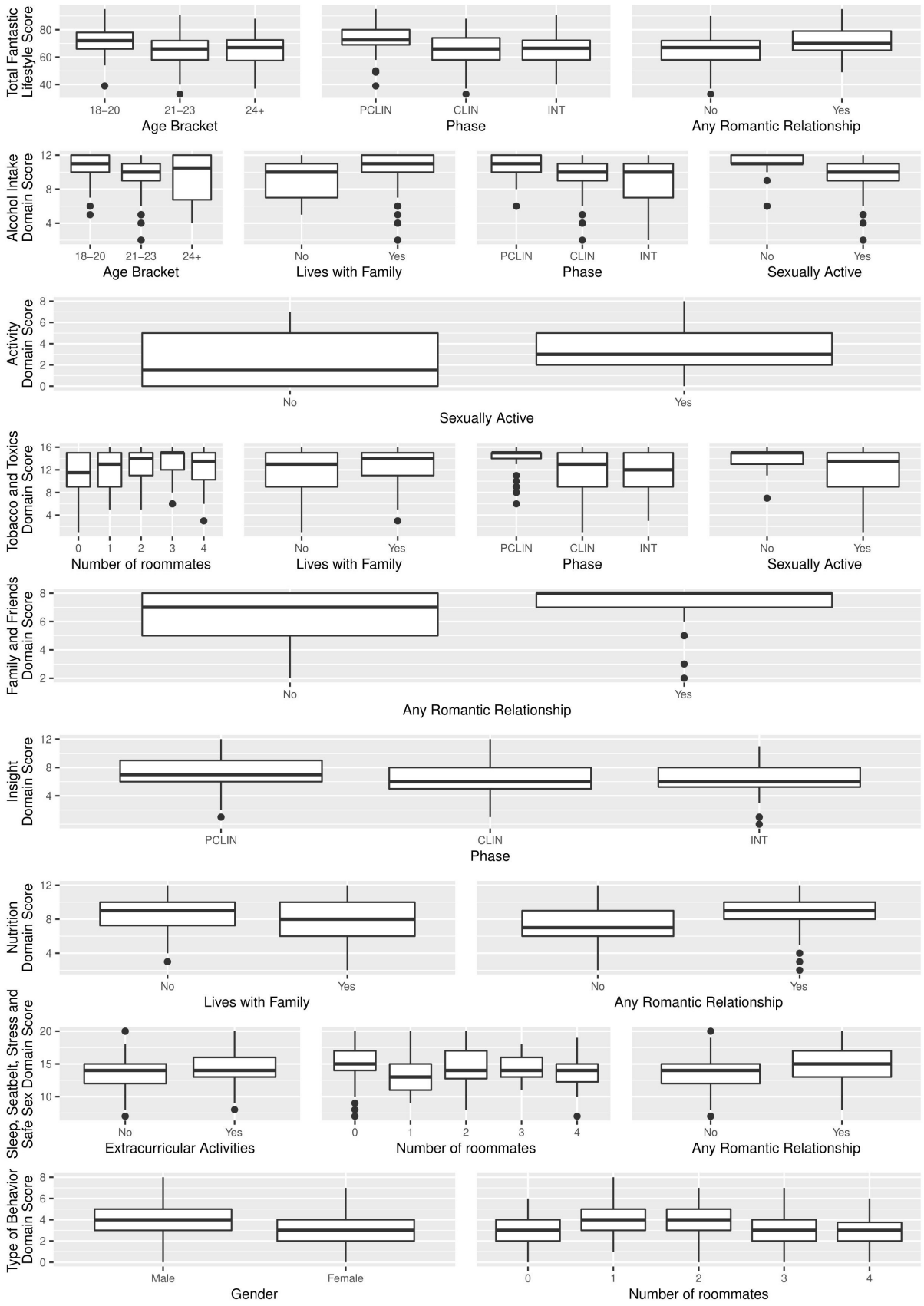

Fig. 1. The only items shown are those that represented a significant association between either total or domain scores in the Fantastic Lifestyle Score instrument with the prespecified sociodemographic factors.
PCLIN: pre-clinical phase, CLIN: clinical phase, INT: internship phase.

Table 2. Comparation of the total fantastic lifestyle score between each of the participant characteristics

Characteristic	N	Total Fantastic Lifestyle Score Mean; Median (IQR)	p-value
Age bracket			0.013[a]
18 to 20 yrs	43	71.5; 72 (66-78)	
21 to 23 yrs	65	65.6; 66 (58-72)	
24 years or more	40	65.0; 67 (57.5-72.5)	
Sex			0.902[b]
Male	42	67.6; 68 (58.5-76.5)	
Female	106	67.0; 68 (60.3-74.8)	
Extracurricular activities			0.527[b]
Does not participate	45	67.8; 69 (61-78)	
Participates	103	66.9; 68 (60-74)	
Paying activities			0.873[b]
Does not participate	143	67.2; 68 (60-75)	
Participates	5	65.2; 72 (60-78)	
Number of cohabitants			0.408[a]
No cohabitants	34	66.4; 68 (59-78.5)	
1 cohabitant	23	65.2; 65 (58-72)	
2 cohabitants	29	70.1; 73 (62-78)	
3 cohabitants	38	68.6; 70 (65.3-74)	
4 cohabitants or more	18	65.5; 65 (58.5-72)	
Cohabitates with family members			0.967[b]
Does not cohabitate	59	66.6; 68 (59-76)	
Cohabitates	89	67.5; 68 (61-75)	
Phase of medical education			0.003[a]
Pre-clinical	34	72.9; 72.5 (69-80)	
Clinical	66	65.3; 66 (58-74)	
Internship	48	65.7; 66.5 (58-72.3)	
Sexually active			0.937[b]
Is not sexually active	14	67.1; 67.5 (61.5-75.5)	
Is sexually active	134	67.2; 68 (60-75)	
Relationship status			0.005[b]
Single	87	64.4; 67 (58-72)	
Any type of romantic relationship	61	71.0; 70 (65-79)	
Maternal education			0.434[a]
Post-graduate	48	68.1; 68 (62.8-74)	
Complete college	55	67.6; 69 (61-75)	
Incomplete college	22	63.7; 64.5 (58-69.8)	
Basic education or other	23	67.4; 67 (59.5-78.5)	

Values are presented as mean (range).
IQR: interquartile range.
[a]Significance of Kruskal-Wallis test.
[b]Significance of Mann-Whitney test.

and being in any type of romantic relationship ($p < 0.001$).

In the sleep, seatbelt, stress and safe sex domain, partaking in extracurricular activities ($p = 0.040$), being in any type of romantic relationship ($p = 0.014$) and living alone instead of having one roommate ($p = 0.013$) were all associated with higher scores. Scores on the type of behavior domain showed associations with being of the male gender ($p = 0.014$), living with 1 instead of no individuals ($p = 0.046$) and living with 2 instead of four individuals ($p = 0.036$). The career domain was not significantly associated with any sociodemographic factors.

DISCUSSION

The majority of medical students' lifestyles were characterized as "Good (42.5%)" or "very good (35.8%)" using the Fantastic Lifestyle Checklist. This is distinct from what was previously reported for latin american samples of university students, which tended to report lower proportions of "Good (21% in brazilian students and 18.7% in colombian students)" and higher proportions of "Very good (61.3% in brazilian students and 57.8% in colombian students)" in general university student samples [24-28]. Alternatively,

one brazilian sample of medical students tended to report higher proportions of "Good (55.7%)" and lower proportions of "Very good (1.6%)", while another reported null proportions of "Very good" and lower proportions of "Good (20.6%)" [29,30]. This suggests that our sample strengthens the assumption that medical students tend to present with a lifestyle profile suboptimal for a sample of university students.

Students in the pre-clinical phase of medical education and in the 18-20 years age bracket presented with higher total Fantastic lifestyle scores when compared with students in later phases of medical education and in older age brackets. This corroborates previous data that state that as students age and progress further into higher-education, lifestyles have a propensity towards being augmented with risky behaviors [31,32]. Thus, the pre-clinical phase of medical education may present itself as a promising moment for lifestyle interventions focused on preventing such decline, but it is important to focus on interventions other than only formal education, as it alone appears to be ineffective in preventing worsening lifestyle behaviors over the course of time [33].

Additionally, it was observed that being in any romantic relationship was also associated with higher Fantastic lifestyle scores when compared with being single. As a couple's interdependence may lead to enhanced motivation with regards to cooperation in adopting health-enhancing behavior change, a portion of the higher scores could be a product of dual improvement of lifestyle resulting from an effort on the novel couple's part that was sustained at least until the survey [19]. Alternatively, health behaviors are influenced by the partner's perception of, for example, diet- and exercise-related support, which suggests that feeling supported in a relationship in respect to a lifestyle change is beneficial in maintaining such a change [34].

In the alcohol domain, being in the pre-clinical phase of education and in the 18-20 years age bracket were also associated with higher scores, as was residing with family. Although age was not correlated with high frequency drinking in other studies, both the consumption of alcohol and heavy episodic drinking have been previously associated with not residing with family [18,35,36]. This implies that our results support the previous observations that living with family may present a correlation with better habits in relation to alcohol consumption during attainment of higher-education.

Additionally, being sexually active was also associated with lower scores on the alcohol domain and on the tobacco and toxics domain, while conversely being associated with higher scores on the activity domain. There exists a notable expectancy that drinking alcohol can lead to sexual activity, especially if done in social situations, which may in part explain the association between these two behaviors [37]. A relationship also exists between premarital sexual activity and smoking status, which supports the concurrence of such lifestyle characteristics in a portion of our sample [38]. Furthermore, increased physical activity leads to better physical fitness and improved disposition, while also simultaneously reducing risk of sexual dysfunction and thereby creating the ideal conditions for successful sexual activity [39,40].

Residing with family members, being in the pre-clinical phase and living with three compared to no roommates was linked to higher scores in the tobacco and toxics domain. It was previously observed that, when compared with living with family, living alone or with friends led to higher odds of smoking among university students, but other studies have not observed the same relationship [18,35]. While we cannot affirm that the samples with multiple roommates were represented by participants living with family, we suspect that such observations strengthen the prospect that living with family appears to reduce risk of presenting with harmful lifestyle behaviors during university with respect to the tobacco and toxics domain.

In the family and friends domain, being in any romantic relationship was correlated with higher scores. In order to maintain relationship satisfaction, certain behaviors are more favorable than others [41,42]. Thus, as this domain was primarily focused on having someone to confide in as well as receiving and giving affection, individuals who maintained romantic relationships already probably had to have an effort dedicated towards maintaining these characteristics and, consequently, scored higher.

Being in the pre-clinical phase when compared only to the clinical phase was associated with higher scores on the insight domain, which investigated optimistic thinking as well as feelings of anxiety and depression. Previous studies have shown notable prevalences of depression (30.6%), burnout (13,1%) and anxiety (32,9%) among medical students, with a reported correlation with later stages of the course [43]. Our results reflect such correlation, but restrict it to the pre-clinical and clinical phase dyad.

Higher nutrition domain scores were linked with being in any type of romantic relationship and not living with family. Conversely, existing data on the relationship between living with family and diet quality supported the notion that such shared residence implied improved nutrition [44,45]. While our study is the first to our knowledge to report the inverse relationship, such discrepancy may be attributable to the setting of private medical education in Brazil, in which a subgroup of students from families of high socioeconomic strata located in Brazil's interior study away from home in urban metropolises.

In the sleep, seatbelt, stress and safe sex domain, higher scores were associated with partaking in extracurricular activities, being in any type of romantic relationship and

living alone instead of having one roommate. A possible hypothesis as to why such correlations were found is that the domain in study tends to focus on aspects of life related to self-care and responsibility, and the sociodemographic characteristics identified require a certain degree of such attributes.

Being of the male gender and having one instead of no roommates and two instead of four roommates were associated with higher scores on the type of behavior domain, which tends to identify type B behavior patterns with increasing scores and type A behavior patterns with decreasing scores [24]. Our results did not support previous data that suggested no difference between male and female genders in relation to the prevalence of type A behavior [46].

The career domain score, which mainly focused on occupation satisfaction, showed no correlation with any sociodemographic factor. Considering the other results, this one is particularly interesting as it may suggest that although progression into different phases of medical education leads to different states of lifestyle quality, it doesn't necessarily lead to changes in satisfaction with the chosen career path, at least during attainment of higher education.

This study presents various limitations. Firstly, as this was an electronic-form survey study, there is potential for sampling bias. However, our use of a two-pronged approach to sampling without other attempts at sampling and restriction of access to the electronic survey to only one researcher allowed for greater control of the procedure and less variability with respect to data collection. Additionally, this is an observational cross-sectional study, and although certain temporal and causal relations can be inferred, none can be formally concluded from this study. Our results suggest that medical students tend to present with a lifestyle suboptimal in relation to other university students, with there being various opportunities for improvement via targeted interventions for certain lifestyle domains. Overall, our sample represents a segment of medical students that have access to private higher-education in southern Brazil, which may limit the generalisability of our results to medical students outside of this specific population.

With regards to further research, studies that investigate the relationship between sociodemographic factors and a more ample higher-education student sample would be welcomed. Additionally, qualitative investigations into the correlations identified in this study are promising subjects of study, especially with respect to those involving the progression of higher education and worsening lifestyle and dynamics involving relationships and lifestyle.

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