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Sun exposure practices, attitudes and knowledge among students and teachers at a University School of Health Sciences in Ecuador

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ABSTRACT

Skin cancer incidence is increasing worldwide. Late adolescence and young adulthood are fundamental stages of life to acquire good sun exposure practices, regarding both personal involvement in skin cancer prevention and being a role model for others, especially in a health education environment.

This descriptive cross-sectional study is based on the validated CHACES questionnaire to study sun exposure and photoprotection behavior among students and teachers at the School of Health Sciences in the National University of Chimborazo, Riobamba (Ecuador). University members (814 students (89.8 %) and 93 teachers (10.2 %)) were studied, with a predominance of females and light-skin phototypes in both groups. Similar results were obtained regarding sun exposure, with higher recreative exposure in the teachers' group and higher occupational exposure in students. However, students significantly showed lower avoiding midday sun (41.9 % vs 60.9 %), and lower use of sunglasses (10.1 % vs. 41.6 %). Attitudes towards the sun and photoprotection knowledge issues were also equivalent between students and teachers (6.1/10 vs 6.2/10). Students' sunburn rate last year reaches 88.4 % and 52.7 % in teachers ($p < 0.001$). Using a multivariable logistic regression model, we identified risk factors associated with a greater risk of sunburn in our population.

This study highlights areas to be improved regarding knowledge, attitudes and, especially, practices of photoprotection, among students and teachers at the University of Chimborazo. These results point out that awareness-raising campaigns should be implemented to reduce sunburns, morbidity and mortality of skin cancer in this environment.

1. Introduction

Skin cancer, in various forms including melanoma, basal cell and squamous cell carcinoma, is a major health problem and is the most common type of neoplasm among the general population (Arnold et al., 2022; Waldman and Schmults, 2019). Moreover, its incidence is increasing progressively (Que et al., 2018), causing higher healthcare costs and a significant loss of quality of life. Accordingly, the design and

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implementation of primary and secondary prevention campaigns to reduce its incidence, morbidity and mortality, as well as the associated costs, is a priority issue for healthcare policymakers.

Numerous studies have been conducted on practices, attitudes and knowledge in relation to sun exposure and photoprotection, among various populations and age groups. Many such studies have focused on the periods of childhood and adolescence, when a high percentage of the lifetime accumulation of radiation in the skin takes place (Stern et al., 1986) mainly due to UV peak days, receiving up to the double daily SED than adults (Thieden et al., 2004).

To date, however, few studies have been undertaken to analyze this question with respect to persons in their late teens and early adulthood, as is the case of the university community. In the published literature, the data reveal a good knowledge about sun exposure and photoprotection measures by university students (Castilho et al., 2010; Gambla et al., 2017; Othman Bahakim et al., 2016; Rodríguez-Gambetta et al., 2016; Sirera Rus et al., 2020), although some studies also show the existence of risky sun exposure behaviors in this group (Basch et al., 2017; Kirk and Greenfield, 2017; Miller et al., 2022; Spradlin et al., 2010).

The present study was conducted in the city of Riobamba (Ecuador) at an altitude of 2754 m. This location receives high levels of ultraviolet radiation, due to two factors: on the one hand, its proximity to the equator means that ultraviolet radiation falls more perpendicularly than in the tropics; on the other, the considerable altitude means that less ultraviolet radiation is absorbed by the atmosphere (around 4 % for every 300 m of elevation) and the ozone layer is thinner in the equatorial region than at medium to high latitudes (Gandini et al., 2019; Rigel et al., 1999). The Ecuadorian territory receives throughout the year levels of ultraviolet radiation (UV) much higher than the maximum established as safe or tolerable for health, with maximum UVI levels higher than 14 for Guayaquil and 24 for Quito (Agencia Espacial Civil Ecuatoriana, 2008).

Especially in countries with low latitudes such as Ecuador, skin cancer incidence rates rise drastically. According to Cueva et al. (Sociedad de Lucha contra el Cáncer / Registro Nacional de Tumores, 2019), the incidence of non-melanoma skin cancer increased progressively in Quito (Ecuador) from 1985 to 2015. In this city, the standardized rates of incidence in 1986–1990 were 21.4 per 100,000 men and 21.7 women, rising to 41.1 and 36.7, respectively, in 2011–2015. Several authors (Sociedad de Lucha contra el Cáncer / Registro Nacional de Tumores, 2019; Sortino-Rachou et al., 2011) also observed that the incidence of skin cancer was higher in mountainous areas, such as Quito, Cuenca and Loja, than in areas at sea level, such as Guayaquil, Manabí and El Oro. Rates of non-melanoma cancer are lower in Ecuador than in Brazil and Argentina, but higher than in other countries such as Peru, Jamaica and Colombia.

The main study goals are to record practices and attitudes regarding sun exposure, to determine the knowledge about the effects of this exposure and the efficacy of photoprotection measures, to determine the prevalence of sunburn and to consider the possible association of the study variables evaluated with the presence of sunburn in the past year among teacher and students of Health Sciences. This work was undertaken to achieve a better understanding of how to prevent the occurrence of skin cancer in the university population and to promote healthy habits in this respect.

2. Material and methods

2.1. Study design

This questionnaire-based descriptive cross-sectional study was conducted to assess knowledge, attitudes and practices regarding sun exposure and photoprotection among the university community at the School of Health Sciences of the University of Chimborazo (Riobamba, Ecuador).

The evaluation tool used was the questionnaire on practices, attitudes and knowledge related to sun exposure (CHACES, Spanish initials), which has been validated for use with a population aged over 18 years (Blázquez-Sánchez et al., 2020). The questionnaire collects the sociodemographic characteristics (age, sex, educational level, marital status and minor children) of both study populations, along with information of skin color and self-reported sun reactive skin type (Fitzpatrick, 1988). The main blocks of the questionnaire correspond to *sun exposure habits* frequency performing outdoor activities in different scenarios (days in the year and daily hours), along with the report of the number of skin burns (redness and pain) in the last year; 6 items related to sun protection practices were collected with a Likert response scale of frequency (5 options from always to never), and 10 items on *attitudes towards sun exposure and photoprotection* also with a Likert response assessing the degree of agreement (5 options from "Totally agree" to "Totally disagree"). Finally, *sun related knowledge* is assessed through 10 statements with a true/false answer, and a score is calculated in relation to the number of correct answers. For greater ease of use, the CHACES questionnaire was adapted to Ecuadorian Spanish without changing the number or order of the questions (Supplementary information).

2.2. Study population

The target population was the university community (teachers and students) at the School of Health Sciences of the University of Chimborazo, Riobamba (Ecuador), who agreed to participate. The study took place in March and April 2021.

The surveys were self-completed online through the SurveyMonkey platform. Participation was voluntary and no financial incentive was offered. The study data were recorded anonymously, in strict accordance with current data protection laws and regulations.

2.3. Ethical aspects

The study was approved by the Research Ethics Committee of the University of Granada, Report No. 2036/CEIH/2021. All study data were recorded and stored anonymously in strict compliance with applicable data protection laws and regulations (Law 41/2002, of November 14; Organic Law 3/2018, of December 5, on personal data protection and guarantee of digital rights).

2.4. Statistical analysis

A descriptive analysis was made of each subpopulation (students and teachers), including measures of central tendency and dispersion (mean and standard deviation) for the quantitative variables, and of frequency distribution for the qualitative ones. Between-group differences were evaluated for the grouped qualitative variables, using the chi-square test. The level of statistical significance was established at $p < 0.05$. Multivariable logistic regression models were created to assess the outcome variables, i.e. the presence of sunburn in the previous year when outdoor sports were practiced and whether three or more sunburn events were experienced. In these models, in which all the independent variables were initially included, the step-forward criterion was applied, the odds ratios with 95 % confidence intervals were calculated, and the level of statistical significance was established at $p < 0.05$.

3. Results

3.1. Characteristics of the study population

The questionnaire was completed by 963 members of the university community (students and teachers). Of these, 907 (94.1 %) were analyzed. The remaining 56 were incomplete and hence excluded. The 907 valid questionnaires were returned by 93 teachers (10.2 %) and 814 students (89.8 %). The total response rate was 72.7 % (100 % for the

teachers and 70.4 % for the students).

Female respondents predominated both among the teachers (62.4 %) and the students (73.7 %). In both groups, the vast majority were of Ecuadorian origin (99 % of the students and 87 % of the teachers). The mean age of the students was 21.2 years (SD: 2) and that of the teachers, 43.8 years (SD: 11.5). By skin color, the most common colors among all respondents were light brown (*Trigueño*) (71.9 % students and 62.4 % teachers) followed by white (21 % students and 31.2 % teachers). For both students and teachers, the most prevalent sun-reactive skin types were types I (33.3 % students and 48.4 % teachers) and II (48.7 % students and 31.2 % teachers) (Table 1).

3.2. Sun exposure habits

The following results were obtained for the respondents' sun exposure (Table 2). 92.2 % of the students and 81.1 % of the teachers reported a sun exposure of less than 30 days a year at the beach or swimming pool. The corresponding figures for exposure during sports or leisure activities were 80.5 % and 78.9 % respectively, and in the work setting, 87.8 % and 90 % respectively.

With respect to sun exposure at the beach or pool, 18.6 % of the students reported values of more than 3 h a day; this figure rose to 24.1 % for sun exposure during leisure activities or sport, and to 23.2 % during work activities. For the teachers, the corresponding figures were 19 % at the beach/pool or during sports/leisure activities, and 16 % during work activities.

Significant differences between the two groups were only observed for the number of days' sun exposure at the beach/pool – greater among the students ($p < 0.001$) – and for exposure during work activities – greater among the teachers ($p = 0.007$).

3.3. Sunburn events during the past year

With respect to sunburn events (SE) (Table 2), 78.4 % of the students and 52.8 % of the teachers had suffered at least one SE in the previous year. Moreover, 30.8 % of the students and 16.2 % of the teachers had suffered 3 or more SE during the same period. An analysis of SE frequency revealed that the students experienced a significantly greater occurrence and repetition than the teachers ($p < 0.001$).

Table 1
Distribution of sociodemographic characteristics and skin type of teachers and students from the School of Health Sciences of the University of Chimborazo, Riobamba (Ecuador) who answered CHACES questionnaire in 2021.

Variables	Students (n = 814)		Teachers (n = 93)	
	n	%	n	%
Sex[1]				
Male	213	26.3	35	37.6
Female	598	73.7	58	62.4
Age[2]				
Mean - SD	21.2	2.0	43.8	11.5
Country of birth[3]				
Ecuador	792	99	80	87.9
Other	8	1	11	12.1
Marital status[4]				
Single	786	96.7	25	26.9
Married or civil partnership	23	2.8	58	62.4
Separated or divorced	4	0.5	10	10.8
Skin color				
White	171	21.0	29	31.2
Light brown (*Trigueño*)	585	71.9	58	62.4
Dark brown	58	7.1	5	5.4
Black	0	0.0	1	1.1
Sun reactive skin type[5]				
I (Always burn, never tan)	271	33.3	45	48.4
II (Usually burn, tan less than average, with difficulty)	396	48.7	29	31.2
III (Sometimes mild bur, tan about average)	80	9.8	8	8.6
IV (Rarely burn, tan more than average)	66	8.1	11	11.8

SD: Standard deviation; Missing: 1 = 3; 2 = 5; 3 = 16; 4 = 0; 5 = 1.

Table 2
Sun exposure habits and sunburn events of teachers and students from the School of Health Sciences of the University of Chimborazo, Riobamba (Ecuador).

Variables	Students (n = 814)		Teachers (n = 93)		*p*
	n	%	n	%	
Days' exposure at the beach/pool[1]					
≤30 days	736	92.2	73	81.1	**<0.001**
31–90 days	41	5.1	4	4.4	
> 90 days	21	2.6	13	14.4	
Days' exposure during sports/leisure activities[2]					
≤30 days	651	80.5	71	78.9	0.088
31–90 days	98	12.1	7	7.8	
> 90 days	60	7.4	12	13.1	
Days' exposure during work activities[3]					
≤30 days	706	87.8	81	90	0.581
31–90 days	59	7.3	4	4.4	
>90 days	39	4.9	5	5.6	
Hours of daily exposure at the beach/pool[4]					
0 h	311	38.9	31	35.2	0.721
1–2 h	339	42.4	38	43.2	
3 or more hours	149	18.6	19	21.6	
Hours of daily exposure during sports/leisure activities[5]					
0 h	115	14.3	19	21.3	0.207
1–2 h	495	61.6	51	57.3	
3 or more hours	194	24.1	19	21.3	
Hours of daily exposure during work activities[6]					
0 h	325	40.6	52	57.8	**0.007**
1–2 h	290	36.2	22	24.4	
3 or more hours	186	23.2	16	17.8	
Sunburn events during the previous year after sports activities					
0	176	21.6	44	47.3	**<0.001**
1–2	388	47.7	34	36.6	
3–5	186	22.9	10	10.8	
6–10	43	5.3	3	3.2	
>10	21	2.6	2	2.2	

Chi-square test. Missing: 1 = 19; 2 = 8; 3 = 13; 4 = 20; 5 = 14; 6 = 16.

3.4. Sun protection practices

In general, in the two population groups the sun protection practices (SPP) most commonly used were to wear long-sleeved shirt and long trousers (60.4 % of students and 63.7 % of teachers) and to use sunscreen (59.4 % of students and 63 % of teachers). In this respect, there were no significant differences between the two groups (Fig. 1).

The teachers were much more likely to wear sunglasses than the students (41.6 % vs. 10.1 %, $p < 0.001$) and to avoid sun exposure at midday (60.9 % vs. 41.9 %, $p < 0.001$). However, more students than teachers made use of a hat or cap to protect against the sun (53.2 % vs. 41.3 %, $p = 0.041$). Finally, fewer than half of the students (43 %) and teachers (45.7 %) took shelter in the shade. In this respect, there were no significant differences between the two groups.

3.5. Attitudes towards sun exposure (ATSE)

Although nearly half of the respondents enjoyed sun exposure (52.7 % of students and 64.5 % of teachers stated "I like sunbathing", and 47 % and 57.1 %, respectively, agreed with the view that "Sunbathing makes me feel good"), there was less enthusiasm for becoming suntanned, and fewer than 30 % rejected the use of sunscreen. Around 80 % of students and teachers were in agreement with protective attitudes (6–10),

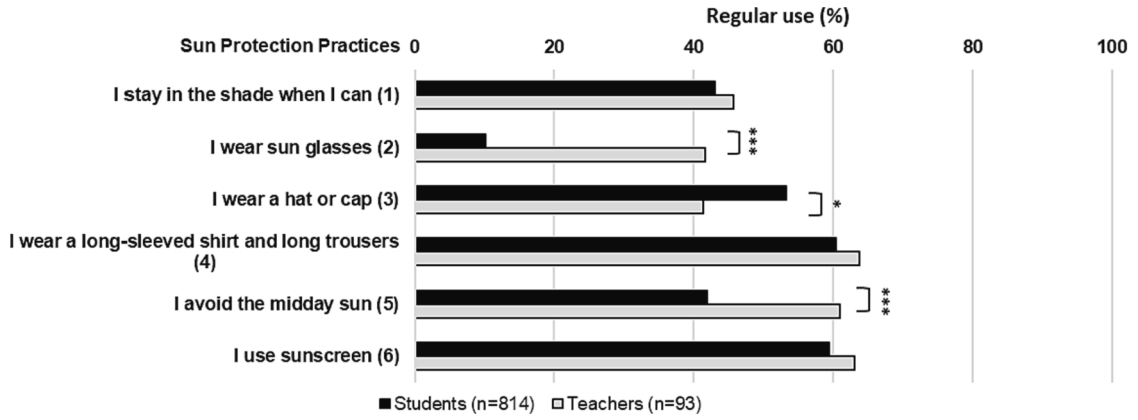

Fig. 1. Frequency of regular use of sun protection practices by teachers and students of the School of Health Sciences of the University of Chimborazo, Riobamba (Ecuador): 2021. *Regular use was represented as the percentage of teachers or students who answered "always" or "usually" to each sun protection practice frequency of use question. Chi-square test. *p < 0.05; ** p < 0.01; ***p < 0.001. Missing: 1 = 8; 2 = 14; 3 = 10; 4 = 6; 5 = 8; 6 = 5.*

expressed in statements such as "I don't want to get sunburned" or "I'm concerned that too much sun may provoke skin cancer". Between the two population groups, there were significant differences in two specific attitudes: a liking for sun exposure ("I like sunbathing"; p = 0.039) and seeking out the shade to escape the midday sun ("At midday, I'd rather be in the shade than in the sun"; p = 0.012) (Fig. 2).

3.6. Knowledge about sun exposure

In relation to knowledge about sun exposure and photoprotection (Table 3), the students obtained an average score of 6.1 out of 10 (SD 1.3) compared to the 6.2 (SD 1.3) obtained by the teachers. Although there were no significant differences between the two groups in the overall score (p > 0.05), a significantly higher percentage of students (p = 0.047) accepted the false belief "Once your skin has tanned there's no need to use sunscreen". Both students and teachers were well aware of certain harmful aspects of sun exposure, such as the influence of UV radiation in provoking skin aging and skin cancer (96.4 % of students and 94.6 % of teachers shared this belief). In contrast, fewer than 25 %, in both groups know that "Using photoprotectors is the best way to protect yourself from the sun and prevent skin cancer" and "It is advisable to sunbathe at least one hour a day to guarantee adequate levels of vitamin D" are false sentence and that dark clothes protect from the sun more than light clothes.

3.7. Multivariable analysis of sunburn events

The multivariable regression analysis of sunburn events (Table 4) highlights the following factors associated with a greater risk of sunburn: pertinence to student group (OR 2.76), female identification (OR 1.5), rejectionist attitude towards sunscreen (agreement or totally agreement with sentence "I don't like sunscreen") (OR 1.79) and occupational sun exposure ≥ 1 h (OR 1.88). The frequent use (nearly always and always) of a sunshade/umbrella was found to be a protective factor against sunburn (OR 0.7).

4. Discussion

This study was undertaken sunburn incidence in a university population, at the School of Health Sciences of the University of Chimborazo (Ecuador) and to identify associated risk factors, both sociodemographic and those related to practices, attitudes and knowledge regarding sun exposure. The present study is one of the few to have addressed this issue with specific regard to the university community.

The study population lives in a location where the number of hours of sunshine is among the highest in the world, with a UV index of 7–12 during most of the year (Williamson et al., 2019). The duration of solar exposure is defined as the sum of time intervals (in hours) during which direct solar radiation (normal to the sun) exceeds 120 W/m^2. In this respect, the study area is second only to Yuma (Arizona, USA), which

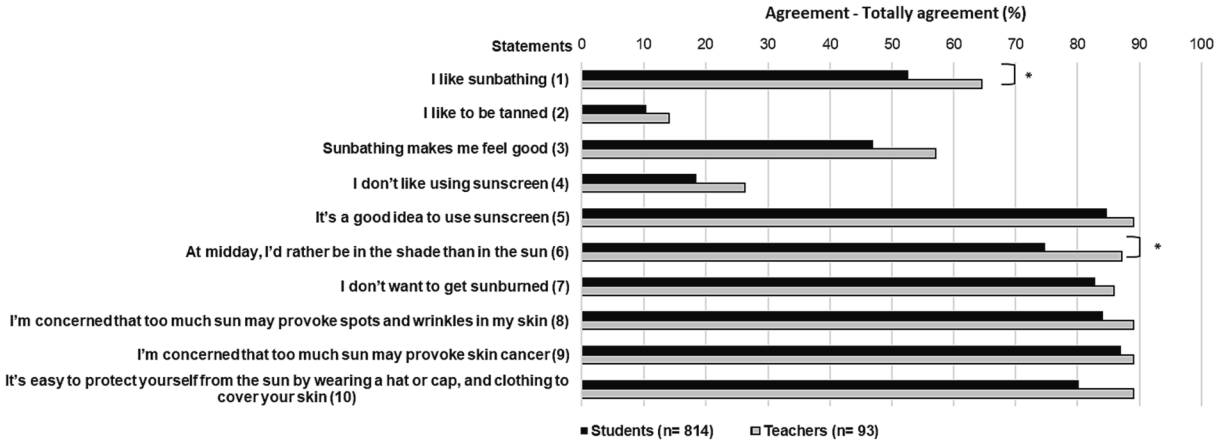

Fig. 2. Attitudes towards sun exposure and photoprotection of teachers and students of the School of Health Sciences of the University of Chimborazo, Riobamba (Ecuador). *Percentage of teachers or students who answered "agree" or "totally agree" to each attitude was represented. Chi-square test. *p < 0.05. Missing: 1 = 3; 2 = 6; 3 = 7; 4 = 4; 5 = 5; 6 = 1; 7 = 3; 8 = 3; 9 = 6; 10 = 5.*

Table 3
Sun exposure and sun protection related knowledge of teachers and students from the School of Health Sciences of the University of Chimborazo, Riobamba (Ecuador).

Sun-related knowledge statements	Correct answer				p
	Students (n = 814)		Teachers (n = 93)		
	n	%	n	%	
Sunburns, before the age of 30, increase the risk of melanoma (T)	684	84	82	88.2	0.372
Ultraviolet radiation accelerates skin aging and provokes various forms of skin cancer (T)	785	96.4	88	94.6	0.559
If you stay in the shade, you're at no risk of suffering the effects of solar radiation (F)	563	69.2	57	61.3	0.153
Sunscreen is the best way to protect yourself from the sun and to prevent skin cancer (F)	169	20.8	14	15.1	0.245
Once your skin has tanned, there's no need to use sunscreen (F)	663	81.4	84	90.3	**0.047**
Babies under 1 year of age should not be exposed directly to the sun (T)	530	65.1	55	59.1	0.305
Extreme sun protection measures should be taken when the UV index is higher than 3 (T)	703	86.4	83	89.2	0.539
Dark clothing provides greater protection from the sun than light clothing (T)	155	19	22	23.7	0.355
It is advisable to get at least one hour's sun exposure a day to ensure adequate levels of vitamin D (F)	89	10.9	11	11.8	0.931
Children should use sunscreen with a factor of at least 30 (T)	619	76	76	81.7	0.273
Knowledge score (0–10)					
Mean - SD	6.1	1.3	6.2	1.3	0.696

Number and percentage of persons who respond correctly to each item was presented.
SD: Standard deviation; T: True; F: False. Chi-square test.

Table 4
Multivariable logistic regression model for the occurrence of a sunburn event in the previous year.

Variable	β	p	Odds Ratio	95 %CI	
				Lower	Upper
Group					
Teachers			1.00		
Students	1.01	<0.001	2.76	1.70	4.48
Sex					
Male			1.00		
Female	0.41	0.03	1.50	1.05	2.16
SPP1: I stay in the shade or use an umbrella					
Never – Hardly ever - Usually			1.00		
Nearly always - Always	0.36	0.03	0.70	0.50	0.97
ATSE4: I don't like sunscreen					
Totally disagree - Disagree - Neutral			1.00		
Agree - Totally agree	0.58	0.01	1.79	1.13	2.83
Hours per day of sun exposure during outdoor activities or work					
<1 h			1.00		
1–2 h	0.63	0.00	1.88	1.28	2.76
>2 h	0.55	0.01	1.74	1.12	2.69

according to the World Meteorological Organization is the sunniest place in the world with 11 h of sunshine per day in winter and up to 13 h in summer (World Health Organization, 2002).

The most worrying finding in the present study was the high number of sunburn events reported by this university students (78 %), in comparison with values reported previously in the US (73 %) (Dunn, 2014) and (64.4 %) (Basch et al., 2017), and in Spain (70.6 %).

In addition, our analysis of this university community highlighted the following independent variables associated with the risk of sunburn: membership of the student group, having a rejectionist attitude towards sunscreen, failing to use a sunshade or umbrella as protection from the sun, and solar exposure for more than one hour per day during work activities. Although in our sample women were more likely than men to experience sunburn, this finding is not corroborated in the literature (Ponce et al., 2019).

Although in our study population younger persons (i.e. the students) were more likely to experience sunburn than those who were older (i.e. the teachers), there was also a clear statistical correlation (of 0.007 %) between sunburn and the duration of teaching activity, in the range of 1–2 h (probably because this duration corresponds to time spent during recess, when outdoor sports are performed; no statistical significance was detected for other time periods). This factor should be further investigated in order to establish preventive measures against sunburn.

In relation to sun protection practices, the measure most widely used by the study respondents was the use of appropriate clothing, followed by the application of sunscreen. Factors such as the cold but sunny climate of Chimborazo, together with certain cultural or economic factors (for example, the high cost of sunscreen in some countries), may account for the differences observed and the greater use of protective clothing in some areas. Some useful practices, however, such as avoiding the sun at midday and wearing sunglasses, were rarely employed by the students and teachers in our study population. In this respect, statistically significant differences were observed between the students and the teachers, with the latter making greater use of sunglasses ($p < 0.001$) and being more likely to avoid solar exposure at midday ($p < 0.001$). Accordingly, policymakers should seek to raise awareness about the benefits of these practices, as well as adopting structural measures such as making greater provision of shaded spaces within the campus. There were no statistically significant differences between students and teachers regarding the use of sunscreen ($p = 0.57$).

Regarding the respondents' knowledge about the effects of solar exposure, the overall score obtained by both students and teachers (6 out of 10) shows that knowledge deficits remain and should be addressed. As regards attitudes towards sun exposure, positive attitudes towards tanning were not strongly present (while 52.7 % of students and 64.5 % of teachers agreed with the statement "I like sunbathing", only 10.5 % of the students and 10.1 % of the teachers asserted "I like to be tanned"). By contrast, over 70 % presented a positive attitude towards sun protection (expressed in ideas such as "It's a good idea to use sunscreen", "I'm concerned that too much sun may provoke spots/wrinkles/skin cancer"). In view of these findings, it seems likely that a large part of this population is in the "Change (or Contemplation/Action) phase" described in Prochaska's transtheoretical model of change (Prochaska and DiClemente, 1982). This is a positive outcome, since it implies that knowledge and attitudes are developing in an appropriate direction. However, motivational interventions that work on this attitudinal aspect are necessary for the prevention of skin cancer. In this sense, strategies such as those of the Sunsmart program have been shown to be effective and significantly reduce the taste for tanning in the long term.

Overall, therefore, the members of this university community, although they have an acceptable knowledge of the effects of the sun on the skin, sometimes engage in risky sun exposure practices and do not always adopt prudent measures of photoprotection. As a result, both population groups present an alarming frequency of sunburn events. Measures should be undertaken to address this unsatisfactory situation, via the implementation of strategies specifically aimed at reducing the risk of skin cancer in this university community.

5. Limitations

Although this study makes a valuable contribution to our understanding of the questions raised, it also presents certain limitations, which must be acknowledged. Firstly, the use of self-completed

questionnaires is subject to various forms of bias, such as social desirability bias, possible misinterpretation of the text and/or inaccurate memory recall. Moreover, the disproportion between the numbers of students and teachers in our population sample may have influenced the results obtained (although this distribution represents the reality of the university community considered).

Finally, the possible extrapolation of our results to other locations is limited by the nature of the geographical area in which the study took place (Ecuador, with its very specific climatic and cultural characteristics). Moreover, we focus on two population groups (university students and teachers) with a high cultural level, of whom a reasonable knowledge about solar exposure risks and photoprotection is to be expected and all of whom spoke Ecuadorian-Spanish. These factors cannot be assumed if the conclusions drawn are to be implemented in other population groups (perhaps in rural areas, or with a lower level of culture/education).

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CRediT authorship contribution statement

J. Cambil-Martín: Conceptualization, Funding acquisition, Project administration, Writing – original draft. **J.D. Sánchez López:** Writing – original draft. **A. Rodríguez-Martínez:** Visualization, Writing – review & editing. **F. Rivas-Ruiz:** Formal analysis, Writing – original draft. **Y.E. Salazar-Granizo:** Investigation. **A.S. Herrera Molina:** Investigation. **N. Blázquez-Sánchez:** Conceptualization, Writing – original draft, Writing – review & editing. **M. De Troya-Martín:** Conceptualization, Supervision, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pmedr.2023.102458.

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