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Factors associated with interest in scientific research in dental students of six Cuban universities

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Introduction: To determine the factors associated with interest in scientific research in dental students of six Cuban universities.

Methods: This is a multicenter cross-sectional analytical study. Interest in scientific research was the dependent variable, and it was assessed through a questionnaire proved to be reliable (Cronbach's $\alpha=0.88$). We obtained adjusted prevalence ratios (aPR), 95% confidence intervals (95% CI), and p values through generalized linear models.

Results: A total of 587 students were part of the research, and 57.9% manifested interest in scientific research. However, when they were asked if they wanted to pursue a research career in the future, only 45.1% responded affirmatively. We found, through multivariate analysis, that there was more interest in scientific research among those who were student assistants (aPR: 2.42; 95% CI: 1.41–4.16; $p=0.001$), those who had previous studies (aPR: 1.35; 95% CI: 1.02–1.79; $p=0.034$), and those who had received awards in scientific events (aPR: 1.74; 95% CI: 1.26–2.41; $p=0.001$). In contrast, there was less interest among those who were at the clinical stage of their career (aPR: 0.66; 95% CI: 0.49–0.89; $p=0.006$), adjusted for seven variables.

Conclusions: There exists interest in scientific research and we found some factors associated with this. This has to be taken into account in order for educational institutions to generate strategies.

KEYWORDS

dentistry, dental students, multicenter study, research, surveys, questionnaires

1. Introduction

Universities are the nexus between society and science; in addition, they have a duty to promote research among their professors and students (Barrios and Delgado, 2020). It is necessary to recognize the importance of research skills that students should acquire and contribute to their

development for this function to be properly executed (Mejia et al., 2019). This improves critical thinking, the problem-solving capacity through the application of the scientific method, knowledge acquisition, and the development of skills to generate scientific knowledge (Barja-Ore et al., 2019). In addition, this increases the probability of entering graduate programs at the end of undergraduate studies (Maury-Sintjago et al., 2018; Barrios and Delgado, 2020).

However, research is not always considered fundamental in the teaching-learning process during professional training (Barja-Ore et al., 2019). As a result, the number of graduates developing a research career has decreased worldwide (Zemlo et al., 2000; Salas and Attilio, 2005). This constitutes a serious threat to research development itself, the training of other research professionals, and the advancement of health sciences (Carrillo-Larco and Carnero, 2013).

In view of this situation, there has been research on knowledge, attitudes, practices, and limitations of carrying out research perceived by health science students. A study conducted in Pakistan reported that the lack of funding support and preference for instruction over research were the most significantly highlighted barriers by students (Bilal et al., 2019). An investigation carried out in Saudi Arabia found that the majority of students had positive attitudes toward scientific research, but pointed out that the little support received from teachers and universities limited their performance (Alsalem et al., 2021). An Australian investigation indicated that there was a lack of awareness of the needs, benefits, and career opportunities associated with the research practice and voiced clear impediments in their career path with respect to the choice of research-related careers (Alsalem et al., 2021). In Egypt, the majority of students considered research to be valuable but, at the same time, they had little time to conduct research because of their educational tasks (Abulata et al., 2019).

In Latin America, there are some reports on this topic. For example, in Chile, Maury-Sintjago et al. (2018) reported that the students recognized the importance of scientific research and considered it necessary to grant academic credits to students who carry out scientific research, publications, and presentations. In Peru, Chara-Saavedra and Olortegui-Luna (2018) found that students who work longer, read fewer books and articles weekly, as well as those who do not attend scientific research training have an unfavorable attitude toward it. Cabrera-Enriquez et al. (2013) investigated the factors associated with the level of knowledge and attitude toward research in 1,554 students from 17 medical schools in Peru. They reported that only 46.7% of those surveyed had a good level of knowledge and 37.7% had an adequate attitude toward research. The associated variables with the good level of knowledge were: the academic year, belonging to a research group and having an advisor. Having an adequate attitude toward research was associated with being a woman and having an advisor. No differences were found between the level of knowledge and the attitude of the students of the studied universities.

Another Peruvian study found that students showed a high interest in scientific research; however, when asked if they wanted to pursue a research career in the future, only 53.9% answered affirmatively. This interest decreases as the academic cycle's progress, and is greater in women. When the academic cycles in preclinical and clinical sciences were grouped together, the interest in participating in scientific events at the clinics was lower. Women showed greater interest in writing scientific articles (Alarco et al., 2017).

An investigation carried out with 400 Peruvian students belonging to 19 medical schools reported that only 7.8% said that their medical school did support the research. Around 56% reported that they did

not feel sufficiently trained by their university to achieve scientific publication in biomedical journals. Most of the students reported that their universities do not promote research hotbeds, do not have scientific internships and there is no support for students to carry out or carry out their theses (Nakandakari, 2019).

Urrunaga-Pastor et al. (2020) assessed the rate and characteristics of research publications by 1,241 Peruvian undergraduate medical students in Lima, Peru. They reported that 173 (13.9%) students published at least one paper, 102 (8.2%) published at least one original paper, and 30 (2.4%) published at least one original paper in PubMed-Indexed journals. Also, they registered a total of 174 papers authored by medical students, of which 98 (56.3%) were published in Peruvian journals, 128 (73.6%) were published in Spanish, 90 (51.7%) had a medical student as the first author, and 43 (24.7%) had a medical student as the corresponding author. The percentage of students with at least one publication was very heterogeneous across the eight medical schools evaluated.

In Costa Rica, Acón-Hernández et al. (2015) found that only 4.6% of the students surveyed had a good level of knowledge and 21.5% had an adequate attitude toward research, being higher in women (62.7%). The academic year, participation in an extracurricular research course, and membership in a research group were factors associated with the level of knowledge about scientific research.

In the field of Dentistry, there are few studies that address this problem at the undergraduate level (Habib et al., 2018). A study conducted in 18 Latin American universities reported that only six of them had a well-defined objective aimed at research training of future dentistry professionals (Rosales and Valverde, 2008). We can also add the fact that there is a deficiency in getting research published (Corrales-Reyes and Castro-Rodríguez, 2018). The Latin American country that has most reported on this subject is Peru, with reports on scientific production and research perception (Castro-Rodríguez et al., 2018a), attitudes toward research (Arellano-Sacramento et al., 2017), factors that contribute to scientific production (Castro-Rodríguez, 2019), research skills (Castro-Rodríguez, 2021), support and publication of university theses (Castro-Rodríguez et al., 2018b), as well as the perception of academic plagiarism (Castro-Rodríguez et al., 2018c). However, there are few studies in other Latin American countries that specifically address the interest in scientific research in undergraduate Dentistry (Corrales-Reyes et al., 2019; Castro-Rodríguez et al., 2020). Therefore, the objective of this research was to determine the factors associated with interest in scientific research in dental students of six Cuban universities.

2. Methods

We conducted a cross-sectional, analytic, observational, multicenter and questionnaire-based study. The universe was constituted by 1,562 dental students enrolled in the academic year 2019–2020, in the following Cuban medical universities: Pinar del Río, Sancti Spiritus, Villa Clara, Ciego de Ávila, Camagüey, and Granma. It was calculated that 517 respondents were required, because in a previous pilot study it was found that the minimum difference of the five main crosses was 31 vs. 40% (for research motivation according to having taken extracurricular scientific courses), where a power of 99% was used, confidence level at 95%, and for a single sample. An additional 70 surveys were added to compensate for possible exclusions. In the end, 587 students (37.6% of the total population) were surveyed, who were reached through non-probability and intentional sampling.

Undergraduate students of any academic year, who were willing to participate in the study and who signed the informed consent form, were included. We had considered excluding those who did not attend classes or practices on the days of the administration of the survey and those who did not answer $\geq 20\%$ of the items. However, this situation did not occur, and the response rate was 100%. We designed a questionnaire where we requested information on the following independent variables: age, gender, being a student assistant, university, stage of dental studies (basic or clinical), having a tutor, having previous studies, participation in extracurricular research courses, in research projects, scientific events and having awards in these events, as well as having published at least one scientific article.

The dependent variable was interest in scientific research, which was assessed through the scale developed originally by Alarco et al. (2017) in Peruvian medical students. That scale was used to measure interest in research in undergraduate dental students' in Cuba (Corrales-Reyes et al., 2019) and it was proven to be valid to study the construct (Cronbach's $\alpha = 0.93$). It is an anonymous self-administered questionnaire consisting of 10 items. All the items have five options written as Likert-type responses, ranging from "completely disagree" = 1 to "completely agree" = 5. The instrument assesses aspects about general interest, scientific writing, and scientific publications, participation in events, and interest in pursuing a research-related career. The total score was calculated by summing the score of each one of the items. Higher scores indicate a higher interest in scientific research (top tercile of the scores). The scale reliability in this study was very good (Cronbach's $\alpha = 0.88$).

Having previously explained the objective of the study and having obtained the permission of the professor in charge, the instrument was administered during class hours. The surveyors only answered questions related to the type and form of the questionnaire, in order not to bias the results with opinions or answers to specific questions. The average time students spent answering the questionnaire was 10 min. Participation was voluntary and without any type of economic compensation. Participants signed the informed consent form and were told that they could withdraw from the study at any time. The principles of the Declaration of Helsinki for research involving human subjects were respected. The research project was approved by the Ethics Committee of the "Hospital General Universitario Carlos Manuel de Céspedes."

A database was created in the Microsoft Excel program (version 2019 for Windows), in which the quality control of the data was carried out. To obtain the dependent variable, all the responses scores were added. Hence, students with interest in scientific research were considered to be those who had responses located in the top tercile of the total of all the scores, and they were compared with those who were not located in the top tercile (this is, the sum of the middle tercile and the lowest tercile).

To get the results, we first obtained frequencies and percentages of the categorical variables and, then, medians and interquartile ranges of the numerical variables (because the Shapiro–Wilk test had a non-normal result). Through bivariate analysis, p values were obtained with the chi-squared test, except for age, which was obtained with the sum of ranks. Finally, generalized linear models were used (Poisson family, log-link function, and models for robust variances), with which prevalence ratios, 95% confidence intervals, and p values were obtained. For a variable to pass from the bivariate to the multivariate model, values of $p < 0.30$ were considered statistically significant, while for the final model, values of $p < 0.05$ were considered statistically significant. The statistical program Stata v.11.1 (StataCorp LP, College Station, TX, United States) was used.

3. Results

A total of 587 students were the part of our study, from which 62.9% were female. The median age was 22 (interquartile range: 21–23). Out of the total, 40.5% of the surveyed students were student assistants; 74.6% were in the clinical stage of their career; 40.4% had a tutor; 13.6% had previous studies; 30.3% had studied extracurricular research courses; 35.6% had performed research projects; 50.0% had attended scientific events; 34.8% had received awards; and 10.6% had published at least one scientific article.

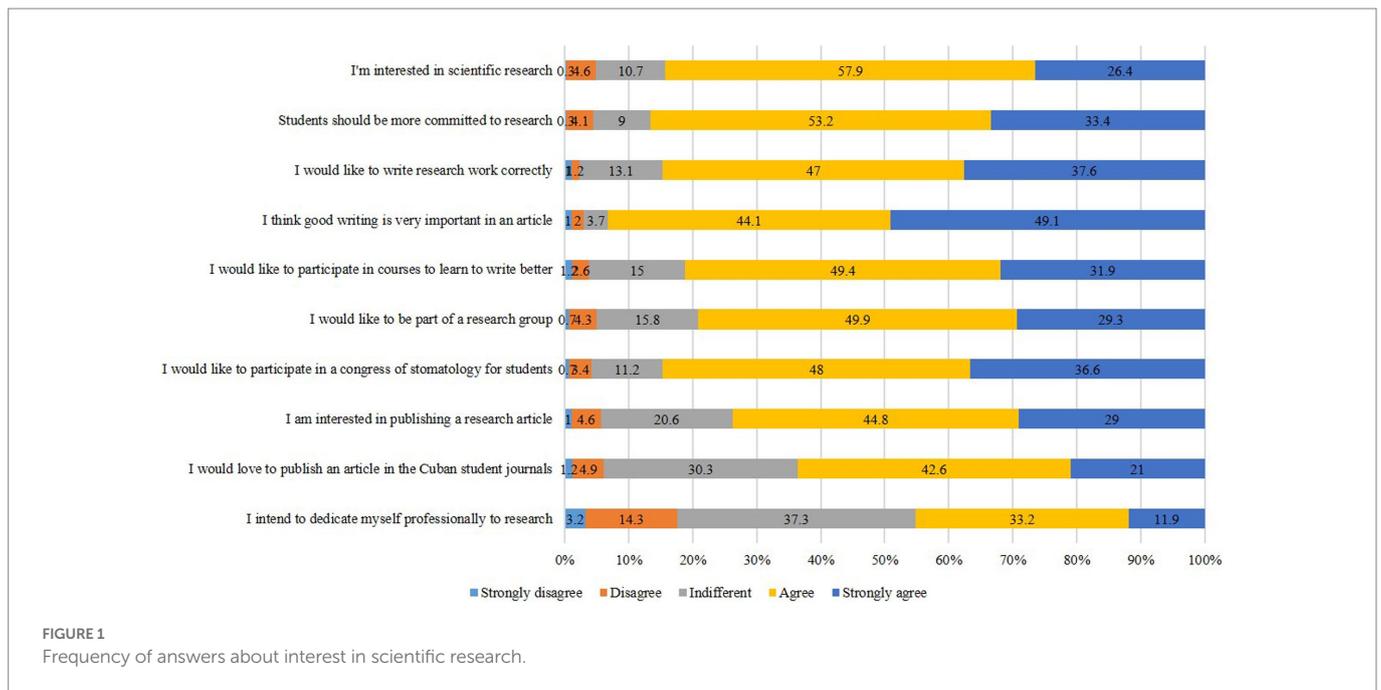
Out of the total, 57.9% of the respondents agreed that they were interested in scientific research (Item 1); while 33.4% strongly agreed that they should be more committed to it (Item 2). In addition, 44.1% of the respondents agreed that good writing is very important in an article (Item 4); and 29.3% strongly agreed to participate in courses where they can be taught to write better (Item 5). Moreover, 48% percent of the students agreed to participate in a scientific congress of dental students (Item 7). Also, 42.6% of the participants agreed that they would be interested in publishing a research article (Item 8); while 44.8% agreed to do so in Cuban student journals (Item 9). However, when asked about the intention of pursuing a research-related career, only 45.1% of the students responded affirmatively. Even 37.3% of the respondents were indifferent to this possibility (Item 10; Figure 1).

In the bivariate analysis, interest in scientific research was associated with age ($p = 0.006$), being a student assistant ($p < 0.001$), university ($p < 0.001$), and study stage ($p = 0.004$), having a tutor ($p < 0.001$), participation in extracurricular research courses ($p < 0.001$), research projects ($p < 0.001$), scientific events ($p < 0.001$), having obtained awards in these scientific events ($p < 0.001$), and publication of scientific articles ($p < 0.001$; Table 1).

We found, through multivariate analysis, that there was more interest in scientific research among those who were student assistants (aPR: 2.42; 95% CI: 1.41–4.16; $p = 0.001$), those who had previous studies (aPR: 1.35; 95% CI: 1.02–1.79; $p = 0.034$), and those who had obtained awards in scientific events (aPR: 1.74; 95% CI: 1.26–2.41; $p = 0.001$). In contrast, there was less interest among those who were at the clinical stage of their studies (0.66; 95% CI: 0.49–0.89; $p = 0.006$), adjusted for age, university, having a tutor, participation in extracurricular research courses, in research projects, scientific events, or publication of scientific papers. (Table 2).

4. Discussion

In developed countries, in contrast to the Latin American context, health sciences students consider research a useful option to follow in the future, which conditions their active participation in the generation of knowledge from the undergraduate level (Corrales-Reyes and Castro-Rodríguez, 2018). We found that six out of 10 respondents agreed that they were interested in scientific research, but only one third recognized that they should be more committed to it, which is similar to what was reported in Cuba (Corrales-Reyes et al., 2019) and Peru (Alarco et al., 2017; Castro-Rodríguez et al., 2020). This could be related to the fact that, although students recognize the importance of research and show interest in it, more actions are needed to show the benefits of research, in order to achieve a greater commitment to it, so that it translates into the generation of scientific knowledge.



Almost half of the students recognize the importance of good writing in a scientific article and approximately one third strongly agree to participate in courses in writing better. These results are similar to previous reports (Alarco et al., 2017; Corrales-Reyes et al., 2019; Castro-Rodríguez et al., 2020) and are important because one of the factors that most limits scientific production, both at undergraduate (Corrales-Reyes et al., 2017) and graduate levels (Caron et al., 2020), is the lack or low level of preparation for scientific writing.

Although training in scientific research methodology is important, it is also necessary to write correctly in order to effectively communicate the results of a given research process within the medical community. Therefore, in order for students to effectively publish their research, they must not only master research methodology, but also scientific writing (González Aguilar, 2018). The incorporation of training strategies in scientific writing at undergraduate level, as well as the implementation of continuing education courses are fundamental to increase the number of successful writers in the health sciences (Eslava-Schmalbach and Gómez-Duarte, 2013).

Approximately half of the respondents agreed to participate in a scientific congress for dental students, which is similar to what was reported in undergraduate dentistry in Peru (Castro-Rodríguez et al., 2020). However, in the multivariate analysis, this was not a factor associated with interest in research. It is recognized that it is useful to disseminate research results, and scientific events are favorable spaces to this end (Corrales-Reyes et al., 2017). In the specific case of Cuba, undergraduate students can participate in various events; however, as previously noted (Corrales-Reyes et al., 2019), many students attend these scientific events as a form of socialization, to get to know new places in the country, and for the social recognition that it could represent before their fellow students, and not necessarily because of an interest in scientific research.

There is interest in publication of scientific articles and approximately half of the respondents agreed to publish in Cuban student journals. These results coincide with those reported in Cuba (Corrales-Reyes et al., 2019) and Peru (Alarco et al., 2017) and ratify the fact that research that is not published practically “does not exist.”

Furthermore, the role played by Cuban student journals in the communication of the results of science generated at the undergraduate level is getting more importance (Lazo-Herrera and González-Velázquez, 2021; Magariño Abreus et al., 2021).

The condition of student assistants was associated with a greater interest in scientific research, which was previously reported in Cuba by Corrales-Reyes et al. (2019). This could be related to the fact that student assistants are distinguished due to having faster rates of assimilation, as well as favorable aptitudes for learning specific disciplines of the curriculum and for teaching. In addition, they show interest in research work through their participation in scientific events, participation in research projects, and publication of scientific articles (Hernández-Negrín et al., 2018).

Having pursued a previous career was associated with a greater interest in research. No studies have been found that evaluate previous professional training as a possible factor associated with interest in research. However, there is a study in Peru that shows that having previous studies was associated with the use of scientific search engines, which could be an indication that students with previous experience are more interested in research (Mejía et al., 2019).

Obtaining awards in scientific events was associated with a greater interest in research. We did not find studies that have studied this variable. However, it is probable that students have more interest after having obtained awards for their research, due to the social recognition and personal satisfaction that an award can mean to them after participating in a scientific event. This hypothesis has to be proven in future research, with designs that can explain causality.

The students who were in the clinical stage of their career had less interest in research. Studies developed in Saudi Arabia (Habib et al., 2018), Cuba (Corrales-Reyes et al., 2019), and Malaysia (Kyaw Soe et al., 2018) reported that the interest increases as the academic year progress. However, research undertaken in Pakistan (Bilal et al., 2019) and Peru (Acón-Hernández et al., 2015; Alarco et al., 2017; Habib et al., 2018; Nakandakari, 2019; Urrunaga-Pastor et al., 2020) show opposite results. A possible explanation for this result could be their predisposition and enthusiasm in the initial stage of their studies due to belonging to any

TABLE 1 Bivariate analysis of factors associated with being interested in scientific research in dental students of six Cuban universities.

Variable	Interest in scientific research		p-Value
	No n (%)	Yes n (%)	
Gender			
Female	242 (65.6)	127 (34.4)	0.818
Male	145 (66.5)	73 (33.5)	
Age (years)*			
Median and interquartile range	22 (21–23)	22 (20–22)	0.006
Student assistant			
No	280 (80.2)	69 (19.8)	<0.001
Yes	107 (45.0)	131 (55.0)	
University			
Ciego de Ávila	12 (46.2)	14 (53.8)	<0.001
Villa Clara	31 (62.0)	19 (38.0)	
Camagüey	103 (69.6)	45 (30.4)	
Granma	171 (75.7)	55 (24.3)	
Pinar del Río	43 (53.4)	39 (47.6)	
Sancti Spiritus	27 (49.1)	28 (50.9)	
Studies stage			
Basic sciences	84 (56.4)	65 (43.6)	0.004
Clinical sciences	303 (69.2)	135 (30.8)	
With a tutor			
No	273 (78.0)	77 (22.0)	<0.001
Yes	114 (48.1)	123 (51.9)	
With previous undergraduate studies			
No	341 (67.3)	166 (32.7)	0.087
Yes	46 (57.5)	34 (42.5)	
Extracurricular research courses			
No	289 (70.7)	120 (29.3)	<0.001
Yes	98 (55.1)	80 (44.9)	
Participation in research projects			
No	279 (73.8)	99 (26.2)	<0.001
Yes	108 (51.7)	101 (48.3)	
Participation in scientific events			
No	221 (81.9)	49 (18.1)	<0.001
Yes	166 (52.4)	151 (47.6)	
Having obtained awards in scientific events			
No	300 (78.3)	83 (21.7)	<0.001
Yes	87 (42.6)	117 (57.4)	
Publication of scientific articles			
No	364 (69.3)	161 (30.7)	<0.001
Yes	23 (37.1)	39 (62.9)	

*Quantitative variable, median, and interquartile ranges are shown. *p* values were obtained with Chi-squared test (except from age, which was obtained with the sum of ranks).

research group, attending scientific events, or the desire to publish articles. However, by having to face research limitations at undergraduate and postgraduate levels (Mejia et al., 2014; Atamari-Anahui et al., 2016; Mejia et al., 2016; Corrales-Reyes et al., 2017; Mejia et al., 2019), this interest decreases progressively. Another aspect to take into account is

the high academic load at the end of undergraduate studies, as well as the great number of hours that students have in dental clinics as part of their professional training (Alarco et al., 2017).

When asked about the intention of dedicating themselves professionally to research-related work, almost half of the students

TABLE 2 Analysis of factors associated with interest in scientific research in dental students of six Cuban universities.

Variable	Bivariate analysis	Multivariate analysis
Male gender	0.97 (0.77–1.23) 0.819	Not included in the model
Age years*	0.92 (0.86–0.98) 0.009	0.95 (0.87–1.03) 0.219
Student assistant	2.78 (2.19–3.54) <0.001	2.42 (1.41–4.16) 0.001
University		
Ciego de Ávila	Ref. category	Ref. category
Villa Clara	0.71 (0.43–1.17) 0.174	1.01 (0.66–1.56) 0.954
Camagüey	0.56 (0.37–0.87) 0.009	0.98 (0.68–1.43) 0.933
Granma	0.45 (0.30–0.69) <0.001	0.93 (0.62–1.39) 0.716
Pinar del Río	0.88 (0.58–1.35) 0.565	0.99 (0.67–1.46) 0.958
Sancti Spiritus	0.95 (0.61–1.47) 0.803	1.29 (0.89–1.89) 0.181
Studies stage	0.71 (0.56–0.89) 0.003	0.66 (0.49–0.89) 0.006
Has a tutor	2.36 (1.87–2.98) <0.001	0.71 (0.40–1.25) 0.236
With previous undergraduate studies	1.30 (0.98–1.72) 0.072	1.35 (1.02–1.79) 0.034
Extracurricular research courses	1.53 (1.23–1.91) <0.001	0.98 (0.76–1.26) 0.867
Participation in research projects	1.85 (1.48–2.39) <0.001	1.07 (0.83–1.39) 0.580
Participation in scientific events	2.62 (1.99–3.47) <0.001	1.30 (0.86–1.96) 0.216
Having obtained awards in scientific events	2.65 (2.11–3.31) <0.001	1.74 (1.26–2.41) 0.001
Publication of scientific articles	2.05 (1.63–2.58) <0.001	1.24 (0.98–1.58) 0.072

*Quantitative variable Prevalence ratios (left), 95% confidence intervals (within parenthesis), and *p* values (right) were obtained with generalized linear models (Poisson family, log-link function and models for robust variances).

responded affirmatively. These results are lower than those found in Peru (Alarco et al., 2017; Castro-Rodríguez et al., 2020) and Cuba (Corrales-Reyes et al., 2019). It is recognized that dedicating professionally to research implies a high level of interest in it from the undergraduate level. However, economic resources, the uncertainty of success and other known limitations (Corrales-Reyes et al., 2017; Caron et al., 2020) diminish the interest of students and few of them decide to continue with a research career (Zemlo et al., 2000; Carrillo-Larco and Carnero, 2013). Cuban educational systems in health sciences prioritize professional training focused on the profile of medical care, to the detriment of the training of professional researchers. In the study plans, the subjects taught related to research are very basic. In the specific case of Dentistry, evidence-based practice is still incipient and this limits the interest of students. It is necessary to show students the benefits of conducting research, in order to arouse interest in it and consider it as a future job option.

Some variables were not associated, although other studies (Cabrera-Enríquez et al., 2013; Alarco et al., 2017; Arellano-Sacramento et al., 2017; Bilal et al., 2019; Corrales-Reyes et al., 2019; Castro-Rodríguez et al., 2020; Alsaleem et al., 2021) show that there is an association. Such is the case of participation in extracurricular research courses, research projects, and publication of scientific articles. Those students who participate in research projects and take extracurricular

courses have higher scores with respect to interest in research, perhaps because they are constantly learning from researchers or because they are more familiar with the importance of strengthening their research competencies (Castro-Rodríguez et al., 2020).

This research had a limitation as some variables were not associated, and when calculating the statistical power, it was found that it did not reach the minimum necessary to determine whether there is an association (gender, the last two universities, and whether they published any research). In addition, the type of sampling does not allow extrapolating the results to the totality of the students of the participating universities, as well as to the rest of the country. However, the results are important because they show the reality in a country where the resources for research are limited, but there is still interest in research and associated factors. It is favorable to focus all efforts on studying the factors associated with interest in scientific research, so that they can be identified and promoted in students.

It is concluded that there is interest in scientific research; nevertheless, less than half of the students plan to dedicate themselves professionally to research. Being a student assistant, having previous studies, having obtained an award in scientific events, and being in the clinical stage of undergraduate studies were associated factors.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

IC-R was in charge of the conceptualization. CM and IC-R analyzed and interpreted the data. IC-R, JV-M, LV-G, MG-R, OV-C, LT-F, DT-H, AV-C, RT-V, and CM participated in the development of the methodology, formal analysis, writing, review, and editing of the first draft. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

- Abulata, N. N., Ismail, A. S., Sabra, N. A., Alnezawi, R. A., Bazhair, R. M., Ahnaf, N. F., et al. (2019). Attitudes and barriers of undergraduate students towards conducting research at Fakeeh college for medical sciences, Jeddah, KSA; a cross-sectional descriptive study. *Int. J. Commun. Med. Public Health* 6, 927–935. doi: 10.18203/2394-6040.ijcmph20190574
- Acón-Hernández, E., Fonseca-Artavia, K., Artavia-Chávez, L., and Galán-Rodas, E. (2015). Conocimientos y actitudes hacia la investigación científica en estudiantes de medicina de una Universidad Privada de Costa Rica, 2015. *Rev. Cuerpo Med. HNAHA* 8, 217–221. doi: 10.35434/rcmhnaaa.2015.84.161
- Alarco, J. J., Changlilio-Calle, G., and Cahuana-Salazar, M. (2017). Investigación en pregrado: interés según sexo y ciclo académico. *Educ. Med.* 18, 67–73. doi: 10.1016/j.edumed.2016.04.004
- Alsalem, S. A., Alkhairi, M. A. Y., Alzahrani, M. A. A., Alwadai, M. I., Alqahani, S. S. A., Alaseri, Y. F. Y., et al. (2021). Challenges and barriers toward medical research among medical and dental students at King Khalid University, Abha, Kingdom of Saudi Arabia. *Front. Public Health* 9, 706–778. doi: 10.3389/fpubh.2021.706778
- Arellano-Sacramento, C., Hermoza-Moquillaza, R. V., Elías-Podestá, M., and Ramírez-Julca, M. (2017). Actitud hacia la investigación de estudiantes universitarios en Lima, Perú. *Femina* 20, 191–197. doi: 10.33588/fem.204.901
- Atamari-Anahui, N., Sucasaca-Rodríguez, C., Contreras-Sotomayor, S., Aguilar-Muñiz, A., Velásquez-Cuentas, L., and Mejía, C. R. (2016). Factores asociados a las prácticas de publicación de médicos que laboran en hospitales de Cusco, Perú. *Rev. Cubana Inf. Cienc. Salud.* 27, 1–14.
- Barja-Ore, J., Otoy-Petit, O., Vega-Gonzales, E. O., Moreno-Gutierrez, N., and Loli-Ponce, R. A. (2019). Actitudes hacia la investigación de internos de obstetricia rotantes en un hospital de Lima-Perú. *Rev. Fac. Med. Hum.* 19, 53–59. doi: 10.25176/RFMH.v19i4.2341
- Barrios, E., and Delgado, U. (2020). Diseño y validación del cuestionario “Actitud hacia la investigación en estudiantes universitarios”. *Rev. Innova Educ.* 2, 280–302. doi: 10.35622/j.rie.2020.02.004
- Bilal, M., Haseeb, A., Mari, A., Amhed, A., Sher, M. A., and Saad, M. (2019). Knowledge, attitudes, and barriers toward research among medical students of Karachi. *Cureus* 11:e5599. doi: 10.7759/cureus.5599
- Cabrera-Enríquez, J. A., Cruzado-Mendoza, C., Purizaca-Rosillo, N., López-Samanamú, R. O., Lajo-Aurazo, Y., Peña-Sánchez, E. R., et al. (2013). Factores asociados con el nivel de conocimientos y la actitud hacia la investigación en estudiantes de medicina en Perú, 2011. *Rev. Panam. Salud Pública* 33, 166–173. doi: 10.1590/S1020-49892013000300002
- Caron, R., Mattos, P., and Barboza, J. J. (2020). Dificultades para la elaboración de artículos de investigación científica en estudiantes de posgrado en salud. *Ed. Med. Sup.* 34:e1624
- Carrillo-Larco, R. M., and Carnero, A. M. (2013). Autoevaluación de habilidades investigativas e intención de dedicarse a la investigación en estudiantes de primer año de medicina de una universidad privada en Lima, Perú. *Rev. Med. Chile* 24, 17–25. doi: 10.20453/rmh.v24i1.729
- Castro-Rodríguez, Y. (2019). Factores que contribuyen en la producción científica estudiantil. El caso de Odontología en la Universidad Nacional Mayor de San Marcos. *Perú. Educ. Med.* 20, 49–58. doi: 10.1016/j.edumed.2017.10.002
- Castro-Rodríguez, Y. (2021). Factores relacionados con las competencias investigativas de estudiantes de Odontología. *Ed. Med. Sup.* 35:e2929
- Castro-Rodríguez, Y., Cósar-Quiroz, J., Arredondo-Sierralta, T., and Sihuay-Torres, K. (2018a). Producción científica de tesis sustentadas y publicadas por estudiantes de Odontología. *Educ. Med.* 19, 85–89. doi: 10.1016/j.edumed.2017.04.002
- Castro-Rodríguez, Y., Sihuay-Torres, K., and Pérez-Jiménez, V. (2018b). Producción científica y percepción de la investigación por estudiantes de odontología. *Educ. Med.* 19, 19–22. doi: 10.1016/j.edumed.2016.11.001
- Castro-Rodríguez, Y., Valenzuela-Torres, O., Saucedo-García, A., Laura-López, N., and Apaza-Choque, C. (2020). Interés por la investigación de los estudiantes de una facultad de odontología en Lima. *Rev. Cuba. Estomatol.* 57:e3400
- Castro-Rodríguez, Y., Yoplac-Lopez, B., Carpio-Tello, A., Sihuay-Torres, K., and Cósar-Quiroz, J. (2018c). Percepción del plagio académico en estudiantes de Odontología. *Educ. Med.* 19, 141–145. doi: 10.1016/j.edumed.2017.03.003
- Chara-Saavedra, P., and Olortegui-Luna, A. (2018). Factores asociados a la actitud hacia la investigación en estudiantes universitarios de enfermería. *CASUS* 3, 83–88. doi: 10.35626/casus.2.2018.73
- Corrales-Reyes, I. E., and Castro-Rodríguez, Y. (2018). Scientific output in dentistry: a look toward the undergraduate in Latin America. *J Oral Res.* 7, 168–169. doi: 10.17126/joralres.2018.042
- Corrales-Reyes, I. E., Fornaris-Cedeño, Y., Valdés-Gamboa, L., Dorta-Contreras, A. J., and Mejía, C. R. (2019). Socio-educational factors associated to perception of research among stomatology students in a Cuban university. *J Oral Res.* 8, 13–21. doi: 10.17126/joralres.2019.001
- Corrales-Reyes, I. E., Rodríguez, M. D. J., Reyes, J. J., and García, M. (2017). Limitantes de la producción científica estudiantil. *Educ. Med.* 18, 199–202. doi: 10.1016/j.edumed.2016.11.005
- Eslava-Schmalbach, J., and Gómez-Duarte, O. (2013). La escritura científica, un aspecto olvidado de la formación profesional. *Rev. Colomb. Anestesiol.* 41, 79–81. doi: 10.1016/j.rcas.2013.04.001
- González Aguilar, H. (2018). La relevancia de la redacción científica. *Educ. Med.* 19:226. doi: 10.1016/j.edumed.2017.09.004
- Habib, S. R., AlOtaibi, S. S., Abdullatif, F. A., and AlAhmad, I. M. (2018). Knowledge and attitude of undergraduate dental students towards research. *J. Ayub. Med. Coll. Abbottabad* 30, 443–448.
- Hernández-Negrín, H., Negrín, A., Cabrera, Y., Zurbano, J., and Martínez, X. (2018). Movimiento de alumnos ayudantes: experiencia de una institución cubana. *Educ. Med.* 19, 115–119. doi: 10.1016/j.edumed.2016.09.006
- Kyaw Soe, H. H., Than, N. N., Lwin, H., Nu Htay, M. N., Phyu, K. L., and Abas, A. L. (2018). Knowledge, attitudes, and barriers toward research: the perspectives of undergraduate medical and dental students. *J. Educ. Health Promot.* 7:23. doi: 10.4103/jehp.jehp_61_17
- Lazo-Herrera, L. A., and González-Velázquez, V. E. (2021). Revistas científicas estudiantiles en Cuba: nuevos espacios para la publicación en ciencias de la salud. *Educ. Med.* 22, 220–221. doi: 10.1016/j.edumed.2020.04.003
- Magariño Abreus, L. R., Echevarría Regojo, L., Rivero Morey, R., Ramos Rangel, Y., and Roque Batista, T. (2021). Caracterización de la producción científica en estudiantes de Estomatología de la Universidad de Ciencias Médicas de Cienfuegos. *Review* 60:e1227
- Maury-Sintjago, E. A., Valenzuela-Figueroa, E., Henríquez-Riquelme, M., and Rodríguez-Fernández, A. (2018). Disposición a la investigación científica en estudiantes de ciencias de la salud. *Horiz. Med.* 18, 27–31. doi: 10.24265/horizmed.2018.v18n2.05
- Mejía, C. R., Cáceres, O. J., Vera, C. A., Inga-Berrosopi, F., and Mayta-Tristán, P. (2016). Percepción y factores asociados a insatisfacción que los médicos recién graduados tienen de sus asesores de tesis, Lima-Perú. *Ed. Med. Sup.* 30, 1–10.
- Mejía, C. R., Inga-Berrosopi, F., and Mayta-Tristán, P. (2014). Titulación por tesis en escuelas de medicina de Lima, 2011: características, motivaciones y percepciones. *Rev. Peru. Med. Exp. Salud Pública* 31, 509–514. doi: 10.17843/rpmesp.2014.313.88
- Mejía, C. R., Valladares-Garrido, M. J., Almanza-Mio, C., and Benites-Gamboa, D. (2019). Participación en una sociedad científica de estudiantes de Medicina asociada a la producción científica extracurricular en Latinoamérica. *Educ. Med.* 20, 99–103. doi: 10.1016/j.edumed.2017.10.014
- Mejía, C. R., Valladares-Garrido, M. J., Quintana-Gómez, S., and Heredia, P. (2019). Carrera previa como factor asociado al uso de buscadores científicos entre estudiantes de medicina latinoamericanos: cuando la experiencia no cuenta. *Educ. Med.* 20, 131–135. doi: 10.1016/j.edumed.2017.10.022
- Nakandakari, M. D. (2019). Apreciación estudiantil de la investigación médica en pregrado. Estudio multicéntrico en 19 universidades. *Rev. Fac. Med. Hum.* 19, 74–83. doi: 10.25176/RFMH.v19i4.2337
- Rosales, S. Á., and Valverde, O. (2008). La formación para la investigación en el perfil de carreras de Estomatología de universidades latinoamericanas. *Rev. Cuba. Estomatol.* 45, 3–4.
- Salas, S. P., and Attilio, R. (2005). Médicos-científicos en Chile: ¿una especie en extinción? *Rev. Med. Chil.* 133, 121–128. doi: 10.4067/S0034-98872005000100016
- Urrunaga-Pastor, D., Alarcon-Ruiz, C. A., Heredia, P., Huapaya-Huertas, O., Toro-Huamanchumo, C. J., Acevedo-Villar, T., et al. (2020). The scientific production of medical students in Lima, Peru. *Heliyon* 6, 35–42. doi: 10.1016/j.heliyon.2020.e03542
- Zemlo, T. R., Garrison, H. H., Partridge, N. C., and Ley, T. J. (2000). The physician-scientist: career issues and challenges at the year 2000. *FASEB J.* 14, 221–230. doi: 10.1096/fasebj.14.2.221