BMC Public Health

https://doi.org/10.1186/s12889-025-25935-8

Article in Press

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Received: 15 September 2024

Accepted: 3 December 2025

Published online: 20 December 2025

Cite this article as: Ferreira P.L., Morais C., Pimenta R. *et al.* Health literacy of the higher education community in a European country: a cross-sectional survey. *BMC Public Health* (2025). https://doi.org/10.1186/s12889-025-25935-8

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Health literacy of the higher education community in a European country: a cross-sectional survey

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Abstract

Background. Health literacy is a dynamic and multidimensional concept. Examining health literacy among higher education students and teachers is crucial for promoting informed health decisions and encouraging healthier behaviors. Our study aimed to measure health literacy among higher education students and teachers, assess the impact of sociodemographic variables, and compare health literacy levels between these groups.

Methods. This study is a Portuguese Academic Health Literacy Network (RALS) project. Data were collected via a questionnaire, including the HLS-EU-Q16 and sociodemographic and health information-seeking behavior items. The statistical analyses involved descriptive statistics and binary logistic regression. The executive boards of the participating universities and polytechnic institutes were initially informed about the objectives of the study and the prior approval obtained from an ethics committee. We then requested that the institutions use their official email databases to distribute invitations to students and teachers to complete the online questionnaire.

Results. The sample consisted of 5,798 students and 1,823 teachers. The majority were women, with students predominantly aged 20-30 years and teachers mostly over 40 years. Compared with students, teachers presented

higher health literacy levels ($p<0.001$). Specifically, 45.0% of the students and 31.5% of the teachers had inadequate or problematic health literacy. Graduate students and PhD-holding teachers had superior literacy scores ($p<0.001$). Economic sufficiency (highest OR: students 2.708; teachers 3.310) and self-health perception positively influenced health literacy (highest OR: students 1.974; teachers 2.284), whereas nonhealthy fields decreased the likelihood of positive health literacy (lowest OR: students 0.583; teachers 0.456). For students, age and educational level were significant factors for positive literacy levels, whereas for teachers, professional background in health was key. Sex and chronic disease presence were not significant for either group.

Conclusions. The study highlights a meaningful portion of students with inadequate health literacy (45%). Socioeconomic factors, including education and economic resources, significantly influence health literacy. Additionally, involvement in health-related fields and better self-assessed health correlate with higher health literacy. These findings underscore the need for targeted interventions and training to enhance health literacy across the academic community.

Keywords. Health literacy, Higher Education, Students, Teachers, Assessment

Background

The World Health Organization (WHO) defines health literacy as personal knowledge and competencies mediated by organizational structures and the availability of resources that enable people to access, understand, appraise and use information and services in ways that promote and maintain good health and well-being for themselves and those around them [1]. Under the model proposed by Sørensen et al. [2], the health literacy levels of populations are affected by factors external to individuals (e.g., socioeconomic, cultural, and educational status), as well as by proximal factors (e.g., individual cognitive abilities, family context, experiences with health systems, and age). Moreover, health literacy plays a key role in the three main domains of health (healthcare, disease prevention and health promotion). Adequate health literacy contributes to the improvement of the health status of populations due to the adoption of health-promoting and disease-preventive behaviors and to a more regulated and effective use of health services with a consequent reduction in health costs [3].

A group of European experts developed and validated a measurement instrument, the HLS-EU-Q (*European Health Literacy Survey Questionnaire*), allowing the construction of four levels of health literacy (inadequate, problematic, sufficient and excellent) for each of the three health domains, as well as for a global domain [4].

Assessing and promoting the health literacy of higher education students is fundamental for empowering them to make decisions about their own health and for promoting their intentional involvement in collective

health promotion actions on health determinants, as recommended [2]. The goal of placing health literacy on the educational and academic agenda is to align with the declaration resulting from the 9th Conference on Global Health Promotion, which establishes (among others) an articulation between health literacy and sustainable development goals for 2030 [5].

Academic responsibilities and students' expectations, social life, and monetary concerns can have a negative impact on their health. Some studies also refer to a considerable percentage of university students as having problematic or inadequate health literacy levels [6-14]. Therefore, adequate health literacy can help students make informed and better health decisions, avoid some risk behaviors such as an unhealthy diet, not perform physical exercise, and consume drugs or alcohol [12].

According to a systematic review of health literacy among university students, sex, age, type of enrolled course, college year, parental education and socioeconomic characteristics are determinants of students' health literacy [15]. Other determinants, such as chronic diseases [16-19], social support, physical activity, access to information and health-related experiences, may also influence health literacy. The authors recognized education as a social factor that influences health, and the need for a healthy lifestyle should be taught not only by the family but also by the school [15].

Health literacy interventions have been shown to increase the health literacy of the academic population. Another systematic review revealed that health literacy interventions in academic settings lead to gains in health, specifically in mental health; emotional, social and psychological well-being; physical activity; attitudes, norms and self-efficacy of condom use; sleep latency and sleep efficiency; subjective sleep quality; and self-reported portions of fried foods [20].

It is also a factor for health-related behaviors [21], and it promotes people's own health. Moreover, teachers can have a positive influence on students' health [22] and play a critical role as health promoters [23]. The continuous improvement of health literacy is achieved by acquiring the necessary individual competences and skills. Teachers are qualified and crucial characteristics for the creation and development of these characteristics associated with health literacy [24].

On the other hand, teachers' health literacy and health competence are the main components of health education and directly influence students' health literacy [25]. Therefore, teachers in health-related areas have a better understanding of health behaviors, and their awareness of health behaviors is more likely to lead to the adoption of healthier actions [26].

However, there are very few studies about teachers' health literacy, and to our knowledge, there are no published studies about health literacy among university teachers. Therefore, the aims of our study were to measure health literacy among university students and teachers, assess whether sociodemographic variables are significantly associated with health literacy, and compare the results between students' and teachers' literacy.

Methods

Study design

A quantitative, observational, and cross-sectional survey was conducted in Portugal between December 2020 and April 2024. This study was part of a larger study led by the Portuguese Academic Health Literacy Network (RALS) [4]. The RALS is a network of researchers and academics from Portuguese institutions (comprising 71% of the universities and 61% of polytechnic institutes) that aims to assess health literacy in teachers, and higher education students, as well as identify related factors [27]. In fact, there was a time gap in data collection because the logistical processes required varied greatly among institutions. The study was approved by the Ethical Committee of the University of Minho (CEICVS 103/2020).

Participants and measurement instrument

Data from 21 institutions, 11 universities and 10 polytechnic institutes were analyzed. The questionnaire was disseminated via institutional email, and all academic community members could submit answers.

The data collection instrument consisted of three sections. The first section included the Portuguese validated version of the HLS-EU-Q16, a European standard developed by a consortium of academic institutions and funded by the European Commission, with 16 selected items assessing the four health literacy levels (inadequate, problematic, sufficient and excellent) for each of the three health literacy domains (healthcare, disease prevention, health promotion), as well as for a global domain [4,27]. The second section aimed to characterize the respondents and included sociodemographic questions, such as age and sex, and socioeconomic questions. Finally, a third section included a batch of questions about the search for health information (listed on Table 3).

Procedures

The objectives of the study and the questionnaire itself were initially discussed and agreed upon by representatives of the institutions within the RALS network. Following this, the executive boards of the participating universities and polytechnic institutes were informed about the study's aims and the prior approval

granted by an ethics committee. We then asked the institutions to use their own email databases to send invitations to students and teachers to complete the questionnaire.

Due to the anonymity built into the study design, individual follow-up reminders could not be sent to non-respondents. However, three general reminders were sent to the entire sample.

Data analysis

Data analysis was performed via descriptive and inferential statistics, applying the appropriate tests for data comparison. Associations or regressions were used to test the effects of isolated variables, as well as comparisons of some variables in independent groups.

Based on the health literacy literature, all four health literacy indices (healthcare, disease prevention, health promotion, and overall) are expected not being normally distributed. Therefore, we addressed the hypothesis of using the non-parametric approach.

Multivariable binary logistic regression models were conducted separately for the students and teachers to analyze the relationships among sex, age, economic sufficiency, presence of chronic disease, self-assessment of health, scientific area and educational level; for the teachers, the variable health professional was also included, as was the probability of having a positive health literacy level. For that purpose, the ordinal global literacy variable (originally with four levels) was recoded into a 2-level ordinal variable: the negative variable comprising inadequate and problematic levels and positive which resulted from combining the sufficient and excellent level. The success defined for the logistic regressions was the positive level. P-values lower than 0.05 were considered significant.

Results

Sample characterization

The sample included a total of 7,621 individuals, 5,798 students and 1,823 teachers. The sociodemographic and health characteristics of both samples are presented in Table 1.

Table 1 about here

In both samples, the majority were women, mainly with students in the [20-30) age group (50.9%) and teachers older than 40 years (77.4%). About 22% of the students considered that their income was never/rarely/sometimes enough for daily expenses; the same did not happen with less than 7% of the teachers who responded. The most incident scientific areas were, in both samples, health, including medicine, nursing,

pharmacy, sports/life sciences and veterinary science, followed by science, engineering and informatics and by economics, management science and tourism. With respect to their health, the majority of the respondents did not have any chronic diseases and perceived their health status as good.

Results of the HLS-EU-Q16

The one-sample Kolmogorov-Smirnov test four health literacy indices confirmed that data were not normally distributed. However, given the large sample size of 7,632 individuals, the fact that the analysis was based on mean values and the corresponding Q-Q plots did not reveal significant asymmetries, we deemed it appropriate to apply the central limit theorem, which justifies the use of parametric statistical tests.

By analyzing the health literacy indices, we consistently found that teachers had higher literacy than did students ($p<0.001$ for all indices). Table 2 presents the main statistics and the distribution of health literacy levels.

Table 2 about here

In terms of global health literacy levels, 45.0% of the students reported inadequate/problematic literacy, whereas 31.5% of the teachers reported inadequate or problematic literacy.

Results of sources of information

We also asked respondents to tell us how frequently they use a series of sources and channels to search for health information. Table 3 presents a comparison of the proportions of always or almost always use among students and teachers.

Table 3 about here

This table shows that both students and teachers rely mostly on healthcare professionals, free internet searches and national government departments as sources of health information. Friends and family are more commonly used by students than by teachers. Moreover, among the less frequently used sources of information, both groups use radio, TV, or written press. Social media is relatively more used by students than by teachers.

Results from health literacy determinants

Next, we examined how some variables determine health literacy scores. The results of these analyses are presented in Supplementary Tables S1-S5. Therefore, having calculated the scores for the various health literacy

indices, we started by analyzing how age determined these scores. We found that older students always had better health literacy and that for teachers, only disease prevention literacy was not dependent on age (Table S1).

Next, we studied how a better education level induced better health literacy. The results revealed that graduate students had slightly higher health literacy scores in all health literacy domains than did undergraduate students (Table S2). The same results were observed for teachers with PhDs compared with teachers with an MSc degree or lower.

We have also studied how economic sufficiency affects health literacy scores. We found that, in both samples, individuals with economic slack were more likely to have better health literacy (Table S3). In addition, we investigated whether self-health perceptions influenced literacy scores. As a result, both students and teachers with higher self-perceptions of their own health also presented significantly greater health literacy (Table S4).

Next, we investigated how the scientific areas of students and teachers determine health literacy. The health science area determined, in both samples, better health literacy (Table S5). For teachers, being a health professional also results in better health literacy.

Finally, in terms of our multivariate data, the results of the binary logistic models for positive health literacy levels are presented in Table 4, with both models being statistically significant (students: $\chi^2_{(11)}=318.279$, p value<0.001; teachers: $\chi^2_{(9)}=129.368$, p value<0.001). For both students and teachers, higher economic sufficiency and higher self-health perception increased the odds of having a positive health literacy level, as did belonging to the health/sports/pharmacy/veterinary scientific area. For students, age and educational level were identified as having an impact on the probability of having a positive level, with older students and graduates having higher odds of having a positive level. For teachers, age, educational level and sex were not significant. However, not being a health professional decreases the odds of having a positive health literacy level. For both groups, sex and the presence of chronic disease were not statistically significant.

Table 4 about here

Discussion

A meaningful percentage (45%) of inadequate/problematic general health literacy indices between students was expected, as noted by other studies [6-14]. In the teachers' sample, the percentage of inadequate/problematic general health literacy was lower but still exceeded 25%. Compared with the results of Pedro et al. [4], a higher percentage of teachers reported excellent health literacy (27.7%) than did the general population (8.4%).

The highest percentages of sufficient/excellent health literacy levels were observed in health promotion (69.1%) compared with the other dimensions (healthcare: 65.2%; disease prevention: 60.3%). These values are above those reported in the general population in 2016 [4] and closer to those reported in other European countries [28], which reinforces the role of schools and universities in the development of health literacy [29].

The comparison between students and teachers regarding the use of information sources reveals significant results for all the sources studied, except for national government departments, whose use was approximately 50% in both samples. Radio also showed nonsignificant results, with the source least used by students and the second least used by teachers.

Consulting health professionals was the option most often chosen by both samples but was significantly more common among teachers. This may be because teachers have a greater percentage of chronic illnesses than do students (32.0% versus 20.5%), leading to the regular use of healthcare and, consequently, greater contact with healthcare professionals and trust in healthcare services.

A meaningful percentage (64%) of students use internet research as a source of health information. This result was expected since the internet is an easy and quick tool to use, allowing wide anonymous access to health-related topics [30]. A friend/family member was also a frequent source of health information chosen by students. These results are in line with those of Santos et al. [30].

The greater use of universities/scientists/researchers by teachers (48.5%) than by students (36.5%) may be because they do more research and know experts in specific areas, either in academia or in government departments, recognizing their scientific value.

Teachers had consistently more literacy than students did in all the indices. This may be related to teachers being generally older with more academic training than students. In all health literacy domains, students aged ≥30 years had significantly higher health literacy levels than did students <30 years. These results are in line with those of Kühn et al., who reported that better health literacy is associated with increasing age [15-25], reflecting increased awareness of health promotion, disease prevention and healthcare. This age-related increase in health literacy was also observed in university teachers, but only in the domains of healthcare and health promotion literacy, in which those older than 55 years presented higher values. Despite this, a concerning percentage (31.5%) of teachers had an inadequate/problematic level of global health literacy.

It has been reported that socioeconomic characteristics, education and financial resources have a negative influence on people's health literacy levels [31-32]. This finding was also verified in this study. In both samples, individuals with a lower level of education had a significantly lower level of health literacy. The literature

reports the same findings [15-33], indicating that the level of education is a determinant of health literacy [15]. It was also verified that students and teachers who reported never/rarely/sometimes having economic sufficiency had significantly lower health literacy.

Students and teachers who reported a self-assessment of health good/very good had significantly higher health literacy in any domain of analysis. There is evidence of a positive correlation between perceived health and disease prevention and health management [34]. Self-assessed health also affects health behaviors and responsibility [35]. Perceived health status is also associated with health protection, self-care and higher health literacy levels [36]. Health perception influences health literacy [35,36], but as health literacy increases, so does health perception [36], a favorable relationship between these terms is demonstrated.

We aimed to analyze whether students in health-related courses had higher health literacy than other students did since they had higher rates of access to and understanding health information [13]. Compared with students in other courses, those in health-related courses had significantly greater health literacy in all HLS-EU-Q16 dimensions. Similar results were reported by Rababah et al. [12]. In contrast, Sukys et al. [13] did not find significant results between health students and other health students but revealed that the number of health-related subjects is positively related to higher health literacy levels. With respect to teachers, there was also an increase in health literacy in health-related fields. In addition, a significant increase was also observed in teachers who were health professionals compared with those who were not. These results were expected since health professionals and teachers in this area are closely involved with healthcare services and, like health-related course students, have greater access to and understanding of health information.

This project has certain limitations and perhaps, the most significant is the means used to collect the data, which may introduce some bias. In fact, in our specific study, selection bias may have occurred because the questionnaire was distributed via email, potentially affecting the representativeness of the target population. However, this risk is somewhat mitigated by the large sample size achieved in the study and the representativeness of the Portuguese schools involved. Moreover, no causality has been established between health literacy and email use, which suggests that it is unlikely that the method of distribution significantly affected the study's results. It should be noted that in Portugal, email is the main communication vehicle for universities and polytechnic institutes, with teachers and students.

Still in relation to data collection, the extended period associated to this study can also be consider as a possible limitation. Nevertheless, we don’t believe that it affected the quality of data collection.

On the other hand, although this study had a sufficiently large sample to support robust statistical analysis, the full generalizability of the results may still be subject to discussion. Nevertheless, the sample includes 71% of Universities and 61% of Polytechnic Institutes, representing a substantial portion of higher education institutions.

Furthermore, the anonymity ensured in this study prevented the researchers from sending individual reminders to non-respondents. However, three general reminders were sent to the entire sample.

Conclusions

Health is built every day, with all the people and sectors of society. Therefore, health literacy is fundamental for giving people responsibility in making health decisions and should be understood as an integral part of human training and development.

This study aimed to assess health literacy in higher education and revealed that teachers have greater health literacy at all levels than do students. Both samples had higher levels of literacy than did the general population, revealing the importance of greater academic training. However, there were significant levels of inadequate/problematic literacy among both students (approximately 45%) and teachers (over 30%).

Compared with other dimensions, health promotion stands out more positively. Government departments and health professionals are the sources of information most used by the participants. In addition to these sources, the students also sought friends/family. Health literacy is positively associated with higher levels of education, economic sufficiency, positive health self-perceptions and being in health/sports/pharmacy/veterinary scientific areas. For students, age and level of education were identified as positive determinants of health literacy. For teachers, age, education level and sex were not meaningful as possible determinants.

In summary this study showed the following main results: (i) a significant proportion of students exhibit inadequate or below-desirable levels of health literacy, whereas teachers generally demonstrate higher levels; (ii) final-year students in health-related courses tend to have higher health literacy than their peers; (iii) social determinants of health literacy are evident, particularly students' socioeconomic status and parents' educational background; and (iv) there are regional asymmetries in health literacy based on participants' areas of origin.

These results also highlight the need for the promotion of health literacy through the use of the resources available in higher education institutions. Establishing challenges and opportunities for interventions based on innovative approaches and co-construction can be a valuable tool not only for students in nonhealthy-related courses but also for teachers from other areas, promoting improvements in health literacy levels in the academic

community. This will contribute to the promotion of people's empowerment and participation in communities and healthcare, in line with the WHO Health 2020 European strategy [37].

Higher education institutions have a particular opportunity and responsibility to build transformative education, including health literacy promotion. It is important to involve all of academia in the (co)construction of environments that promote well-being, quality of life and physical, mental, spiritual and social health through salutogenic approaches. Understanding and rethinking common and specific health interests and needs and developing interventions aligned with institutional, national and international policies are urgently needed.

Students and teachers from health areas should work together with their peers from other scientific areas to define and implement active strategies and mobilize resources through the valorization of their knowledge areas and identified interests. It is also important to create open spaces for discussion to share the results of interventions and raise awareness of participatory intervention guided by the best evidence produced [38]. Moreover, we need effective coordination, which is mediated by specialists with recognized skills in the management of personal and health data [1].

Promoting health literacy will be one of the driving forces behind the consolidation of effectively transformative higher education institutions and the co-construction of health as the right and duty of all citizens, as proposed, in 1986, by the Ottawa Charter for Health Promotion.

Given the significant consequences of poor health literacy — both at the individual level and in terms of public policy — we propose the following recommendations: (i) the development of health literacy promotion campaigns; (ii) the implementation of local initiatives aimed at identifying existing gaps and opportunities for improvement, using a co-creation approach; and (iii) the inclusion of a longitudinal component in future research to evaluate the effectiveness of these initiatives over time.

Regarding future directions in this field, we advocate for the development of health literacy promotion campaigns, complemented by local initiatives aimed at better understanding existing deficits and identifying areas for improvement through a co-creation approach. Future research could also incorporate a longitudinal component to assess the effectiveness of these initiatives over time.

Declarations

Ethics approval and consent to participate: The Ethics Committee of the University of Minho (CEICVS 103/2020) approved its implementation. The participants provided their informed consent to participate in this study and authorize to share the main results with the research community.

Abbreviations

HLS-EU-Q - European Health Literacy Survey Questionnaire

OR – odds ratio

RALS - Portuguese Academic Health Literacy Network

WHO - World Health Organization

Ethics approval and consent to participate: This study was approved by the ethics committee of the University of Minho (CEICVS 103/2020). This study was conducted in accordance with the principles set out in the Declaration of Helsinki (2024). Informed consent to participate was obtained from all of the participants in the study.

Consent for publication: Not Applicable**.**

Data availability: The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare no relevant conflicts of interest or financial relationships.

Funding: This research has not been funded. However, CEISUC/CiBB is funded by national funds through FCT - Foundation for Science and Technology, I.P., under the contract Ref. UID/04539/2025 - CiBB - Centro de Inovação em Biomedicina e Biotecnologia.

Authors' contributions: PLF: Data curation, formal analysis, methodology, validation, writing-original draft and writing—review and editing; CM: validation, writing-original draft and writing—review and editing; RP: Data curation, formal analysis, methodology, validation, writing-original draft; IR: writing-original draft and writing—review and editing; SMA: Data curation, formal analysis, methodology, validation, writing-original draft; ARP: validation, and writing—review and editing; AE: validation, and writing—review and editing. All coauthors confirm that they had full access to all the data in the study and accept responsibility to submit for publication.

Acknowledgements: The authors particularly thank the participants who, in a very willing way, accepted to participate in this study. It is also worthy of a deep gratitude the collaboration of all the members of the RALS (Academic Network of Health Literacy) and their ready availability for the implementation of this project in the higher education institution to which they belong.

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Supplementary Tables

Table S1. Relationship between age and health literacy

Table S2. Relationship between education level and health literacy

Table S3. Relationship between economic sufficiency and health literacy

Table S4. Relationship between health status self-perception and health literacy

Table S5. Relationship between scientific area and health literacy