European Journal of Public Health, 2024, ckae120

https://doi.org/10.1093/eurpub/ckae120

Development and validation of the Environmental Health Literacy Index: a new tool to assess the environmental health literacy among university students

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Abstract

Environmental health literacy (EHL) is a rather recent concept that applies health literacy skills to environmental issues. Research in this field is still at the beginning, and there is currently no existing tool in the literature designed to comprehensively assess individual general EHL among university students. The aim of our study is to fill this gap through the validation of the Environmental Health Literacy Index (EHLI) in such a target group. We adapted a previously administered survey, originally completed by 4778 university students from various Italian universities. Starting from the original questionnaire, our methodology involved a three-round item selection process, followed by a comprehensive evaluation of the instrument's psychometric properties. The EHLI consists of 13 Likert-type items, covering three primary domains of health literacy: functional (six items), interactive (three items), and critical (four items). The Cronbach's alpha coefficient is 0.808 for the global scale, while it stands at 0.888 for the functional, 0.795 for the critical, and 0.471 for the interactive components. The area under the receiver operating characteristic curve reached a value of 0.643. Spearman correlation analysis revealed a significant yet slight correlation between EHLI and both functional health literacy score and the extent of pro-environmental behaviors adoption. Our study serves as an important initial step in developing a tool able to evaluate the EHL of university-aged individuals. Further research efforts may improve the questionnaire's validity and completeness, as well as to explore its applicability to different age groups.

Introduction

The environmental crisis has unprecedented levels, due to human behavior [1, 2]. Recognizing the interconnectedness of humans and ecosystems, holistic concepts like Planetary Health, One Health, and EcoHealth have emerged. These three concepts recognize the importance of understanding the roles of ecosystems, climate change, and socioeconomic determinants of health in the well-being of Earth and its inhabitants, offering complementary perspectives [3].

Public perception of the health risks related with human activities on the environment is increasing [4]. Previous studies described that risk perception positively influences attitudes and pro-environmental behaviors among general population and other specific groups, such as university students [5–7]. In fact, young and university students are key stakeholders with regard to environmental issues, and more efforts are being made to effectively engage them in environmental actions, so as to promote pro-environmental behaviors [8, 9]. In this perspective, schools and universities should focus on educating climate-literate citizens by moving away from individual-centric approaches and moving toward collective and meaningful measures. This shift empowers students to develop political knowledge and act on climate change [10, 11]. This is particularly relevant considering that university students are the leaders and teachers of the future.

In this context, it is crucial to explore the concept of environmental health literacy (EHL) [12] and its role in fostering pro-environmental consciousness among people. In recent years, there has been a notable increase in research concerning EHL. This field represents a recent subset of health literacy (HL) that integrates principles from both HL and environmental literacy, encompassing functional, critical, and interactive dimensions [12, 13]. Consequently, EHL incorporates fundamental principles and procedural components from the domains of HL, risk communication, environmental health sciences, communications research, and safety culture [14]. The Society for Public Health Education (SOPHE) clarifies that the aim of EHL is to "develop the wide range of skills and competencies that people need in order to seek out, comprehend, evaluate, and use environmental health information to make informed choices, reduce health risks, improve quality of life and protect the environment" [15]. In this perspective, EHL could be a key element to promote structural changes through community participation and to guarantee environmental justice [14, 16, 17].

Although studies on EHL have been increasing over the years, the relative novelty of this construct compared with the more general concept of HL means that primary studies on this topic are still scarce. After an initial period focused on defining the concept, research is now concentrating on developing measurement tools to identify its level. In fact, specific measurement tools are essential to assess the level of EHL of populations or target groups, as well

as to evaluate the impact of interventions aimed at increasing EHL levels. Nonetheless, to date, few EHL scales or tools have been developed and validated, and mostly deal with air, water, or food pollution [18–20], or assess only functional EHL or knowledge [21, 22]. Among these, a tool has been specifically developed to assess EHL among nursing university students with respect to children's environmental health [32], while the study of Gray *et al.* [18] was conducted in the campus of a large public university in New York to develop a measurement tool focused on toxic metals contamination in well water. However, there is neither a global, validated scale for EHL in Italy nor a measure specifically devoted to assessing general EHL among university students. To fill this gap, starting from data collected in a survey conducted among university students in Italy, this study aims to develop and validate an index to measure general EHL in such a crucial target group.

Methods

Study design

The EHL Index (EHLI) was developed based on the questionnaire used in a survey, aimed at investigating the perception of the risk of environmental pollution for human health, attitudes, and behaviors to counter it and related determinants. The survey, conducted between November 2017 and January 2018, involved 4778 students from 15 Italian universities and various study programs, as previously described [5, 23]. Briefly, the enrolled Universities were chosen to allow national-level representativeness of different Italian geographical areas: north (Genoa, Milan, Modena and Reggio Emilia, Padua, Turin), center (Camerino, Florence, Pisa), south (Bari, Chieti, Lecce, Naples), and islands (Catania, Messina, Sassari). The respondent students were equally distributed into courses belonging to scientific-health (e.g. biological and environmental sciences, medicine, pharmacy, mathematics, and engineering) and Humanistic-Legal-Social (sociology, political sciences, literature, philosophy, economics, and law) areas.

The questionnaire and the study protocol were approved by the Ethics Committee of the University of Milan on 18 December 2017, one of the universities involved in the research [5, 23].

The original 56-items-questionnaire consisted of six sections: socio-demographic characteristics, information, perception of environmental health risk, trust in various subjects, attitudes and behaviors in reduction and control of environmental pollution, and functional HL. It was a self-administered and paper-and-pencil questionnaire. University students filled it out in classrooms or study rooms and returned it immediately after completion. Students were given instructions on how to correctly fill out the questionnaire, and informed consent was obtained for scientific research purposes.

The items of interest for this study are Likert-type with six or five possible answers and associated scores, as follows:

- 0—don't know, 1—not important, 2—not very important, 3—quite important, 4—very important, 5—extremely important, or
- 0—don't know, 1—strongly disagree, 2—disagree, 3—agree, 4—strongly agree.

The "don't know" option has been included to avoid casual responses.

A measure of functional HL was also included, namely the knowledge of body location of 12 selected terms, chosen from a list of the most common words obtained through a computational linguistic analysis of a sample of information leaflets of the 38 bestselling over-the-counter medicines. In particular, participants were asked to place the first 12 terms in the right section of a stylized body divided into four sections. The number of corrected answers was used as a measure of functional HL [24].

Regarding pro-environmental behaviors, we considered private sphere behaviors according to Stern definition [25] represented by actions that can be adopted to minimize environmental harm in the private domain, that is, separate collection waste; use public transport; reduce energy consumption; use fewer polluting fuels; buy products with low impact on the environment. A detailed description of the questionnaire can be found elsewhere [23].

Selection of the items to be included into the Environmental Health Literacy Index

In our study, we have considered three different dimensions of EHLI, borrowing from what have been described for HL. In fact, HL can be defined considering three different dimensions: functional, interactive, and critical HL [13]. Functional HL includes abilities, such as reading, writing, and numeracy, which are valuable in a health context. Interactive HL pertains to the skills required to extract health information and to derive meaning from different forms of health communication and to apply it in changing circumstances. Critical HL involves cognitive and social skills necessary to critically analyze information and use it to exert greater control over life events.

A consensus process was conducted among the authors to select the items of the original questionnaire to be included into the EHLI. Three rounds of consultation were conducted. In round 1, a consensus on the definition of EHL to be considered was reached. In round 2, there was the first selection of the items of the original questionnaire that seemed most useful to measure EHL as defined in round 1. In round 3, the final list of items was developed.

Subsequently, statistical analyses were conducted to assess whether data collected in the original survey supported the validity of the EHLI.

Statistical analysis

Descriptive statistics were carried out using percentages and frequencies for qualitative data. Mean, median, standard deviation, and interquartile range were computed for quantitative data.

The validity of the items selected by the authors as the result of the consensus in generating the EHLI was tested using different approaches. First, a principal component analysis (PCA) with varimax rotation was applied to find out the number of components that fit the data. The goodness of the model was ascertained by the explained variance, the Kaiser–Meyer–Olkin test (KMO, should exceed 0.80 for the PCA results and the multidimensional components to be reliable), and Bartlett sphericity test. Then the internal consistency evaluation was carried out using Cronbach's analysis (a measure of reliability). It was computed for each component as well as for the entire scale. A Cronbach's alpha ≥ 0.70 is generally considered an acceptable level for internal consistency. Finally, the percentage of "don't know" responses for each item was also considered as a proxy of item difficulties and comprehensibility.

EHLI was calculated by adding the scores of each individual response. A receiver operating characteristic (ROC) curve was plotted using EHLI values to predict (sensitivity and specificity) pro-environment behaviors. In particular, the "level of adoption of pro-environmental behaviors" was investigated through five items (separate collection of waste; use public transport; reduce energy consumption; use less polluting fuels; buy products with low impact on the environment) and the answers were coded according to a Likert 4-point-scale (1 = never; 2 = rarely; 3 = yes, sometimes; 4 = yes, always). A scale score was calculated by summing each item's score, and the median value (20) was used to dichotomize the respondents in "individuals who adopt the behaviors more frequently" (score ≥ 20) or "individuals who adopt the behaviors less frequently" (score <20) [7]. The ROC curve was used to identify the EHLI cut off, which discriminates between individuals who adopt the behaviors more frequently with respect to those who

adopt the behaviors less frequently. EHLI discriminating power was measured by the area under the curve (AUC = 0.5 the test is not informative; 0.5<AUC < 0.7 the test is inaccurate; 0.7<AUC < 0.9 the test is moderately accurate; 0.9<AUC < 1.0 the test is highly accurate).

To assess concurrent validity, Spearman's correlation analysis was conducted between the score at EHLI, that of the functional HL, and the level of adoption of pro-environmental behaviors (APEB). As described elsewhere, APEB was calculated by adding answers to the question "How often have you adopted the following behaviors?" that included five different items (separate collection waste; use public transport; reduce energy consumption; use fewer polluting fuels; buy products with low impact on the environment) with Likert 4-point-scale (where "1" indicates that the behavior is never adopted and "4" always adopted) [23].

All analyses were performed with SPSS 27.0 for Windows; *P* values <.05 were considered significant.

Results

General characteristics and recruitment

A total of 4778 students (65.1% female) completed the EHL questionnaire.

The mean age of the respondents was 21 ± 4.3 years. Slightly more than half (53.2%) of the students were attending courses pertaining to scientific-health sector, while the others belonged to the humanities-legal-social area; in addition, 65.1% were attending a bachelor's (3-year) degree course. The largest proportion of participants had Southern Italy as their area of residence (57.1%), while the center and the north were represented by 25.0% and 17.9%, respectively. When the functional health literacy assessment questionnaire was administered, 44.4% of the students scored 9 or less, while the remaining 55.6% rose above that value; the average score was 10 ± 3.

Environmental Health Literacy Index: results of the consensus process

The first round led to identify the definition of EHL to be considered in the selection process of the items to be included into the EHLI. All authors agreed to consider the following definition as reference: "Environmental health literacy integrates concepts from both environmental literacy and health literacy to develop the wide range of skills and competencies that people need in order to seek out, comprehend, evaluate, and use environmental health information to make informed choices, reduce health risks, improve quality of life and protect the environment" [15]. Moreover, the authors agreed to consider the three dimensions of HL proposed by Nutbeam: functional, interactive, and critical HL. Based on these premises, the second and the third rounds led to select 13 out of 56 items grouped into the three EHLI dimensions (Table 1). The functional EHL (six items) focuses on the importance attributed to actions to fight against pollution, the interactive EHL (three items) verifies how much the user agrees with some statements on the link between environmental pollution and health, while the critical EHL (four items) investigates the perception of health risks.

For the functional and critical dimensions, the Likert-type responses were the following: 1-not important, 2-not very important, 3-quite important, 4-very important, 5-extremely important, 6-don't know. For the interactive dimension, the Likert responses were the following: 1-strongly disagree, 2-disagree, 3-agree, 4-strongly agree, 5-don't know.

Environmental Health Literacy Index components responses

About 50% of the students considered the population health risk deriving from "Pollution of coasts, rivers, and lakes," "Outdoor and indoor air quality" as extremely important while about a third considered it associated with "Waste and dirt in the streets" (Table 1). Just over 50% of students considered extremely important: "Separate collection of waste" and "Use fewer polluting fuels," while just over 40% considered extremely important: "Buy products with low impact on the environment," "Reduce energy consumption," "Buy cars with low emissions" and "Use public transport." As regards to the interactive EHL, one-third of the students agreed with the statement "I can control my health risks," almost half of the students agreed with the statement: "Experts can make accurate estimates of health risks from chemicals in the environment," while just over half with the statement: "I believe I am in good health" (Table 1). The percentage of "don't know" responses varied from 2.6% to 13.8%; for the items identified as interactive EHL, the percentage of "don't know" responses was higher than for those classified as functional or critical EHL (Table 1).

Validation—Environmental Health Literacy Index

The Bartlett's test of sphericity was significant (*P* < .001), and the KMO was satisfactory (0.875), thus it was considered appropriate to perform a PCA.

The PCA showed three components, completely overlapping with the initial hypothesis emerged from the consensus process. Table 2 presents the eigenvalues, proportional variance, and percentage cumulative variance explained by each component of the EHLI. There were three components with eigenvalue ≥1 accounting for 60.7% of the total variance. The first principal component (PC) accounted for the largest proportion (35.3%) of the total variation. In the first component converge, the six items that had been identified as of functional EHL, in the second, the four items identified as for critical EHL, while in the third component, the three items identified as for interactive EHL (Table 3).

Cronbach's alpha was 0.808, 0.888, 0.795, and 0.471 for entire scale, functional, critical, and interactive component, respectively.

Due to the lesser amount of variance explained by the remaining subsequent PC with eigenvalue <1 to describe a group of items clearly, they were not considered for further analysis.

Table 3 shows the item-component correlation (factor loadings) after Varimax rotation. All items were strictly more correlated to the component to which they belong than to the other ones. The PC1 had higher loadings on "Use less polluting fuels" (0.832), "Separate collection of waste" (0.786), "Buy products with low impact on the environment" (0.814), "Reduce energy consumption" (0.820), "Buy cars with low emissions" (0.799), "Use public transport" (0.682). This component seemed to represent "Functional" items. The PC2 accounted for 13.47% variability and was loaded heavily for "Pollution of coasts, rivers, and lakes" (0.796), "Outdoor air quality" (0.820), "Indoor air quality" (0.771), "Waste and dirt in the streets" (0.701), whereas PC3 accounted for 10.18% variability and had higher loadings on "I can control my health risks" (0.711), "Experts can make accurate estimates of health risks from chemicals in the environment" (0.683), "I believe I am in good health" (0.692).

Scores of the items included in the three components were added to calculate EHLI. ROC analysis was performed to assess diagnostic validity. The area under the curve (AUC) had a value of 0.643 (*P* < .001), that is, the index would seem little accurate, and the cut-off calculated using the ROC curve to discriminate between individuals who adopt the behaviors more frequently with respect to those who adopt the behaviors less frequently was equal to 30.

EHLI was significantly but slightly correlated both with functional HL score and with the level of APEB score (Table 4).

Seventy-two percent of the students had a high EHLI (cut off >57), 26.7% had a medium index (cut off 30–57), and 1.3% a low index (cut off <30).

Table 1. Environmental Health Literacy Index: responses to single items ($N = 4778$)

	Dimensions and components	I don't know *n* (%)	Not important *n* (%)	Not very important *n* (%)	Quite important *n* (%)	Very important *n* (%)	Extremely important *n* (%)	Mean ± SD	Median (IQR)
Functional									
In your opinion, how important are the following citizens' behaviors in the fight against pollution?	Separate collection of waste	123 (2.6)	45 (0.9)	97 (2.0)	505 (10.6)	1235 (25.8)	2773 (58.0)	4.3 ± 1.1	5 (4–5)
	Use fewer polluting fuels	128 (2.7)	9 (0.2)	65 (1.4)	490 (10.3)	1453 (30.4)	2633 (55.1)	4.3 ± 1.0	5 (4–5)
	Buy products with low impact on the environment	145 (3.0)	21 (0.4)	117 (2.4)	677 (14.2)	1575 (33.0)	2243 (46.9)	4.1 ± 1.1	4 (4–5)
	Reduce energy consumption	128 (2.7)	23 (0.5)	120 (2.5)	676 (14.1)	1606 (33.6)	2225 (46.6)	4.2 ± 1.1	4 (4–5)
	Buy cars with low emissions	155 (3.2)	27 (0.6)	119 (2.5)	634 (13.3)	1605 (33.6)	2238 (46.8)	4.3 ± 1.1	4 (4–5)
	Use public transport	190 (4.0)	94 (2.0)	300 (6.3)	772 (16.2)	1319 (27.6)	2103 (44.0)	4.3 ± 1.0	4 (3–5)
Critical									
Can you quantify the importance of the health risk arising from the following behaviors?	Pollution of coasts, rivers, and lakes	163 (3.4)	28 (0.6)	124 (2.6)	708 (14.8)	1439 (30.1)	2316 (48.5)	4.1 ± 1.15	4 (4–5)
	Outdoor air quality	191 (4.0)	9 (0.2)	54 (1.1)	434 (9.1)	1332 (27.9)	2758 (57.7)	4.3 ± 1.13	5 (4-5)
	Indoor air quality	247 (5.2)	26 (0.5)	194 (4.1)	765 (16.0)	1542 (32.3)	2004 (41.9)	4.0 ± 1.3	4 (3–5)
	Waste and dirt on the streets	147 (3.1)	55 (1.2)	436 (9.1)	1249 (26.1)	1504 (31.5)	1387 (29.0)	3.7 ± 1.2	4 (3–5)
Interactive		**Don't know**	**Strongly disagree**	**Disagree**	**Agree**	**Strongly agree**	/	/	/
For each statement, please indicate whether your level of agreement with the following statements	I can control my health risks	510 (10.7)	444 (9.3)	1732 (36.2)	1762 (36.9)	330 (6.9)	/	2.2 ± 1.1	2 (2–3)
	Experts can make accurate estimates of health risks from chemicals in the environment	660 (13.8)	197 (4.1)	1015 (21.2)	2238 (46.8)	668 (14.0)	/	2.4 ± 1.2	3 (2–3)
	I believe I am in good health	545 (11.4)	124 (2.6)	592 (12.4)	2497 (52.3)	1020 (21.3)		2.7 ± 1.2	3 (2–3)

SD, standard deviation; IQR, interquartile range.

Table 2. Eigenvalue and proportion of total and cumulative variance explained by principal component (PC) of the EHL in Italian university students

Total variance explained[a]									
Component	**Initial eigenvalues**			**Extraction sums of squared loadings**			**Rotation sums of squared loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	4.595	35.349	35.349	4.595	35.349	35.349	3.897	29.98	29.98
2	1.874	14.419	49.768	1.874	14.419	49.768	2.527	19.438	49.418
3	1.424	10.958	60.726	1.424	10.958	60.726	1.470	11.308	60.726
4	0.797	6.133	66.859						
5	0.766	5.894	72.753						
6	0.658	5.061	77.814						
7	0.608	4.679	82.493						
8	0.515	3.962	86.455						
9	0.457	3.517	89.972						
10	0.378	2.911	92.883						
11	0.349	2.685	95.568						
12	0.315	2.42	97.989						
13	0.261	2.011	100						

a: Extraction method: principal component analysis.

Table 3. Principal component analysis (Varimax rotation)

ITEMS	Component (Based on Eighenvalues)[a]		
	1	**2**	**3**
Functional			
Separate collection of waste	0.786	0.171	0.050
Use less polluting fuels	0.832	0.192	0.042
Buy products with low impact on the environment	0.814	0.213	−0.003
Reduce energy consumption	0.820	0.142	0.042
Buy cars with low emissions	0.799	0.144	0.027
Use public transport	0.682	0.081	0.051
Critical			
Pollution of coasts, rivers, and lakes	0.190	0.796	0.000
Outdoor air quality	0.190	0.820	0.023
Indoor air quality	0.097	0.771	0.095
Waste and dirt in the streets	0.063	0.701	0.043
Interactive			
I can control my health risks	−0.028	0.025	0.711
Experts can make accurate estimates of health risks from chemicals in the environment	0.059	0.071	0.683
I believe I am in good health	0.079	0.018	0.692
Cumulative explained variance	29.9%	49.4%	60.7%

a: Kaiser–Meyer–Olkin test: 0.875 (excellent); Bartlett sphericity test: $P < .001$.

Table 4. Environmental health literacy index (EHLI): Spearman correlation analysis ($n = 4690$)

Items	EHLI	Functional EHL score	Critical EHL score	Interactive EHL score
EHLI	1			
Functional EHL score	0.847*	1		
Critical EHL score	0.722*	0.360*	1	
Interactive EHL score	0.451*	0.159*	0.178*	1
APEB* score	0.248*	0.256*	0.128*	0.091*
Functional HL	0.183*	0.179*	0.097*	0.092*

*: P values $< .001$. APEB score, level of adoption of pro-environmental behaviors; EHL, environmental health literacy; HL, health literacy.

Discussion

EHL is extremely important, as it can play a pivotal role in shaping individual and community decisions [26]. Adolescents and youth are recognized as some of the most significant resources for achieving the 2030 Sustainable Development Goals (SDGs), including combating climate change and its impacts. In recent years, young people have become increasingly sensitive to environmental issues, as demonstrated by movements such as Friday for Future or School Strikes for Climate [27]. In this context, EHL measurement becomes a very useful tool for assessing the level achieved by a population on this subject and, consequently, an opportunity for implementing

educational interventions [14, 28, 29], including information curricula and community-based participatory research [30]. These approaches have already been applied to environmental health [31, 32].

To provide researchers and policymakers with a measurement tool, in our study, starting from a cross-sectional survey conducted in a large sample of university students, we have developed an index to measure general EHL that included as widely as possible knowledge, skills, and motivation in relation to environment and health issues. In fact, to the best of our knowledge, it could be considered the first attempt to build an index that analyzes someone's environmental behavior and attitudes, with a focus on university students. The results suggest that the EHLI can cover the three domains (functional, interactive, and critical), although with different levels of reliability. Considering the results for interactive component, EHLI index should be considered only as a whole scale, and further studies are needed to make EHLI reliable and suitable for evaluation on single subscales, as well as to improve accuracy with respect to the APEB.

As for HL [33], the score at the EHLI should be used as an outcome of educational or policy interventions devoted to enhancing the awareness of university students. In this perspective, the inclusion of EHLI in university programs aimed at contributing to address the environmental issue should be encouraged. In fact, environmental issue has been included in the curriculum of university courses elsewhere, resulting in an increase in pro-environmental attitudes [34, 35], which should be quantitively assessed using a measurement tool for general EHL. Moreover, in recent years, universities have risen to the challenge of sustainability and SDGs by creating new tools or partnerships. Higher education institutions are uniquely positioned to generate, translate, and disseminate relevant transdisciplinary knowledge. By enhancing academic disciplines and addressing societal needs through research, teaching, operations, governance, and community involvement, they contribute significantly to achieving the SDGs [36]. Again, the impact of universities and other higher education institutions on progress toward the SDGs should be measured by using a quantitative index such as the EHLI. Additionally, De la Poza *et al.* [37] have proposed a ranking system for reporting the SDG achievements of higher education institutions. By assessing the current EHL levels of students, researchers can better reach target populations and improve report-back processes, ensuring that research participants comprehend the informational materials. These materials then serve as tools for building additional knowledge and understanding that constitute EHL. In this perspective, as already described by Hoover [38] for exposure report-back, that is the act of reporting study findings back to participants. In fact, an iterative process can be developed to link EHL with the institutions' SDG achievement report-back. This process should be measured by monitoring the EHLI over time.

As already observed in other specific areas of HL (such as nutrition and vaccine literacy) [39, 40], the results show a significant but low correlation of EHLI with functional HL. This suggests that specific skills are needed when analyzing different areas. As a suggestion for further analysis, the correlation with subjective measures of general functional, interactive, and critical HL should be assessed to better understand the extent to which the context of HL and of EHL are overlapped. In fact, deepening the debate from both a conceptual-theoretical and experimental perspectives has increasingly led to the understanding that people with a high level of "general" HL do not necessarily have a high level of "specific" HL as well. Regarding the issue of this study, we can assume that competencies and knowledge related to the relationship between the environment and health are very specific. Even individuals with a broad range of HL skills may lack the specific abilities that encompass EHL. Moreover, EHL incorporates the public health perception since individual behaviors necessarily impact population health [14], while for general HL, the individual perspective is often more relevant.

In conclusion, our study introduces a novel index for measuring general EHL among university students. The preliminary results, as outlined in this article, show promising potential for further advancements. Future research endeavors will aim to enhance the internal and external validity of EHLI to strengthen its effectiveness in gauging the level of EHL among young adults.

Author contributions

Conceptualization: A.C., M.F., G.B., C.L., M.V., I.F., M.F.; Methodology: all authors; Formal analysis: A.C., M.F., G.B., C.L., M.V., I.F., M.F.; Investigation: A.C., M.F., G.B., C.L., M.V., I.F., M.F.; Data curation: all authors; Writing—original draft preparation: all authors; Writing—review and editing: all authors; Visualization: all authors; Supervision: A.C., M.F., G.B., M.F.; Project administration: A.C., M.F., G.B., M.F. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors have no conflicts of interest.

Funding

No funding was received for conducting this study.

Data availability

Data will be shared on reasonable request to the corresponding author.

Key points

- Environmental health literacy (EHL) is a rather recent concept that applies health literacy skills to environmental issues.
- To date, only a few measurement tools of EHL have been developed.
- This study is the first attempt to validate an EHL Index for Italian university students.
- Once improved, the EHL Index may be useful to understand the EHL level for public health purposes.

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European Journal of Public Health, 2024, 00, 1–7
https://doi.org/10.1093/eurpub/ckae120
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