Environmental risk perception of prospective biology teacher in Indonesia in pandemic era

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ABSTRACT

Environmental Risk Perception has a long-time travel in the public participation in environmental fields. This perception involves individually socially constructed physical and mental experiences that involve many factors just for knowledge, attitudes, and the culture that develops in society. An individual's understanding of environmental risk provides an overview of an individual's preparedness for appropriate environmental risk strategies and measures. This cross-sectional survey study aims to collect data on the environmental risk perception of Indonesian students. The survey data instrument used in this study is the Environmental Risk Perception Scale (ERPS) questionnaire, transformed into Google Forms in the Indonesian language. The target respondents were 1267 students from 1300 undergraduate population size of educational study programs in the field of biology who came from various institutions in Indonesia. Sexual category, GPA, and university status to explore the perception of the active student environment of prospective biology teachers with various parameters. The results showed several interesting findings: the female sex is more sensitive to environmental risks, academic abilities play a more logical role in environmental risk analysis, and respondents who have taken environmental courses have a higher sensitivity to environmental risk.

1. INTRODUCTION

In recent decades, environmental risk and problem has become a major issue in various disciplines and jurisdictions [1], [2]. Environmental risk is the focus of the scientific, social, political, education [3]–[6], and even security fields [7]. Various potential negative impacts on human life and nature are inevitable [8]. Some examples are the emergence of severe environmental damage, extreme weather changes, storms, droughts, famines, and various new types of diseases [9]. Environmental risks related to impending environmental hazards, well-prepared strategies, and the capacity to act on environmental hazards [8], [10]. The question that often arises is related to the readiness of related parties, both individually, population, and institutions or institutions, to deal with the risks of various environmental risks that continue to arise [11].

Environmental risk requires the correct perception of individuals in the community of society [12], [13]. Environmental risks are characterized by high complexity and uncertainty, which involve complex causal relationships and various consequences [14]. Furthermore, the characteristics of risks and various variables in the culture of the community are truly relevant; the culture of the people of a certain circle may be different from that of another group. Social globalization, evolving professional values, and a global view of risk are important points for understanding environmental risks [15]. From another point of view, the perception of environmental risk is understood as awareness or belief in possible negative consequences (dangers) that affect individuals and society due to one environmental phenomenon [13]. Risk perception can be measured at least from three aspects: (1) risk of fear; (2) unknown risks; and (3) the number of people exposed to risk [16]. Perception of environmental risk is an important point to be prioritized [17], [18]; this awareness supports the achievement of environmental sustainability and stability [19]. Environmental risk perception is associated with situations, events, activities, or technologies [20], [21]. The perception of environmental risks is also influenced by factors of scientific information received, personal experiences, values, personal views manifested in the views of society [22], cultural worldviews [23], attitudes, and moral values [24]. Tracing This has an important influence on the political context of policymaking, and understanding the perception of environmental risks is important for improving risk awareness and communication [25].

Estimating changes in the surrounding environment, awareness of events that will occur, and individual behavior that reflects environmentally friendly responsibilities are closely related to the environmental information obtained by the individual. In the context of environmental risk perception, these factors are some the important things for all parties to have [26], because they are substantial things [27], both from the local and global contexts [28]. Included are prospective teachers and prospective biology teachers [29], [30]. Teachers who have an adequate perception of environmental risk may be able to cultivate their students with a high perception of environmental risk and a good level of environmental awareness [31].

So far, there has been research to dig into students' environmental risk perception at one university, Mersin University, Turkey. The results show that student environmental risk perception needs to be improved [32]. The research focused on classroom and science teachers according to different variables, showing there was a positive relationship between environmental identity and environmental risk perception [31]. The research focused on high school students shows that student awareness is importantly related to climate change, environmental hazards, global warming, nuclear waste, active and passive smoking, and the use of liquor and drugs as "very high-level" environmental risks [33] that may impact their future. Meanwhile, the subject of secondary school students indicates the existence of sexual characteristics roles in the understanding of environmental risk perceptions [34]. The evidence is in line with the finding of other researchs, although he added power, perception, and adaptation aspects [35]. The study of environmental risk Perception, which is focused on people who have a place to live near industrial areas, shows the results of needing good communication so that people actually aware of the environmental risks they face [28]. Research on public perceptions shows the need for cognitive and affective processes of certain audiences better than providing only a simple characterization of risk [36]. Conforming studies with subjects close to solid waste open dumpsites show the need for intense communication related to this issue [37]. Science teachers, including biology, are one of the main and leading figures in teaching love of the environment, literacy, and overcoming various environmental problems [38], [39].

Simultaneously, studies considerate to tourists show that they tend to ignore possible environmental risks [40]. Environmental risk research in pregnant female respondents showed that environmental risk perception does not impact smoking behavior during pregnancy [41]. These studies show the low environmental risk perception of people with various backgrounds. In addition, research focused on prospective biology teachers still needs more published research results. The subject of pre-service biology teachers is an important research respondent. These prospective teachers, in time, become teachers who will teach the urgency of environmental risk perception to their students in schools. Therefore, this study aims to determine the environmental risk perception of prospective biology teachers throughout Indonesia. With several research parameters, Gender identity, student academic ability depicted student Grade Point Average (GPA), university status, and lecture status. This follows the parameters used by previous researchers [29], [30].

2. METHOD

2.1 Research design and participants

This cross-sectional survey study aims to collect data on the environmental risk perception of Indonesian students. The 1267 respondents of this study are active students at state universities and private universities in Indonesia, are studying the undergraduate level (S1) of Biology Education, are Indonesian citizens, are still active students, and are voluntary to be respondents. Respondents came from the Faculty of Teacher Training and Education, the College of Education, and the Faculty of Mathematics and Natural Sciences. The survey's target population size is 1300 respondents. The minimum sample size inclusion criteria of the study respondents, using the Krejcie and Morgan criteria with an intrepidity level of 95% and a margin of error of 5%. According to the Krejcie and Morgan tables, the minimum samples required are 1235 respondents. Moreover, the exclusion criteria in this study are undergraduate students (S1) not from the educational study program, have dropped out, and needed to fill in the complete information data on the characteristics of respondents, postgraduate students (S2). The Femininity, Grade Point Average (GPA) of students, and university status were positioned as the characters of respondents whose impact on student environmental risk perception was analyzed in this study.

2.2 Instrument and Data Collection Procedure

The research collection instrument used in this research is the Environmental Risk Perception Scale (ERPS) questionnaire [32]. The ERPS questionnaire consists of 24 items using a 7-point Likert scale, from unimportant (score 1) to extremely important (score 7). There are four environmental risks measured in ERPS, namely ecological risk (eight items), chemical waste risk (six items), resource depletion (six items), and global environmental risk (four items). During the data collection process, Indonesia was still hit by the COVID-19

outbreaks. Based on these conditions, the survey process is carried out fully online. Therefore, ERPS is transformed into an online questionnaire through Google Forms, which a bilingual expert has validated.

2.3 Data Processing and Analysis

The ERPS questionnaire that has been filled out by respondents, and has met the research requirements, is downloaded in comma-separated value (CSV) format, checked, and labeled using Microsoft Excel. After the data had been checked and labeled, analyzing process was conducted using statistical analysis software. The data of respondents' characteristics were analyzed using frequencies and percentages. Mean and standard deviation scores are calculated on each item. Comparisons of two groups of students were analyzed using the Mann-Whitney U Test, while comparisons of more than two groups used the Kruskal-Wallis H Test. The alpha value set in this study was 5%.

3. RESULTS AND DISCUSSION

After some time, questionary survey completion, One thousand two hundred sixty-seven respondents who had filled out the questionnaire and met the data requirements were obtained. Respondents have filled out no questionnaires in the exclude. A total of 1090 student respondents were female, and 177 were male. Characteristics of the respondents of this research information are provided in Table 1. The Grade Point Average used in data collection has an index scale range of 4.0. Students with a cumulative Achievement Index of 4.0 demonstrate perfect academic ability. The survey showed that more than 50% of students have a Grade Point Average (GPA) with an index range of 3.6 to 4.0. 4.1% of student respondents have a cumulative Achievement Index below 3.0. Furthermore, as many as 60.38% of respondents came from state universities and 39.62% from private universities. Most of the respondents (79.79%) have taken courses related to the environment.

Table 1. Descriptive Characteristics of Participants

Variable Category		N	Percentage (%)
Sex Group	Male	177	13.97
	Female	1,090	86.03
	Total	1,267	100
GPA	less than 3	52	4.10
	3 - 3.5	552	43.57
	3.6 - 4.0	663	52.33
	Total	1,267	100
University status	State University	765	60.38
	Private University	502	39.62
	Total	1,267	100
Previous Environ-mental Course	Yes	1,011	79.79
	No	256	20.21
	Total	1,267	100

Based on evidence from the survey results, all respondents (100%) have responded to 24 items of environmental risk perception (ERPS). The sampling analysis showed an ERPS score of 88.58 with a deviation of data ± 19.91. The lowest score obtained by respondents had a score of 24, while the highest one reached a score of 120. In more detail, the average score of each item is presented in Table 2.

Table 2. An average score of each ERPS item

Environmental Risk	Items	Mean	Std-dev
Global environmental risk	1	3.63	1.03
	2	4.03	1.06
	3	3.94	1.06
	4	3.83	1.02
Chemical waste risk	5	3.85	1.06
	6	3.75	1.06
	7	3.73	1.01
	8	3.67	1.03
	9	3.77	1.08
	10	3.48	1.18
Ecological risk	11	3.76	1.06
	12	3.79	1.04
	13	3.61	1.02
	14	3.49	1.19
	15	3.55	1.15
	16	3.71	1.05
	17	3.60	1.10
	18	3.59	1.03
	19	3.55	1.07
	20	3.58	1.03
	21	3.54	1.05
	22	3.60	1.10
	23	3.66	1.06
	24	3.86	1.06

The test of the difference in the effect of respondents' characteristics on the environmental risk of several respondents' parameters is presented in Table 3. According to Table 3, the results of statistical analysis that have been carried out, male and female students have environmental risk scores that statistically do not differ significantly, both in the aspects of global environmental risk ($p = 0.883$), chemical waste risk ($p = 0.729$), ecological risk ($p = 0.776$), and resource depletion ($p = 0.701$).

Table 3. Summary of the results of the analysis of the influence of respondent characteristics on environmental risk perception

Variable		Global Environment Risk			Chemical Waste Risk			Ecological Risk			Resources Depletion		
		Mean	Std-dev	p-value	Mean	Std-dev	p-value	Mean	Std-dev	p-value	Mean	Std-dev	p-value
Sex Group	Male	3.84	0.93	0.883	3.68	0.98	0.729	3.63	0.93	0.776	3.61	0.92	0.701
	Female	3.86	0.91		3.72	0.89		3.64	0.88		3.64	0.87	
GPA	Less than 3	3.69	1.06	0.047	3.56	1.09	0.040	3.50ab	0.91	0.007	3.43	1.05	0.043
	3-3.5	3.81	0.91		3.66	0.90		3.57a	0.90		3.59	0.88	
	3,6-4.0	3.91	0.90		3.76	0.88		3.71b	0.87		3.68	0.85	
University Status	State University	3.92	0.88	0.004	3.78	0.86	0.003	3.71	0.88	<0.001	3.70	0.86	<0.001
	Private University	3.76	0.95		3.61	0.96		3.52	0.90		3.53	0.89	
Previous Environmental Course	Yes	3.89	0.89	0.111	3.73	0.88	0.138	3.66	0.87	0.037	3.65	0.86	0.307
	No	3.75	1.01		3.63	0.97		3.53	0.98		3.58	0.92	

The study's results on several parameters are in line with Sansom et al [42] which state that environmental conditions experienced by individuals are the same. On sexual role parameters, the results of research with student respondents obtained in Indonesia corroborate the results of similar studies that have been conducted in the United States, which explained that perceived risk to be much lower than women did [43]. Actual findings research confirms that sexual characteristics make a difference in risk perceptions [44], femininity moderates the theoretical relationship between risk perceptions [45]. Women are more concerned about environmental risks when compared to men [46], [47]. Similarly, a study conducted in Ireland concluded: "feminine judged involuntary risks as being more likely, having a greater impact, and having a higher overall risk rating than their male counterparts" [48]. The perception of environmental risk is higher in women than in men and depends on the type of risk and its characteristics. Women are more likely than men to reduce their impact whenever there is an increase in their perception of risk [45].

In contrast to sexual group identity, differences in respondents' thinking ability characterized by a GPA have a significant influence ($p < 0.05$) on student environmental risk perception. The group of students with a higher GPA had a higher average score than those whose GPA was lower (Table 3). The results of this analysis following research showed that students' GPAs describe higher academic confidence and lower failure anxiety [49]. The GPA describes students' cognitive intelligence [50]. A good GPA illustrates the ability and confidence of students, which means they have a relatively more comprehensive understanding of risk [51]. Students with a higher GPA tend to have good reasoning ability, which means they have high thinking ability [52], so in the end, it affects their good risk perception [53]. A more reliable predictor for environmental awareness, one of which is students' stronger science ability, plus a variety of other factors that appear to be determining factors for different levels of environmental literacy among university students [54].

Linked with the academic ability of students visualized with a GPA, the status of universities also significantly influences the four aspects of environmental risk in this study. Students from public universities have a score that is significantly ($p < 0.005$) higher than students from private universities (Table 3). That authority can explain some field conditions, and the government has issued Government Regulation of the Republic of Indonesia no. 66 of 2010 Amendments to Government Regulation Number 17 of 2010 concerning the Management and Implementation of Education in article 53B, which requires state universities to accept new students at least 60% of the capacity of each undergraduate education program study program [55]. Officially, the Higher Education Data Assessment explained that in Indonesia, there are 4,577 universities and of these, 372 state-run universities. The tightness of academic ability excerpt in selecting new students at state universities and the limited number of state universities (8.13%) in Indonesia have illustrated in Table 3 above.

However, in the process, both public universities and private universities are equally required to ensure that students who are studying at universities expect double results from the educational and learning process that has been carried out, namely science, degrees, skills, experiences, beliefs, and noble behaviors as well as balanced life skills [56], [57].

The character of the last respondent studied in this study was university status. Lecture status refers to whether the student has attended lectures related to the environment. The lectures include ecology and environmental sciences. The results of the different tests presented in Table 3 indicate that the lecture status factor only significantly influences the ecological risk aspect ($p = 0.037$). Students who have taken environmental courses have a significantly higher average score than those who have not.

Additionally, this factor does not have a significant influence on aspects of global environmental risk ($p = 0.111$), chemical waste risk ($p = 0.138$), or resource depletion ($p = 0.307$). This paper is harmonious with previous research that environmental education (in the form of environmental courses with various variations of course names, environmental biology, and ecology) will provide a growing understanding of environmental problems, consequences, and risks, all of which are the core targets of environmental education. Ecological risks are inherently complex, interconnected, and subject to perceptual bias. Understanding environmental risks in their future life shape student knowledge and awareness. The strong aspect of ecological risk as a product of environmental education will reduce misunderstandings about environmental problems and develop an assessment of information about their severity [58]. The implementation of environmental education encourages the improvement of student competence in responding to environmental problems [59],or environmental risks [60]. Respondents who have studied environmental education tend to be more concerned about environmental risks and consider environmental problems more harmful to the nation's health, environment, and socioeconomic development [61].

4. CONCLUSION

The study, which involved 1267 research respondents who are active students of prospective biology teachers from all over Indonesia, concluded that sexual characteristics influence student environmental risk perception. Female students have a higher environmental risk sensitivity when compared to male students. The difference in GPA has a significant influence on student environmental risk perception. In line with the GPA, the status of universities also significantly influences the four aspects of environmental risk studied in this study. Students from public universities have higher scores than students from private universities. Finally, the status factor of the lecture (whether or not you have taken a course in the field of environment that represents environmental education only has a significant influence on the ecological risk aspect, not on other aspects.

Our empirical results call for further research, for example, why environmental education only affects ecological risk. At the same time, this factor does not significantly influence the other three aspects: global environmental risk, chemical waste risk, and resource depletion.

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REFERENCES

[1] G. Franken and P. Schütte, "Current trends in addressing environmental and social risks in mining and mineral supply chains by regulatory and voluntary approaches," *Miner. Econ.*, vol. 35, no. 3, pp. 653–671, 2022, doi: 10.1007/s13563-022-00309-3.

[2] B. K. Mishra, P. Kumar, C. Saraswat, S. Chakraborty, and A. Gautam, "Water Security in a Changing Environment: Concept, Challenges and Solutions," *Water*, vol. 13, no. 4. 2021, doi: 10.3390/w13040490.

[3] H. Husamah, H. Suwono, H. Nur, and A. Dharmawan, "Action competencies for sustainability and its implications to environmental education for prospective science teachers: A systematic literature review," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 18, no. 8, 2022, doi: 10.29333/ejmste/12235.

[4] H. Husamah, H. Suwono, H. Nur, A. Dharmawan, and C.-Y. Chang, "The existence of environmental education in the COVID-19 pandemic: A systematic literature review," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 19, no. 11, p. em2347, 2023, doi: 10.29333/ejmste/13668.

[5] H. Husamah, H. Suwono, H. Nur, and A. Dharmawan, "The development and validation of environmental literacy instrument based on spirituality for prospective science teachers," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 18, no. 12, p. em2206, 2022, doi: 10.29333/ejmste/12732.

[6] H. Husamah, H. Suwono, H. Nur, and A. Dharmawan, "Sustainable development research in Eurasia Journal of Mathematics, Science and Technology Education: A systematic literature review," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 18, no. 5, p. em2103, 2022, doi: 10.29333/ejmste/11965.

[7] N. von Uexkull and H. Buhaug, "Security implications of climate change: A decade of scientific progress," *J. Peace Res.*, vol. 58, no. 1, pp. 3–17, 2021, doi: 10.1177/0022343320984210.

[8] S. Tong *et al*., "Current and future threats to human health in the Anthropocene," *Environ. Int.*, vol. 158, p. 106892, 2022, doi: https://doi.org/10.1016/j.envint.2021.106892.

[9] P. Cianconi, S. Betrò, and L. Janiri, "The Impact of Climate Change on Mental Health: A Systematic Descriptive Review," *Front. Psychiatry*, vol. 11, no. March, pp. 1–15, 2020, doi: 10.3389/fpsyt.2020.00074.

[10] N. Gunjyal, S. Rani, B. Asgari Lajayer, V. Senapathi, and T. Astatkie, "A review of the effects of environmental hazards on humans, their remediation for sustainable development, and risk assessment.," *Environ. Monit. Assess.*, vol. 195, no. 6, p. 795, Jun. 2023, doi: 10.1007/s10661-023-11353-z.

[11] U. A. Saari, S. Damberg, L. Frömbling, and C. M. Ringle, "Sustainable consumption behavior of Europeans: The influence of environmental knowledge and risk perception on environmental concern and behavioral intention," *Ecol. Econ.*, vol. 189, p. 107155, 2021, doi: https://doi.org/10.1016/j.ecolecon.2021.107155.

[12] Z. Li and D. M. Konisky, "Personal attributes and (mis)perceptions of local environmental risk," *Rev. Policy Res.*, vol. 40, no. 1, pp. 119–152, Jan. 2023, doi: https://doi.org/10.1111/ropr.12504.

[13] S. Cortés, S. Burgos, H. Adaros, B. Lucero, and L. Quirós-Alcalá, "Environmental Health Risk Perception: Adaptation of a Population-Based Questionnaire from Latin America.," *Int. J. Environ. Res. Public Health*, vol. 18, no. 16, Aug. 2021, doi: 10.3390/ijerph18168600.

[14] O. Renn *et al*., "Systemic Risks from Different Perspectives," *Risk Anal.*, vol. 42, no. 9, pp. 1902–1920, Sep. 2022, doi: https://doi.org/10.1111/risa.13657.

[15] T. Aven and E. Zio, "Globalization and global risk: How risk analysis needs to be enhanced to be effective in confronting current threats.," *Reliab. Eng. Syst. Saf.*, vol. 205, p. 107270, Jan. 2021, doi: 10.1016/j.ress.2020.107270.

[16] G. Xu, X. Feng, Y. Li, X. Chen, and J. Jia, "Environmental risk perception and its influence on well-being," *Chinese Manag. Stud.*, vol. 11, no. 1, pp. 35–50, 2017, doi: 10.1108/CMS-12-2016-0261.

[17] M. Shin, A. K. Werner, H. Strosnider, L. B. Hines, L. Balluz, and F. Y. Yip, "Public Perceptions of Environmental Public Health Risks in the United States.," *Int. J. Environ. Res. Public Health*, vol. 16, no. 6, Mar. 2019, doi: 10.3390/ijerph16061045.

[18] M. Subiza-Pérez *et al*., "Who feels a greater environmental risk? Women, younger adults and pro-environmentally friendly people express higher concerns about a set of environmental exposures," *Environ. Res.*, vol. 181, p. 108918, 2020, doi: https://doi.org/10.1016/j.envres.2019.108918.

[19] I. Msengi *et al*., "Assessment of knowledge and awareness of 'sustainability' initiatives among college students," *Renew. Energy Environ. Sustain.*, vol. 4, no. 6, pp. 1–11, 2019, [Online]. Available: https://doi.org/10.1051/rees/2019003.

[20] M. Alrawad, A. Lutfi, S. Alyatama, I. A. Elshaer, and M. A. Almaiah, "Perception of Occupational and Environmental Risks and Hazards among Mineworkers: A Psychometric Paradigm Approach.," *Int. J. Environ. Res. Public Health*, vol. 19, no. 6, Mar. 2022, doi: 10.3390/ijerph19063371.

[21] K.-W. Hsu, J.-C. Chao, and C.-Y. Hsu, "Environmental Risk Perception and Preventive Behavior during the COVID-19 Pandemic in Central Taiwan.," *Int. J. Environ. Res. Public Health*, vol. 18, no. 18, Sep. 2021, doi: 10.3390/ijerph18189920.

[22] G. L. Bradley, Z. Babutsidze, A. Chai, and J. P. Reser, "The role of climate change risk perception, response efficacy, and psychological adaptation in pro-environmental behavior: A two nation study," *J. Environ. Psychol.*, vol. 68, p. 101410, 2020, doi: https://doi.org/10.1016/j.jenvp.2020.101410.

[23] J. Zeng, M. Jiang, and M. Yuan, "Environmental Risk Perception, Risk Culture, and Pro-Environmental Behavior," *Int. J. Environ. Res. Public Health*, vol. 17, pp. 1750–1766, 2020.

[24] X. Li, Z. Liu, and T. Wuyun, "Environmental Value and Pro-environmental Behavior Among Young Adults: The Mediating Role of Risk Perception and Moral Anger," *Front. Psychol.*, vol. 13, no. February, pp. 1–11, 2022, doi: 10.3389/fpsyg.2022.771421.

[25] F. S. Khatibi, A. Dedekorkut-Howes, M. Howes, and E. Torabi, "Can public awareness, knowledge and engagement improve climate change adaptation policies?," *Discov. Sustain.*, vol. 2, no. 1, p. 18, 2021, doi: 10.1007/s43621-021-00024-z.

[26] H. Liu, G. Zhu, and Y. Li, "Research on the impact of environmental risk perception and public participation on evaluation of local government environmental regulation implementation behavior," *Environ. Challenges*, vol. 5, no. March, p. 100213, 2021, doi: 10.1016/j.envc.2021.100213.

[27] P. D. Howe, J. R. Marlon, X. Wang, and A. Leiserowitz, "Public perceptions of the health risks of extreme heat across US states , counties , and neighborhoods," vol. 116, no. 14, 2019, doi: 10.1073/pnas.1813145116.

[28] M. Dettori *et al*., "Environmental risks perception among citizens living near industrial plants: A cross-sectional study," *Int. J. Environ. Res. Public Health*, vol. 17, no. 13, pp. 1–19, 2020, doi: 10.3390/ijerph17134870.

[29] H. Husamah, A. Rahardjanto, S. Hadi, N. Lestari, and M. K. Ummah BK, "Spirituality-based environmental literacy among prospective biology teacher in Indonesia: Analysis based on gender, accreditation, and semester-level aspects," *JPBI (Jurnal Pendidik. Biol. Indones.*, vol. 9, no. 3, pp. 418–432, 2023, doi: 10.22219/jpbi.v9i3.29500.

[30] A. Rahardjanto, H. Husamah, S. Hadi, N. Lestari, and D. Fatmawati, "The environmental attitude of the prospective biology teachers in Indonesia," *JPBI (Jurnal Pendidik. Biol. Indones.*, vol. 8, no. 3, pp. 255–264, 2022.

[31] C. Yaşaroğlu and H. Otlu, "A Research on the Environmental Identities and Environmental Risk Perceptions of Classroom and Science Teachers According to Different Variables," *Int. J. Psychol. Educ. Stud.*, vol. 2022, no. 2, pp. 171–182, 2022, [Online]. Available: www.ijpes.com.

[32] G. Yapici, O. Ögenler, A. Ö. Kurt, F. Koçaş, and T. Şaşmaz, "Assessment of Environmental Attitudes and Risk Perceptions among University Students in Mersin, Turkey," *J. Environ. Public Health*, vol. 2017, 2017, doi: 10.1155/2017/5650926.
[33] S. L. Prescott *et al*., "Project Earthrise: Proceedings of the Ninth Annual Conference of inVIVO Planetary Health," *International Journal of Environmental Research and Public Health*, vol. 18, no. 20. 2021, doi: 10.3390/ijerph182010654.
[34] B. D. Altunoğlu, E. Atav, and S. Sönmez, "The investigation of environmental risk perception and attitudes towards the environment in secondary school students," *Turkish Online J. Educ. Technol.*, vol. 2017, no. December Special Issue INTE, pp. 436–444, 2017.
[35] R. M. Petrescu-Mag, P. Burny, I. Banatean-Dunea, and D. C. Petrescu, "How Climate Change Science Is Reflected in People's Minds. A Cross-Country Study on People's Perceptions of Climate Change.," *Int. J. Environ. Res. Public Health*, vol. 19, no. 7, Apr. 2022, doi: 10.3390/ijerph19074280.
[36] A. Zhang, H. Yang, Z. Tian, and S. Tong, "Evolution Model and Simulation Study of the Public Risk Perception of COVID-19.," *Int. J. Environ. Res. Public Health*, vol. 19, no. 18, Sep. 2022, doi: 10.3390/ijerph191811581.
[37] N. Ferronato and V. Torretta, "Waste mismanagement in developing countries: A review of global issues," *Int. J. Environ. Res. Public Health*, vol. 16, no. 6, p. 1060, Mar. 2019, doi: 10.3390/ijerph16061060.
[38] A. Fauzi, H. Husamah, F. J. Miharja, D. Fatmawati, T. I. Permana, and A. M. Hudha, "Exploring COVID-19 literacy level among biology teacher candidates," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 16, no. 7, p. em1864, 2020, doi: 10.29333/EJMSTE/8270.
[39] N. Nurwidodo, I. Ibrohim, S. Sueb, and H. Husamah, "'Let's transform!': A systematic literature review of science learning in COVID-19 pandemic era," *Eurasia J. Math. Sci. Technol. Educ.*, vol. 19, no. 2, p. em224, 2023, doi: 10.29333/ejmste/12875.
[40] M. Lamers and J. Student, "Learning from COVID-19? An environmental mobilities and flows perspective on dynamic vulnerabilities in coastal tourism settings," *Marit. Stud.*, vol. 20, no. 4, pp. 475–486, 2021, doi: 10.1007/s40152-021-00242-1.
[41] S. Ruggieri *et al*., "Measuring Risk Perception in Pregnant Women in Heavily Polluted Areas: A New Methodological Approach from the NEHO Birth Cohort.," *Int. J. Environ. Res. Public Health*, vol. 18, no. 20, Oct. 2021, doi: 10.3390/ijerph182010616.
[42] G. Sansom, P. Berke, T. McDonald, E. Shipp, and J. Horney, "Evaluating the Impact of Race and Gender on Environmental Risk Perceptions in the Houston Neighborhood of Manchester," *Environ. Justice*, vol. 12, no. 3, pp. 92–98, Apr. 2019, doi: 10.1089/env.2018.0028.
[43] A. Lewis and R. Duch, "Gender differences in perceived risk of COVID-19.," *Soc. Sci. Q.*, vol. 102, no. 5, pp. 2124–2133, Sep. 2021, doi: 10.1111/ssqu.13079.
[44] V. Lorenzetti, E. McTavish, and J. Matias, "Do Sex Differences and Risk Perception Affect Cannabis Exposure? Results from a Sample of Current Cannabis Users from the European Web Survey on Drugs," *Int. J. Ment. Health Addict.*, 2023, doi: 10.1007/s11469-023-01124-9.
[45] R. R. Carballo, C. J. León, and M. M. Carballo, "Gender as moderator of the influence of tourists' risk perception on destination image and visit intentions," *Tour. Rev.*, vol. ahead-of-p, no. ahead-of-print, Jan. 2021, doi: 10.1108/TR-02-2021-0079.
[46] Y. Li, B. Wang, and O. Saechang, "Is female a more pro-environmental gender? Evidence from China," *Int. J. Environ. Res. Public Health*, vol. 19, no. 13, Jun. 2022, doi: 10.3390/ijerph19138002.
[47] A. T. Huluka, "Is there any gender difference in environmental concern? Evidence from the smallholder farmers in Oromia regional state of Ethiopia," *Cogent Soc. Sci.*, vol. 8, no. 1, p. 2103284, Dec. 2022, doi: 10.1080/23311886.2022.2103284.
[48] G. D. Brown, A. Largey, and C. McMullan, "The impact of gender on risk perception: Implications for EU member states' national risk assessment processes," *Int. J. Disaster Risk Reduct.*, vol. 63, no. July, p. 102452, 2021, doi: 10.1016/j.ijdrr.2021.102452.
[49] C. Infortuna *et al*., "Affective temperament traits and age-predicted recreational cannabis use in medical students: A cross-sectional study," *Int. J. Environ. Res. Public Health*, vol. 17, no. 13, pp. 1–7, 2020, doi: 10.3390/ijerph17134836.
[50] D. M. Lubis and R. Asfur, "The Association Between the Physical Fitness Index and the Grade Point Average in Faculty of Medicine UMSU Students," *Bul. Farmatera*, vol. 6, no. 1, p. 51, 2021, doi: 10.30596/bf.v6i1.3333.
[51] A. Alhadabi and A. C. Karpinski, "Grit, self-efficacy, achievement orientation goals, and academic performance in University students," *Int. J. Adolesc. Youth*, vol. 25, no. 1, pp. 519–535, Dec. 2020, doi: 10.1080/02673843.2019.1679202.
[52] E. Stearns *et al*., "Do Relative Advantages in STEM Grades Explain the Gender Gap in Selection of a STEM Major in College? A Multimethod Answer," *Am. Educ. Res. J.*, vol. 57, no. 1, pp. 218–257, 2020, doi: 10.3102/0002831219853533.
[53] M. Siegrist and J. Árvai, "Risk Perception: Reflections on 40 Years of Research," *Risk Anal.*, vol. 40, no. 0, pp. 2191–2206, 2020, doi: 10.1111/risa.13599.
[54] H. E. Edsand and T. Broich, "The impact of environmental education on environmental and renewable energy technology awareness: Empirical evidence from Colombia," *Int. J. Sci. Math. Educ.*, vol. 18, no. 4, pp. 611–634, 2020, doi: 10.1007/s10763-019-09988-x.
[55] A. Ratnasari, "Strategi komunikasi repositioning perguruan tinggi: Kasus PTN setelah menjadi BHMN," *Mimbar*, vol. 17, no. 1, pp. 104–118, 2001.
[56] A. L. Kadiyono and N. B. Putri, "Comparative Studies of Employability in Higher Education: Private University

and Public University," *AL-ISHLAH J. Pendidik.*, vol. 14, no. 4, pp. 6865–6874, 2022, doi: 10.35445/alishlah.v14i4.2617.
[57] J. Wang, M. Yang, and P. Maresova, "Sustainable Development at Higher Education in China: A Comparative Study of Students' Perception in Public and Private Universities," *Sustainability*, vol. 12, no. 6. 2020, doi: 10.3390/su12062158.
[58] N. Carmi and I. Alkaher, "Risk literacy and environmental education: Does exposure to academic environmental education make a difference in how students perceive ecological risks and evaluate their risk severity?," *Sustain.*, vol. 11, no. 22, pp. 1–19, 2019, doi: 10.3390/su11226350.
[59] G. D. Boca and S. Saraçli, "Environmental education and student's perception, for sustainability," *Sustain.*, vol. 11, no. 6, pp. 1–18, 2019, doi: 10.3390/su11061553.
[60] J. van de Wetering, P. Leijten, J. Spitzer, and S. Thomaes, "Does environmental education benefit environmental outcomes in children and adolescents? A meta-analysis," *J. Environ. Psychol.*, vol. 81, p. 101782, 2022, doi: https://doi.org/10.1016/j.jenvp.2022.101782.
[61] A. A. Al-Masri, K. Mahmood Shafi, H. Seyyed, and S. Ayoub Meo, "Public perceptions: The role of Individuals, societies, and states in managing the environmental challenges – cross-sectional study," *J. King Saud Univ. - Sci.*, vol. 35, no. 3, p. 102581, 2023, doi: https://doi.org/10.1016/j.jksus.2023.102581.

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