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A Longitudinal Study on Sustainability Perceptions in Portugal

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Abstract: This study aims to advance the understanding of sustainable behaviour by exploring the perceptions, knowledge, and opinions about the sustainability of nearly graduated students in Portugal. A three-wave exploratory and longitudinal study was conducted with Management and Marketing students in 2020, 2021, and 2022. The findings come from both quantitative and qualitative approaches. First, the results reveal low levels of knowledge about sustainability, Sustainable Development Goals, and other related concepts. Then, by a qualitative analysis, this study highlights the terms related to sustainability and perceived sustainable practices. It also examines changes perceived since the COVID-19 pandemic and what their threats and opportunities in the coming years are. The main conclusion of this study is the critical need for education on sustainability and related concepts beyond simple recycling practices. The use of sustainability as a marketing tool is insufficient to create a viable future. Higher education must develop a new shared and sustainable vision for sustainability education.

Keywords: sustainability education; sustainable development; sustainable behaviour; sustainability knowledge; exploratory study

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1. Introduction

Sustainability has become critical as the world faces various environmental and socio-economic challenges. Sustainability is an important and current issue. However, an agreement on its definition does not exist in the literature, leading to fragmented understanding and diverse practices [1–3]. In the early seventies, individuals became aware that the degradation of the environment would significantly compromise our capacity to achieve expanding prosperity and economic justice, leading to a growing concern with issues related to the concept of sustainability [4]. Sustainability is maintaining and supporting a certain level of environmental, social, and economic well-being for both present and future generations [2,5]. This definition is widely recognised and has been adopted by various organisations. Its origin is often credited to the Brundtland Commission, which the United Nations established in 1983 to address the global sustainability crisis. The Commission's report, entitled "Our Common Future", defines "sustainable development" as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [6]. In 2015, the United Nations adopted the *Sustainable Development Goals* (SDGs) to promote a flourishing environment, vibrant community, and equitable economy by 2030. Therefore, studying and highlighting young adults' current knowledge and perceptions of sustainability is crucial [7] and is the goal of the present study.

Higher education institutions and teacher training have tried to incorporate sustainability education in the last few years. Bürgener and Barth (2018), in a recent study involving nearly 300 experts from universities worldwide, found persistent barriers to implementing sustainable practices [8]. Teacher education must equip teachers with the necessary knowledge and abilities to act as change agents for sustainable development. They

propose an open learning environment based on living laboratories, where students work with practice partners to address real-world sustainability issues, facilitating this learning and contributing to societal transformation. Other barriers also include a need for more willingness among leaders and decision makers to prioritise sustainability within universities [9]. This reveals a real lack of knowledge management connecting science, technology, innovation, and sustainability, necessitating the creation of new teaching approaches to meet the demands of future innovation and sustainability requirements. Universities must overcome barriers and leverage opportunities to contribute through innovation in teaching, research, and action to achieve the 17 SDGs. Thus, the systematic reviews of the literature by Martins et al. (2019) and Leal Filho et al. (2019) indicate a real need for sustainability-based knowledge management [10,11]. There are gaps in our understanding of sustainability that require further exploration, including themes, strategies, objectives, and research approaches.

The SDGs and their links to green marketing are massively propagated in the community and public knowledge. Gordon et al. (2011) framed sustainable marketing and how to achieve it through the contribution of green marketing, social marketing, and critical marketing [12]. Green marketing has the potential to introduce sustainable products and services into the market, despite the current existence of greenwashing and a lack of realisation of its full potential. By integrating sustainability into all aspects of the marketing process, from product design to promotion, companies can limit the adverse effects of marketing on sustainability and offer consumers more sustainable options. More recently, Amoako et al. (2022) show how sustainable marketing strategies contribute to attaining the SDGs in a developing and emerging country in sub-Saharan Africa [13]. Their findings provide insight into how marketing strategies affect purchasing decisions and brand loyalty by revealing a positive relationship between green marketing and purchase behaviour. At the same time, the rise of sustainability trends has led to some companies claiming to offer sustainable products, raising questions about the legitimacy of these claims and their ethics [14]. For instance, *Fuxia Store* already uses the word "sustainable" as a category of products on its website beyond the classic distinction between man, woman, and child. Consumers' demand for sustainability has also been the subject of growing interest in the marketing literature.

The theory of the psychology of sustainability and sustainable development sees sustainability not only in terms of the ecological and socio-economic environment [15]. It focuses on healthy and safe environments and promotes well-being and quality of life within different settings. Sustainability can also be seen as passive (e.g., care) and active (e.g., custody), determining paths to be activated at the territorial level [16]. Sustainability is a communitarian learning path measured by one's antifragility capacity. Care identifies the objectives of protecting and safeguarding the socio-economic and environmental systems (No Poverty; Zero Hunger; Good Health and Well-being; Quality Education; Gender Equality; Clean Water and Sanitation; Life Below Water, and Life on Land). Custody concerns the objectives that promote qualitative growth (Affordable and Clean Energy; Decent Work and Economic Growth; Industry; Innovation and Infrastructure; Reducing Inequality; Sustainable Cities and Communities; Responsible Consumption and Production; Climate Action; Peace, Justice, and Strong Institutions). A standard "attitude-behaviour gap" between consumers is well reported by showing favourable attitudes towards sustainability and their actions [17,18]. However, the intentions and the actions are still not congruent. Juvan and Dolnicar (2014) show that there is also an attitude–behaviour gap in sustainable tourism [19]. Environmental activists who contribute to environmental degradation through vacationing experience cognitive dissonance and offer justifications for their behaviour. This highlights the challenge of motivating individuals to reduce negative environmental impacts during vacations and presents a potential starting point for developing interventions to encourage environmentally sustainable tourism.

Beyond the marketing arguments, sustainability was studied in various areas. For example, Yildiz Çankaya and Sezen (2019) present the effects of green supply chain man-

agement practices on sustainability performance [20]. They highlighted that green manufacturing, green distribution, green packaging, green marketing, environmental education, internal environmental management, and investment recovery influence performance dimensions. Moreover, Fatemi and Fooladi (2019) introduce the concept of sustainable finance [21]. They support the creation of a sustainable value-creation framework, within which all social and environmental costs and benefits are to be explicitly accounted for. Akomea-Frimpong et al. (2022) explain green finance by exposing the influences of green securities, green investments, climate finance, carbon finance, green insurance, green credit, and green infrastructural bonds [22]. Commonly, the reports aligning sustainability as corporate social responsibility influence stakeholders and shareholders [23]. In environments where a stakeholder approach to management is dominant, the firms still focus their sustainability reports on shareholders as the primary audience.

Feinstein and Kirchgasler (2015) explain that students taught to think about sustainability will be less able to see its ethical and political dimensions. They are less prepared to understand the political realities of a pluralist and democratic society that must balance the needs of multiple groups and integrate science with other sources of knowledge to develop contextualised responses to sustainability challenges [24]. For this, the alternative is a systematic collaboration between science and social studies educators. Similarly, Pompeii et al. (2019) identify low and high levels of sustainability knowledge within the student and faculty subject population [25]. They expose several barriers to pursuing interdisciplinary sustainability curricula across disciplines and among students and faculty at the study university. Higher sustainability knowledge participants identify barriers to institutional accountability, while lower sustainability knowledge participants identify barriers to personal responsibility. Studying sustainable consumer behaviour and their knowledge in various countries is very relevant and fascinating [24,25].

The main goal of the present study is to advance the understanding of sustainable behaviour. More specifically, this study focuses on the level of knowledge and perception individuals have about sustainability concepts. To carry this out, nearly graduated students in Portugal between 2020 and 2022 participated in a longitudinal and exploratory study. This first section was a short literature review of sustainability and education issues. Then, the methodology section is exposed, followed by the presentation of the results. The conclusion aggregates this study's implications, exposes the limitations, and highlights future research ways. The findings of this study provide insight into the pressing need for education on sustainability and its related concepts. This study aims to bring us closer to achieving the SDGs and a more sustainable future by contributing to the ongoing debate on sustainability and sustainability education.

2. Methodology

To deepen the comprehension of sustainable behaviour, knowledge, and perceptions, a longitudinal and exploratory study is conducted based on the perceptions and opinions of nearly graduated students in Portugal in 2020, 2021, and 2022. The sample consisted of students enrolled in the final years of two graduation programs (Management and Marketing) at a public Portuguese higher education institution. No topics of sustainability are integrated into their curriculum.

Data collection was performed through an online survey, available upon request. Participants were asked to answer questions about their attitudes and behaviours towards sustainability and their knowledge of several concepts. The survey was designed to gather information on various aspects of sustainability education, such as the influence of personal values, awareness of environmental issues, and the role of marketing in shaping sustainable behaviour. Additionally, the survey included questions to explore the relationship between students' attitudes towards sustainability and their actual behaviour. In sum, the survey consisted of a combination of closed-ended and open-ended questions based on previous research [10,11,24]. Experts in the field of sustainability reviewed it to ensure its validity

and reliability. Access to the survey was shared at the beginning of a class in December 2020 and repeated with new students in December 2021 and December 2022.

The samples are detailed in Table 1. A total of 214 participants completed the survey (77 in 2020, 77 in 2021, and 60 in 2022). The data were analysed using descriptive statistics and means comparisons (ANOVA) with the software IBM SPSS Statistics v.28. The responses to open-ended questions were analysed with the software NVivo 12 Pro by QSR International.

Table 1. Demographic characteristics of participants.

Characteristics		2020		2021		2022	
		N	%	N	%	N	%
Gender	Total	77		77		60	
	Male	26	34%	26	34%	19	32%
	Female	51	66%	51	66%	41	68%
Ages	Mean	21.2		21.3		20.8	
	Min	19		18		20	
	Max	27		26		24	
Courses	Management	49	64%	50	65%	32	53%
	Marketing	28	36%	27	35%	28	47%
Residences	Local student	30	39%	23	30%	26	43%
	Displaced student	47	61%	54	70%	34	57%

The results of this study provide valuable insights into the factors that drive sustainable behaviour and the challenges that need to be addressed to encourage and support sustainable behaviour. By exploring the attitudes and behaviours of these young adults, this study contributes to the growing body of knowledge in sustainability. It provides some insights for businesses and policymakers looking to promote sustainable consumption patterns.

3. Results

First, the findings from the quantitative analysis are exposed to enhance understanding of the results, followed by the results obtained from the qualitative analysis of open-ended questions.

The analysis of the survey question "*How do you consider yourself in terms of sustainability?*" resulted in categorising participants as active, neutral, or passive agents, as shown in Table 2. The analysis indicates a significant preference among participants for classifying themselves as an active or neutral stance on sustainability over a passive agent. Interestingly, throughout this study, the neutral ones become the most important. Further comparisons show that there is no gender difference.

Table 2. Sustainability Self-Assessment.

Self-Assessment	2020 N (%)	2021 N (%)	2022 N (%)
Active agent	43 (56%)	30 (39%)	22 (37%)
Neutral agent	27 (35%)	40 (52%)	28 (47%)
Passive agent	7 (9%)	7 (9%)	10 (17%)

The levels of knowledge of the UN's 17 Sustainable Development Goals (SDGs) were measured using a scale with the question "*From 0 (as being "none") to 10 (as being "excellent"), what is your level of knowledge about the UN's 17 Sustainable Development Goals (SDGs)?*". Table 3 highlights these results. Surprisingly, there is a noticeable lack of responses at the highest levels (9 and 10) for all years. On a positive note, there has been a decrease in the number of responses at the lowest level, which is a positive trend. However, the overall results indicate a shallow knowledge of the SDGs among participants. In 2020, 26% of

participants declared not knowing SDGs, against only 5% in 2022. Despite this, the results show a slow and steady increase in knowledge about SDGs over the years, with the average score rising from 2.99 to 4.58. This fact itself seems very positive and promising for the following years.

Table 3. Knowledge levels on Sustainable Development Goals (SDGs).

Level	2020 (%)	2021 (%)	2022 (%)
0	26.0%	15.6%	5.0%
1	9.1%	5.2%	10.0%
2	10.4%	15.6%	3.3%
3	13.0%	6.5%	15.0%
4	10.4%	15.6%	5.0%
5	11.7%	20.8%	28.3%
6	10.4%	10.4%	8.3%
7	5.2%	7.8%	15.0%
8	3.9%	2.6%	10.0%
9	0%	0%	0%
10	0%	0%	0%
Mean	2.99	3.60	4.58
SD	2.49	2.30	2.30
N	77	77	60

The comparison between the levels of knowledge of the UN's 17 Sustainable Development Goals (SDGs) and the agent types (active, neutral, or passive) revealed exciting differences. The analysis was conducted for 2020, 2021, and 2022 and ANOVA results were used to determine the differences. The results, detailed in Table 4, show that there were significant differences in the level of knowledge in 2020 and 2021, with active agents demonstrating a higher level of expertise compared to neutral or passive agents ($F(2,76) = 7.46$; $p < 0.01$) and 2021 ($F(2,76) = 8.49$; $p < 0.01$). However, the results in 2022 did not show any significant differences ($F(2,59) = 1.90$; $p = ns$). Despite this, the analysis indicates that the knowledge of the SDGs has increased across all groups over the years, highlighting the growing awareness of the importance of sustainable development. This result highlights the importance of considering individuals' agent types in evaluating their knowledge levels of the SDGs. Further analysis with a two-way ANOVA confirms that there is no gender difference. These results provide insights for further research and educational initiatives to increase awareness and knowledge of the SDGs among three groups, focusing on less active individuals promoting sustainable development.

Table 4. Averages of knowledge levels on Sustainable Development Goals (SDGs) by agent type.

Knowledge Levels by Type of Agent	2020 Means (SD)	2021 Means (SD)	2022 Means (SD)
Active agent	3.88 (2.40)	4.83 (1.97)	5.32 (2.06)
Neutral agent	1.78 (2.17)	2.83 (2.23)	4.07 (2.36)
Passive agent	2.14 (2.12)	2.71 (1.89)	4.40 (2.46)
Total	2.99 (2.49)	3.60 (2.30)	4.58 (2.30)

This study assessed the level of knowledge of nine sustainability-related concepts using a Likert scale of 5 points. The results, presented in Table 5, show the mean values in descending order. The results indicate that sustainability, sustainable development, nature degradation, and photosynthesis were the most widely understood concepts among the participants, with a relatively high mean value. However, the results also revealed a need for further education and awareness of prosperity, circular economy, and biosphere concepts, as their mean values were relatively low. This highlights the importance of increasing understanding and knowledge of these concepts, which are crucial in promoting sustainable development. The remaining two concepts, lithosphere and entropy, were considered more specialised in nature and may require further study. This result highlights the need for continued research and education in sustainability-related topics, particularly in technical areas, to deepen our understanding and promote the implementation of sustainable practices. Additionally, here, no gender difference was significant. In conclusion, this study's results provide valuable insights into the level of knowledge of sustainability-related concepts and highlight the importance of ongoing education and awareness-raising efforts in promoting sustainability.

Table 5. Average knowledge levels about concepts linked to Sustainability.

Concept	2020 Means (SD)	2021 Means (SD)	2022 Means (SD)
sustainability	3.82 (0.64)	3.65 (0.76)	3.93 (0.73)
sustainable development	3.74 (0.68)	3.58 (0.73)	3.80 (0.78)
nature degradation	3.69 (0.89)	3.47 (0.85)	3.63 (0.94)
photosynthesis	3.43 (0.88)	3.36 (0.92)	3.58 (0.91)
prosperity	3.13 (0.91)	3.25 (0.76)	3.35 (0.94)
circular economy	3.01 (0.99)	2.96 (1.09)	3.18 (0.98)
biosphere	3.13 (0.92)	2.77 (0.90)	3.13 (1.11)
lithosphere	2.75 (1.00)	2.36 (0.97)	2.62 (1.21)
entropy	1.94 (0.89)	1.84 (0.81)	1.85 (0.90)

The following open-ended questions provided the most exciting insights into this study. Participants were asked to give, at maximum, three words they associate with the concept of sustainability. The responses were analysed to determine the frequency of each term for each year, with NVivo Software. Each word had to appear five times to be included in the analysis. The results in Table 6 show the top ten most frequently mentioned words. This study revealed that the participants' responses could be grouped into three categories based on repetition. The first group, consisting of "environment", "recycling", "reuse", and "eco-friendly", was the most frequently mentioned and strongly linked to sustainability. These words indicate a focus on environmental protection and responsible resource use. The second group, including "reduce", "nature", and "preservation", was also frequently mentioned and highlights a focus on conservation and reducing waste. The third group, consisting of "green", "renewable", and "future", rounded out the top ten list and indicates a focus on sustainable practices and a vision for a more sustainable future. These results provide valuable insight into the public's perception of sustainability and highlight the importance of promoting environmental protection and responsible resource use, conservation, and sustainable practices.

These study results indicate that the participants considered the environment a crucial issue that requires immediate attention for a sustainable future. They highlighted recycling and reusing as effective methods for reducing waste and conserving resources. Participants emphasised the importance of adopting eco-friendly habits to preserve nature and support using renewable energy sources. This result supports the significance of environmental preservation for the future of the planet and the need for collective efforts to keep it.

Table 6. Word frequencies of topics linked to Sustainability.

Words	2020 Frequency	2021 Frequency	2022 Frequency	Total Frequency
environment	20	17	14	51
recycling	12	11	13	36
reuse	13	6	8	27
eco-friendly	13	9	8	30
reduce	8	5	5	18
nature	10	1	6	17
preservation	3	7	6	16
green	5	2	5	12
renewable	4	2	5	11
future	3	5	1	9

The analysis of sustainable practices reveals that most participants reported practising recycling. A minority of participants were aware of individuals who embody sustainability, with "Greta Thunberg" being the most frequently named individual over the three years of this study. In 2020, fifteen participants declared Thunberg, one declared Leonardo DiCaprio, and one declared Catarina Barreiros. In 2021, six participants named Thunberg, two named Al Gore, one named DiCaprio, and one named Barreiros. In 2022, eleven participants named Thunberg, two named DiCaprio, one named Elon Musk, one named Andrew Tate, and one named Barreiros.

Other results highlight the main changes perceived by the participants in companies, organisations, and schools since the onset of the COVID-19 pandemic. In 2020, the most frequently reported changes were the use of masks, social distancing, increased hygiene, alcohol gel usage, and improved cleanliness. In 2021, the most reported changes were teleworking, mask usage, social distancing, disinfection, and hygiene. In 2022, hygiene was the primary change reported by participants. These findings demonstrate a correlation between the responses and the context of the COVID-19 pandemic, with restrictions and concerns significantly shaping the perceived differences.

The results from the question on the following threats companies will face in the coming year show limited variability. In 2020, the most reported threats were the crisis, increased COVID-19 cases, and economic recovery. In 2021, participants cited a lack of resources, global warming, price increases, and shortage of raw materials as the main threats. In 2022, the threats mentioned were war, pollution, poverty, and sustainability.

In parallel, participants identified the following opportunities in 2020: new business, digital, and new products. In 2021, the focus was on sustainable products, reducing plastic use, and energy reduction. In 2022, sustainable companies, products, and renewable energy investments were the most frequently reported opportunities.

The findings from this study provide valuable insights into the impact of the COVID-19 pandemic on the perceptions and priorities of nearly graduated students in Portugal about sustainability. Regarding the changes perceived in companies, organisations, and schools, it is evident that the pandemic has dramatically influenced their operations and policies. The most reported changes in 2020, such as the use of masks, social distancing, increased hygiene, alcohol gel usage, and increased cleanliness, reflect the immediate response to the virus outbreak. The following year, teleworking, mask usage, social distancing, disinfection, and hygiene remained at the forefront of the changes perceived by the participants. By 2022, hygiene emerged as the primary difference reported, indicating that the focus has shifted from the immediate response to the pandemic to long-term measures to prevent its spread.

The findings on the following perceived threats to companies show that the COVID-19 pandemic profoundly impacted the participants' priorities. In 2020, the most reported threats were directly related to the crisis, such as increased COVID-19 cases and economic recovery. In 2021, the focus shifted to broader sustainability-related challenges, such as lack of resources, global warming, price increases, and shortage of raw materials. In 2022, the perceived threats evolved into global issues such as war, pollution, poverty, and sustainability.

On the other hand, the study results also highlight companies' and organisations' opportunities in the coming years. In 2020, participants identified new businesses and digital and new products as the main opportunities. In 2021, the focus shifted to more sustainability-oriented options, such as sustainable products, reducing plastic use, and energy reduction. By 2022, the participants identified sustainable companies, sustainable products, and investment in renewable energy as the most frequently reported opportunities. These results demonstrate the importance of sustainability and its related concepts in shaping companies' and organisations' future priorities and strategies.

All the findings of this study indicate that sustainability education displays promising results. Further research is necessary to understand its impact and potential applications fully.

4. Conclusions

This study contributes to the growing sustainability knowledge by exploring students' attitudes and behaviours towards sustainability concepts. It supports the argument that Bhuwandeep [7] exposed that studying and highlighting the knowledge and perceptions of young adult generations is essential and crucial. It aims to provide a better understanding of the concept of sustainability. It measures individuals' level of knowledge and perception of sustainability concepts. This research follows the theory of the psychology of sustainability and sustainable development. Over this period, with the emergence of the COVID-19 pandemic, the results reveal an increase in the number of neutral agents. This happens in parallel with the decrease in the number of active agents. This likely occurs because there is a better perception of issues related to sustainability, and participants perceive and assume that they could be more active. Then, they classify themselves as neutral agents.

Moreover, the student's knowledge levels about the SDGs increase. This probably happens because there is an appeal to sustainable awareness by the media and brands, as well as the emergence of activist influencers in favour of sustainable development. This study shows that students have different levels of knowledge of various concepts linked to sustainability. Sustainability, sustainable development, nature degradation, photosynthesis, and prosperity are the more general concepts. Circular economy and biosphere are at an intermediate level of knowledge. The less known are lithosphere and entropy, which are more technical and specifical. This happens because they are generic and used in vast scientific domains.

Thanks to the open questions, independently of the years, this study shows that many students link sustainability to the environment, recycling, reuse, and eco-friendly. These words are related to environmental protection and responsible resource use. Then, the terms most declared are reducing, nature, and preservation. These highlight the topics of conservation and reducing waste. The term green, renewable, and future end the top list, focusing on sustainable practices and a vision for a more sustainable future. This study contributes to the development of the theory of the psychology of sustainability and sustainable development as it explores the knowledge and perceptions of young adult generations about the topics related to sustainability. These findings indicate that awareness of environmental issues is an essential driver of sustainable behaviour, as supported by previous research [8,24]. Higher Education Institutions should see themselves as the most vital links and agents in promoting and advocating sustainability and making education for sustainability and sustainability education part of their cultures. It is necessary to raise awareness of the global challenges and the actions needed to overcome them. In this case,

problems such as poverty, hunger, climate change, and inequality are at stake. Young people must be motivated to take action to solve these problems. SDGs state clear and measurable targets. Knowing them leads to a broader vision of sustainable development. Individuals and organisations such as governments, companies, and associations can collaborate based on shared objectives. Thus, there may be indicators that allow measuring progress towards sustainable development. Knowing the SDGs empowers individuals to make more informed decisions about their actions and consumption patterns. It will enable people to understand how their choices and behaviours impact the environment and society and take steps to reduce their negative impact. Higher Education Institutions should incorporate the SDGs into their curricula.

This study also highlights the challenges in encouraging and supporting sustainable behaviours as the main contribution. There is a need for further education and awareness of sustainability-related concepts, highlighting the importance of ongoing education and awareness-raising efforts in promoting sustainability. Despite favourable attitudes towards sustainability, this study shows and supports the existence of a gap between students' attitudes and their actual behaviour, commonly referred to as the "attitude-behaviour gap". Despite what people claim to know, what they practice is different. This gap suggests that education on sustainability and its relatedness is crucial in promoting sustainable behaviour, as claimed in previous research [9,10,23]. According to Leal Filho et al. (2019), implementing the SDGs at universities is still in its infancy [11]. The concept of "sustainability" is a complex and multi-faceted issue that requires an interdisciplinary approach, as argued previously [1,2,9,11,24,25]. Encouraging interdisciplinary learning can help students understand the interconnectedness of different sustainability issues. Despite the potential for the SDGs to drive further momentum in education for sustainable development, their application remains inconsistent. While some professors use them as key course content, others address them as a topic within a broader curriculum, and still, others incorporate them into assessments [10]. Sustainability education should encourage students to critically evaluate different perspectives and solutions related to sustainability to help them develop their own opinions and approaches to sustainability issues. Providing students with opportunities to act on sustainability issues, such as participating in sustainability projects or campaigns, can help them develop a sense of agency and responsibility for sustainability. This study focuses on students' declarations and emphasises the importance of promoting environmental protection, responsible resource use, conservation, and sustainable practices.

This study also has several limitations that should be considered when interpreting the results. Firstly, the sample size is small and only from one university. More studies should be replicated to generalise the findings provided by the current research. Herein, all students contributed freely to all collected data in this research without any curricular or monetary privileges. Secondly, this study is based on self-reported data, possibly subject to social desirability bias. Lastly, this study is limited to a design, and future research is needed to explore the stability of the results over time.

Further research is needed to explore students' perceptions, attitudes, and behaviours in different universities, countries, and cultural contexts. As shown in previous studies, cultural differences are one of the mechanisms influencing sustainable practices. Additionally, future studies could explore the impact of government policies and regulations on the sustainable practices of young generations. Studying the effects of false information or misinformation about sustainability is also possible. This requires a coordinated effort from various stakeholders and a commitment to promoting accurate information and critical thinking in society.

In conclusion, this study provides valuable insights into the factors that drive sustainable education and the challenges that must be addressed to encourage and support sustainable behaviour. The findings support the importance of education on sustainability and its related concepts beyond simple recycling practices. The results of this study can inform businesses and policymakers looking to promote sustainable consumption patterns and provide a basis for future research in the field of sustainability.

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