

Exploring the Gap Between Pro-Environmental Beliefs and Behaviour Among Students

 **Krystyna Rejman** dr hab., prof. at WULS;  **Marzena Jeżewska-Zychowicz** prof. dr hab.
Warsaw University of Life Sciences, Poland
krystyna_rejman@sggw.edu.pl; marzena_jezewska_zychowicz@sggw.edu.pl

Abstract: In the new century, it has become clear that humans cannot manage the planet in a predatory way, causing much damage and destruction to the environment and threatening their own health. In order to safeguard the future of people and the planet, all human activities, production and consumption must be subject to the principles of sustainability. However, knowledge of these issues is not always matched by consumer behaviour. In this light the aim of the study was to assess beliefs and behaviour regarding sustainable consumption and their interrelationships in a group of students and in this context, the desire to increase knowledge about sustainable consumption and opinions on how to disseminate this knowledge were considered. A cross-sectional survey was conducted on a sample of 146 voluntary students of the Faculty of Human Nutrition at Warsaw University of Life Sciences (Poland), using the CAWI survey method. The relationship between students' beliefs and behaviour was characterized by varying strengths, but for all statements, more positive beliefs were accompanied by more positive behaviour. The strongest correlations regarded drinking tap water and not buying bottled water, and paying attention to the local/domestic origin of purchased products. The weakest correlations, but also significant, were found for buying seasonal fruit and vegetables to limit the purchase of imported food, not using plastic bags when shopping and separating recyclable waste. The desire to learn more about sustainable consumption differentiated students' beliefs and behaviour, but there were more differences in behaviour. Social media was the most accepted method of disseminating knowledge, followed by an optional subject, while compulsory training as part of studies had the least supporters. The study found that, on average, good pro-environmental knowledge was less likely to translate into sustainable consumption behavior. It is therefore essential to undertake a range of awareness-raising and behavioural change motivation initiatives as part of a national campaign. Social media is a favourite communication tool for young people, but the problem of motivating young people to seek out and visit relevant websites remains.

Keywords: environment, sustainability, beliefs, behaviour, students, education

Introduction

The current epoch in the history of planet Earth has come to be known as the Anthropocene due to the negative changes on the planet caused by human activity, especially its unbridled determination to pursue economic growth. Our individual actions have global repercussions, and our consumption is directly linked to the use of resources and the destruction of nature and its ecosystems (Mónica et al., 2020). The unrestrained consumption of natural resources has brought a huge extra load to the planet and destroyed the ecological environment. All inhabitants of the planet are experiencing global warming and climate change, biodiversity loss, water depletion and contamination, plastic pollution of the seas and oceans. The report "Renewable and Non-Renewable Resources" concluded that natural resources are depleting faster than they are being produced or renewed by nature (Conserve Energy Future.com).

The global food system has become the largest emitter of greenhouse gases, accounting for 34% of total anthropogenic emissions (Crippa et al., 2021), especially due to the monoculture cultivation of crops for food and feed, the industrial rearing of animals for meat, milk and eggs, and land use change (deforestation and peatland degradation). The price of progress in food supply is an epidemic of diet-related diseases and near annihilation of the environment, including climate catastrophes. Global food systems have contributed to the crossing of several planetary boundaries that define a safe space for humanity in the Earth system (Campbell et al., 2017). However, food systems have the potential to nurture human health and support a sustainable environment, but currently threaten both (Willett et al., 2019). Dietary changes are potentially the quickest action to implement and can be the foundation for reducing food waste and changing agricultural production (WWF, 2020). Transitioning to plant-based diets has the potential to reduce diet-related land use by 76%, diet-related greenhouse gas emissions by

49%, eutrophication by 49%, and green and blue water use by 21% and 14%, respectively, whilst garnering substantial health co-benefits (Gibbs & Cappuccio, 2022).

Meanwhile, it has been known for at least half a century that relentless global economic growth has its limits. This was warned of by members of the Club of Rome in their forecast “The Limits to Growth”, published in 1972, concerning the environmental (planetary) limits to further dynamic economic growth in the face of also dynamic world population growth (Meadows et al., 1972). In 1987, the World Commission on Environment and Development report “Our Common Future” (also known as the Brundtland Report after the commission's chairwoman) set out the first agenda for changing the world order towards long-term sustainable development. This was the name given to development 'that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987). The third turning point was the adoption by the UN (2015) of the document “Transforming our world: The 2030 Agenda for Sustainable Development”, which formulated 17 Sustainable Development Goals. Goal 12 addresses the responsible production and consumption of goods, emphasising the need to change consumption patterns to sustainable ones. It was only the magnitude and social, financial and economic impact of the covid-19 pandemic that brought about some changes in people's attitudes towards how they manage the planet's resources.

People need to rethink their behaviour patterns of consumption and understand how they acquire and dispose of resources. Awareness of the planet's limitations makes individuals more vulnerable to environmental variability, which requires from them a change in ‘take-make-waste’ approaches (Peterson, 2021). Shaping the pro-environmental behaviour of today's consumers is now a priority and ambitious challenge that needs to be addressed in order to ensure harmony and sustainability of the whole civilisation (Tarapata, 2015), with a view to the lives of future generations. The current turbulent environment places considerable demands on all society groups due to the need to adapt to sudden and unexpected changes in the established climate. Therefore, innovative research and solutions are needed, and the education system at all levels must respond to emerging challenges. This can be achieved in a knowledge-based society. The quality of the education system and its ability to respond to challenges is the cornerstone of sustainable development (Tomsik et al., 2023).

With this in mind, it was decided to explore the gap between beliefs and behaviour regarding sustainable consumption in a selected group of students.

Methodology

The aim of the study was to assess the different beliefs and behaviour regarding sustainable consumption, their interrelationships in a specific group of students, and to find out whether the declared willingness to expand knowledge on this topic influences the beliefs and behaviour analysed. The aim was also to find out students' opinions on different methods of disseminating knowledge about sustainable consumption.

The cross-sectional study was conducted in 2023-24 among students of the Faculty of Human Nutrition at Warsaw University of Life Sciences, Poland, using the CAWI (Computer Assisted Web Interview) survey method. Participation in the study was voluntary. The authors invited participants to the survey and upon acceptance of the invitation, they provided informed consent to participate. The questionnaire was completed by 146 students.

Questionnaire

The questionnaire included statements about selected aspects related to sustainable consumption. Each aspect was asked about twice: first the beliefs on each statement were asked (e.g., "Plastic bottles should be thrown away after unscrewing the cap and crushing the bottle") and then the behaviour regarding the statements. (e.g. "I throw plastic bottles away after unscrewing the cap and crushing the bottle"). All the issues included in the questions are shown in Table 1. For each statement, respondents marked a response on a 5-point scale: 1 – I do not agree; 2 – I rather agree; 3 – neither agree nor disagree; 4 – I rather agree; 5 – I agree.

In addition, students were asked if they would like to expand their knowledge of sustainable consumption. Responses were given on a 5-point scale: 1 – no, 2 – rather not, 3 – no opinion; 4 – rather yes, 5 –yes. Students also gave their opinions on the different methods of imparting this knowledge

using a 5-point scale: 1 – useless, 2 – rather useless, 3 – no opinion; 4 – rather useful, and 5 – very useful.

Statistical analysis

Frequency analysis and cross-tabulations were performed and means and standard deviations were calculated. Student's t-test was used to compare mean values, with an accepted significance level of $p < 0.05$. The Pearson correlation coefficient was used to assess the relationship between beliefs and behaviors relating to sustainable consumption. Statistical analysis was conducted using IBM SPSS Statistics for Windows, version 27.0 (IBM Corp, Armonk, NY, USA).

Results and Discussion

The sample consisted of 146 young adults, including 84.2% women and 15.8% men. The respondents were 18-34 years old. The mean age was 21.5 years, standard deviation 2.71. Most respondents (66.4%) lived in large cities (up to 100,000 inhabitants), 14.4% - in towns (below 100,000 inhabitants), and 19.2% in rural areas.

Table 1 illustrates opinions on selected beliefs and behaviors relating to sustainable consumption and their interrelationships in the study group. Respondents' opinions expressing beliefs were in the range of 3.5 - 4.7 mean value, while for behaviors they were in the range of 3.2 - 4.6.

The mean value describing the behavior was greater than the corresponding beliefs only for two statements, namely turning off the light after leaving the room for more than 5 minutes and drinking tap water and not buying bottled water. In contrast, there were no differences between beliefs and behaviors regarding discarding bottles after unscrewing the cap and crushing it, and buying seasonal fruit and vegetables to limit the purchase of imported food in this way. For the other statements, beliefs obtained higher mean values than the corresponding behaviors, with the largest difference noted for the statement related to the purchase of cosmetics with the "ozone-friendly" label. These differences were confirmed in the percentages of "totally agree" responses except for two statements regarding buying seasonal vegetables and fruits to limit the purchase of imported food (fewer such responses for behaviors) and knowing the product features and being interested in the whole life cycle of the product (same number of responses) (Table 1).

The relationship between beliefs and behaviors was characterized by varying strengths, but the correlations were always positive, that is, more positive beliefs were accompanied by more positive behaviors (Table 1). The strongest correlations were found for drinking tap water and not buying bottled water, and paying attention when shopping to the local/domestic origin of the product (correlation coefficients higher than 0.5). In contrast, the weakest correlations, but also statistically significant, were for buying seasonal vegetables and fruits and limiting the purchase of imported food; not using plastic bags when shopping at the supermarket; and separating recyclable waste (correlation coefficients lower than 0.3) (Table 1).

The plastic-reduction behaviour analysed in the study (not buying bottled water, going shopping with own textile bag) are of huge importance for improving the environment. Plastic has become a constant element in our lives as plastics are the materials in the largest quantities ever produced by man. Plastics production ramped up from 1.5 million tonnes in 1950 to more than 500 million tonnes in 2020 (Plastic Europe, 2016; Iberdrola, 2024). By 2015, 8,300 million tonnes of virgin plastics were produced, about 6,300 million tonnes of plastic waste were generated, of which around 9% was recycled, 12% was incinerated (polluting the air with toxic gases), and the remaining 79% accumulated in landfills or the environment (Geyer et al., 2017). According to Statista (2024) the production of polyethylene terephthalate (PET) bottles worldwide increased from 300 billion in 2004 to 485 billion in 2016, and it is forecasted that in 2021, some 583.3 billion of these plastic bottles will be produced. Reducing the consumption of plastics therefore requires not only a change in habits, but also a change of mindset. The favourable results of our survey on drinking tap water and not buying bottled water indicate a growing awareness of the need to reduce plastic consumption. This may be partly due to the promotion of a sustainable food consumption model. Sustainable food choices give an opportunity to combine sustainability messages with public health messages (Temme et al, 2015; Head et al., 2017). They come down to the rules that are largely consistent with dietary guidelines for the population, but also include

the rules directly focusing on environmental aspects of sustainability, for example 'buy food that meets a credible certified standard', 'buy local, seasonal and environmentally friendly food', choose 'sustainable farming with short transport routes and seasonal products', 'drink tap water' (Rejman et al., 2019). It must be also the result of the national publicity and educational programmes implemented in the schools that the students surveyed were able to attend. For example, in Warsaw, as part of the 'Warsaw tap water' educational programme, more than 30 springs with tap water have been installed in public places such as museums, the airport and squares. Every primary and secondary school in Warsaw can apply to the 'Water at School' project and have a spring installed free of charge (a programme funded by the city council and the city's water and sewage company). By September 2022, the devices had been installed in 239 schools (Żródełka ..., 2022).

However, it should be remembered that consumer behaviour is determined by many factors of different nature, and knowledge is only one of them. Pro-environmental awareness is the basis for green consumption, but people with pro-environmental awareness do not choose green consumption for sure, as consumers' perceived cost is an important obstacle to green consumption (Shen and Wang, 2022).

Table 1

Selected beliefs and behaviors representing sustainable consumption and their interrelationships in the study group

Statements describing sustainable consumption	Beliefs	Behaviors	Beliefs	Behaviors	Bivariate correlations
	Mean; SD		Agree (%)		
When leaving the room for more than 5 minutes, the lights should be turned off/ I turn them off	4.4; 0.95	4.5; 0.87	65.1	67.8	0.420**
One should drink/I drink/ tap water and not buy/I do not buy/ bottled water	3.6; 1.25	3.8; 1.46	26.7	47.3	0.562**
Plastic bottles should be thrown away/ I throw them away/ after unscrewing the cap and crushing the bottle	4.6; 0.69	4.6; 0.82	70.5	69.9	0.374**
It is necessary to buy/ I try to buy seasonal vegetables and fruits to minimize the purchase of imported foods	4.1; 1.08	4.1; 1.06	45.9	43.8	0.278**
Dishes should be washed/I wash them/ in a water bath, not under running water	3.6; 1.24	3.2; 1.24	28.8	21.9	0.443**
Used batteries should be brought back/I bring them/ to a special selective waste collection point or they should be thrown away/I throw them in special containers	4.8; 0.59	4.4; 1.02	82.9	65.1	0.339**
When shopping in the supermarket, do not use/ I do not use/ plastic bags but use your reusable bag/basket	4.7; 0.66	4.4; 0.90	80.8	68.5	0.210**
When buying products, you should/ I pay attention/ to whether they are from local/domestic production	3.9; 0.96	3.5; 1.24	26.0	21.2	0.576**
Consumers should be familiar/I am familiar/ with the product's performance features, but should also be interested/I am interested/ in the entire product life cycle	3.5; 1.18	3.3; 1.33	19.9	19.9	0.494**
When buying cosmetics, you should choose/I choose/ those that are labeled "ozone-friendly"	3.8; 1.09	3.1; 1.40	30.8	19.9	0.484**
It is necessary to segregate/ I segregate/ recyclable waste, i.e. glass, paper, plastics and metals, and vegetable organic waste	4.7; 0.60	4.5; 0.75	76.7	61.0	0.295**
It is necessary to think /I think/ about the amount of purchased products to limit them to those needed	4.6; 0.67	4.3; 0.90	65.1	47.3	0.424**

** Correlation is significant at $p=0.01$

Respondents' declared willingness to learn more about sustainable consumption differentiated their views and behaviors, with more differences noted in behaviors than views (Table 2).

Table 2

Selected views and behaviors representing sustainable consumption according to the declared willingness to expand their knowledge of sustainable consumption

Statements describing sustainable consumption	Willingness to expand the knowledge of sustainable consumption			
	1,2,3*	4,5*	1,2,3*	4,5*
	Views		Behaviors	
	Mean; SD		Mean; SD	
Consumers should be familiar/I am familiar with the product's performance features, but should also be interested/I am interested in the entire product life cycle.	3.1 ^a ; 1.15	3.7 ^a ; 1.15	2.8 ^b ; 1.37	3.5 ^b ; 1.27
It is necessary to buy/ I try to buy seasonal vegetables and fruits to minimize the purchase of imported foods.	3.9; 1.08	4.2; 1.06	3.8 ^b ; 1.28	4.3 ^b ; 0.93
When shopping in the supermarket, you do not use/ I do not use plastic bags but use a reusable bag or basket.	4.6; 0.78	4.8; 0.61	4.2 ^b ; 1.07	4.6 ^b ; 0.80
When leaving the room for more than 5 minutes, the lights should be turned off/ I turn them off.	4.4; 0.97	4.5; 0.95	4.2 ^b ; 1.21	4.6 ^b ; 0.68
When buying cosmetics, you should choose/I choose those that are labeled "ozone-friendly".	3.3 ^a ; 1.14	3.9 ^a ; 1.03	2.8; 1.39	3.2; 1.39
Plastic bottles should be thrown away / I throw them away after unscrewing the cap and crushing the bottle.	4.6; 0.71	4.6; 0.68	4.2 ^b ; 1.14	4.7 ^b ; 0.63
It is necessary to segregate / I segregate recyclable waste, i.e. glass, paper, plastics and metals, and vegetable organic waste.	4.7; 0.47	4.7; 0.64	4.3 ^b ; 0.85	4.6 ^b ; 0.70
It is necessary to think/I think about the amount of purchased products to limit them to those needed.	4.3 ^a ; 0.76	4.7 ^a ; 0.62	3.9 ^b ; 1.17	4.4 ^b ; 0.73

* willingness to expand knowledge of sustainable consumption: 1,2,3 - no, rather not, no opinion; 4,5 - rather yes, yes;

^{a,b} the means with the same superscripts differ statistically at $p < 0.05$; Student's t-test (t).

Those who declared willingness to expand their knowledge of sustainable consumption represented more correct views regarding familiarity with product features and consumer interest in the entire product life cycle; purchasing cosmetics with the "ozone friendly" label, and limiting the amount of products purchased to those needed. These individuals also represented significantly more behaviors revealing sustainable consumption.

The results show that having a certain level of knowledge is a motivation to explore it further. Mobilization attitude is discussed in the literature as a determinant of environmental awareness. Empirical studies provide strong evidence of the impact of mobilization attitudes on environmentally friendly practices. It has been shown, for example, that people living in closely connected neighbourhoods are more likely to buy chemical-free products, use less water and household energy, and drive less often (Macias & Williams, 2016). In a study on responsible energy consumption in the Polish households, mobilization attitudes and environmental awareness were shown to play a key role in explaining the relationship between environmentally unfriendly behaviour and energy efficiency behaviour (Jaciow et al., 2022).

The most accepted method of spreading knowledge on sustainable consumption issues was social media, followed by an optional course devoted to this issue during the study while the least accepted was

compulsory training as part of studies (Table 3). Those who declared a willingness to expand their knowledge of sustainable consumption expressed more positive opinions about all methods, except for the lack of differences in opinions regarding information posted on the University/Faculty's website.

Table 3

Opinions on methods of communicating knowledge about sustainable consumption according to the declared willingness to expand their knowledge of sustainable consumption

Methods of communicating knowledge about sustainable consumption	Total	Willingness to expand the knowledge of sustainable consumption	
		1,2,3*	4,5*
A compulsory course devoted to this issue during studies	3.6**; 1.18	2.8a; 1.28	3.8a; 0.02
An optional course devoted to this issue during the studies	4.0; 1.05	3.4a; 1.11	4.2a; 0.91
A compulsory training as part of studies	3.4; 1.27	2.8a; 1.38	3.6a; 1.15
Events dedicated to this issue at the University/Faculty	3.9; 1.02	3.4a; 1.15	4.1a; 0.90
Information posted on the University/Faculty's website	3.9; 1.12	3.8; 1.15	4.0; 1.11
Information posted on the social media of the University/Faculty	4.2; 0.95	3.8a; 1.01	4.3a; 0.91

*Willingness to expand knowledge of sustainable consumption: 1,2,3 - no, rather not, no opinion; 4,5 - rather yes, yes; **opinions presented on a 5-point scale: 1 – useless, 2 – rather useless, 3 – no opinion; 4 – rather useful, 5 – very useful; ^a means with the same superscripts differ statistically at $p < 0.05$; Student's t-test (t)

Again, students declaring a desire to expand their knowledge appeared more motivated and open to different methods of acquiring that knowledge. In the study among students of the University of Debrecen (Hungary) health and environmentally conscious food consumption was found to be at a fairly low level. In conclusion, the authors stressed that improvement in this area is definitely desirable, and higher education can play a significant role in this area (Gáthy et al., 2022). People living in Scandinavian countries are more sensitive to sustainability issues, so Norwegian and Swedish students had a better understanding of the need to change behaviour to more sustainable ones compared to Latvian students. However many students from these countries understood the need for sustainability and believed that sustainability topics should be included in school curricula (Porozovs et al., 2017). In light of the many challenges facing today's generations, a growing number of authors indicate that education for sustainability should be implemented at all levels of education (Scalabrino et al., 2022; Cyrankowska et al., 2019) and support more integral approaches to knowledge dissemination (Wamsler, 2020), as they are equally important and complement each other (Cakula, 2021).

Conclusions

The study showed that knowledge regarding pro-environmental behaviour of the surveyed group of students translated to a lesser extent into such behaviour (on a 5-point scale, the means for knowledge ranged from 4.8 to 3.5, for behaviour from 4.6 to 3.1). Students with better knowledge of pro-environmental behaviour were also more likely to declare their willingness to extend this knowledge. Social media proved to be a preferred tool for communicating about sustainable consumption, but the problem of motivating young people to find and visit relevant websites remains. A number of initiatives are therefore needed to raise pro-environmental awareness and motivate behavioural change. It is certainly necessary to publicise the importance of the challenges facing communities and to reach out with sound scientific knowledge by all possible means. Action should be undertaken at all levels of school and university education, seminars, trainings and workshops should be conducted in cultural centres, libraries, workplaces etc. as part of national campaigns demonstrating the sense and need for

behavioural change towards sustainable behaviour, i.e. towards behaviour that is friendly to the planet and its inhabitants.

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