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Level of Awareness and Attitudes towards Plastic Contamination by Students of an Italian University

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Abstract: Although micro- and nanoplastics (MNPs) represent one of the main environmental emergencies worldwide, citizens are not always aware of their active role in contributing to such contamination. In this study, the perception, level of knowledge, and behaviours towards MNPs were assessed in young citizens in Modena (Italy), represented by science-oriented Bachelor's students (n = 220) enrolled at the university, through the administration of a voluntary-based questionnaire. No differences in knowledge and in students' attitudes were observed according to gender and the undergraduate program. Students seem to be aware of MNPs' global distribution and effects on ecosystems but were less advised about MNP types and their potential effects on human health. A positive correlation between the students' level of concern and their knowledge or their behaviour was found. Differently, no correlation between students' knowledge and behaviour towards plastic and MNP contamination was observed. Thus, having a good knowledge of the issue does not always translate into effective actions planned to mitigate the problem. As a first step forward, more environmental education programs should be promoted to increase knowledge and awareness in young citizen as well as pro-environmental behaviours to pursue future mitigation strategies.

Keywords: microplastic; pollution; citizen science; university students; questionnaire; sustainable behaviour; environmental education

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1. Introduction

Globally, plastic production has grown from a few tons in the early 1950s to more than 390 million tons in 2021, out of which it is estimated that 352 million tonnes are derived from oil [1]. Properties such as malleability, durability, corrosion resistance, low production costs, versatility in end use, lightness, etc., which have made these materials successful in modern society, are also the main determinants for their high persistence, with manifold short- and long-term effects on the environment. By nature, in fact, plastic waste is poorly biodegradable and therefore pervasive and widely distributed in all ecosystems on the planet [2].

It has been estimated that plastic products such as bottles and bags could take several hundred years to fully degrade in the marine environment [3]. Over time, plastic materials dispersed in the environment lose their integrity and fragment as a result of abrasion, photo-oxidation, and other abiotic and biotic degradation processes [4], giving rise to small particles called microplastics (usually with size between 0.001 and 5 mm) and nanoplastics (with size below 1 µm), referred in the text as MNPs, which represent a threat to the environment and the organisms within [5], including, among others, humans [6].

Although the scientific literature on MNPs and their effects on organisms and ecosystem functions is vast and constantly updated, relatively few studies have analysed the perception of this environmental issue in its social dimension [7], resulting in the need to understand how much scientific knowledge about MNPs reaches citizens (i.e., as the

main end users and consumers) and through which information channels. Indeed, even though land-based sources (including inadequate industrial and domestic disposal and littering) represent the primary pathways by which MNPs are released in the environment and migrate among different matrices [8–10], people might not be fully aware of how much their lifestyle and attitudes can contribute to such contamination.

The detrimental effects of MNPs are multiple and well known. At least 700 marine species across the world are negatively affected by the presence of plastic litter in the sea that can trap, choke, or injure sea turtles, birds, and marine mammals. MNPs also critically affect marine biota through ingestion by a large number of aquatic organisms, starting from primary producers, with subsequent bioaccumulation in the trophic chain [5,11]. The entry and accumulation of MNPs also poses a risk to human health, since several studies have shown that they can reach humans via animal/vegetable food items [12] and water and/or by leaching from plastic food and drink packaging [6,13]. The effects of the prolonged ingestion of MNPs are not yet well understood, but they are suspected to enhance inflammatory responses and disrupt the gut microbiome, while MNP exposure via inhalation could cause lung cancer and may have adverse neurological effects [14–16].

Another source of the ingestion and breathing of microplastics is represented by the "fallout" (i.e., atmospheric MNPs precipitated to the ground), which can even be greater than particles taken with contaminated food, especially for children [17–19]. Both outdoor and indoor environments are contaminated by microplastics. As such, the deposition of MNPs is mainly linked to the abundance and composition of the textile materials present in rooms and to the turbulence in the air that can resuspend the MNPs and carry them from external environments [17,20,21]. Thus, in urban settings, people are particularly exposed to MNPs on multiple fronts, and most of our lifestyle choices, including the type of food consumed (i.e., also packaging wise), the composition of clothes (potential source of synthetic microfibres), and the means of transport used (source of tire wear debris) can affect the intake of MNPs [6,12,19,22,23].

Human society is facing a wide range of challenges related to sustainability, with varying levels of complexity; people are often forced to take positions on a range of environmental and societal issues and make decisions to address the problems arising from such challenges [24–26]. Tackling complex issues like climate change or pollution typically involves the combined actions of different stakeholders, including public authorities, industries, researchers, the media, and civil society [27]. Noteworthy, the improvement in public awareness, sensitisation, and the understanding of public perceptions cannot be pursued without proper science communication. Thus, knowing through which sources people receive and assimilate information is essential to achieve the ultimate goal of engaging society in environmental solutions following the One Health approach [28] by promoting sustainability consciousness [29].

Educational activities seem to be a promising strategy to increase engagement and raise awareness [30,31] among citizens, pushing everyone to actively participate in a range of environmental and social issues [32,33]. The part of the population that should be most aware of environmental risks is represented by students in the field of scientific disciplines, who should adopt sustainable and pro-environmental behaviours and also disseminate them [30,31,34,35]. Involving students in awareness-raising projects by motivating them to embrace the challenges of plastic pollution has been recognized as an effective training and action tool to promote virtuous behaviours and orient the new generations towards a "plastic-free" (or at least a "plastic-less") future [24,36–42].

Although the body of research on environmental education programs is growing, social science studies on plastic pollution and particularly microplastics remain rather fragmented worldwide (see [40] and references therein for some examples).

To the best of our knowledge, people's conceptions of MNPs in Italy have been very poorly investigated; ref. [43] highlighted the lack of knowledge about microplastics within a sample of future healthcare workers, while [44] analysed the intention of young Italian students to buy bottles of water packaged with eco-friendly materials, demonstrating the

presence of high sensitivity to paying for the purchase of green bottles. Therefore, further studies are needed to gain insights on people's awareness on these topics.

Following this call, this study aimed at assessing the level of knowledge, awareness, and attitudes towards MNP contamination in science-oriented Bachelor's students at the University of Modena and Reggio Emilia (UNIMORE, Italy). This student sample has finished secondary school diplomas and has already experienced university education; thus, they can provide useful information on the effectiveness of science communication and the need to implement awareness campaigns [36,37]. Students from the first and second years of different degree courses (Biological Sciences, Natural Sciences, Biotechnologies, Geology, Mathematics, and Informatics) volunteered to participate in a questionnaire survey. Potential differences among groups in terms of their information and background on MNPs and their perceptions and attitudes towards plastic and MNP pollution were evaluated.

In line with [41], our hypothesis was that students choosing and following more ecology-oriented courses at the University, for example, Biological and Natural Sciences, would have been more informed about MNP risks, with effects on their everyday choices towards pro-environmental behaviours compared to students from other courses. Following the validation of the questionnaire items, this hypothesis was assessed by comparing the knowledge about MNPs among the students' groups and evaluating the potential correlation with their perception and attitudes. A focused description of the research methods and the subjects considered can be found in the Methods section.

2. Materials and Methods

2.1. Questionnaire Design and Structure

The questionnaire "Micro for life—Plastic that lasts" was developed at UNIMORE by experts in the field of Ecology and Ecotoxicology, taking into account the relevant literature on the topic to assess knowledge, perception, and attitudes [36–38,43,45] of the respondents.

The questionnaire (see full text in the Supplementary Information) was administered as a quiz test of 25 questions, divided into 5 sections:

1. Profile of respondents (questions n. 1, 2), which allowed us to group the students based on gender and university degree course, which were used as variables for data analysis.
2. Awareness (n = 6, questions n. 3–8), to understand how students perceive such environmental issues. The question n. 3, "Are you worried about the impacts of plastic pollution on the environment and the human beings", aimed to quantify the students' level of concern towards plastic and MNP contamination using a Likert scale from 1 (I have no knowledge about this) to 5 (Yes and I think actions are needed to reduce the problem).
3. Knowledge (n = 13, questions 9–21), to evaluate the general background information of the students about plastic waste and MNPs, including their environmental distribution and impacts. This section included multiple-choice questions, with the exception of one true or false question, designed with single (n = 8 questions) or multiple correct answers (n = 5 questions, having two correct answers to select). To highlight these multiple-answer questions, the sentence "check all that apply/select two answers maximum" was added, to invite the respondents to choose more than a single option. The option "I don't know" was also provided to discourage random answers.
4. Attitudes (n = 4, questions 22–25), to acquire information on students' behaviours and activities associated with the usage and release of plastic waste and, thus, exposure to MNP.
5. The last section "For a less-plasticised life. . ." contained additional information about MNP sources from everyday products including plastic packaging from food containers, personal care products, clothing, and shopping bags, with suggestions to reduce plastic usage and release into the environment.

Once the quiz was completed, key information on sections 2–4 were displayed to provide the respondents with explanations of the correct answers and links to freely available short videos [46–48] about MNP occurrence in the environment and their effects on wildlife and humans. Together with the section 5, this aimed at raising students' awareness with targeted thoughts and real examples of plastic usage and pervasiveness in everyday life.

2.2. Questionnaire Administration

To test our hypothesis that students choosing ecology-oriented courses would have been more informed with respect to students from other scientific-based courses, we conducted an exploratory study considering as potential participants only UNIMORE undergraduate students enrolled in the first and second years of science-oriented Bachelor's degree courses (Table S1), without extending the survey to other fields. A similar sampling approach was carried out by [34,39,43].

To this aim, Biological Sciences and Natural Sciences courses (BS + NS) were considered as a single group of students more oriented to the study of the environment and natural communities. Indeed, both include teaching courses in Botany, Zoology and Ecology (for an average quantity of more than 220 h of work per academic year, including lessons as well as home study), which are not present in the other scientific degree courses (Biotechnologies, Mathematics, Informatics, and Geology).

The questionnaire was administered online using the App Google Forms in Google Workspace from the beginning of April to early June 2022. Prior to the quiz, participants were notified that the survey was voluntary and anonymous with data collected and administered by UNIMORE researchers as aggregated only.

In order to proceed and complete the test, participants had to answer all the questions by selecting at least one option. No final score was provided, as student evaluation was not the aim of the study. Only completed questionnaires were considered for further analysis.

2.3. Data Collection and Analysis

Questionnaire answers were displayed as a Microsoft Excel data sheet and organised based on the profile of respondents, i.e., their Bachelor's degree course and gender (male or female).

Questions from the Awareness and Attitudes sections were used to determine the perception and describe the behaviour, respectively, of the respondents towards MNP contamination. For each question, the relative frequency of the observed answers was determined. Differently, questions from the Knowledge section were considered as quantitative items, attributing a score of 1 to single correct answers, 0.5 to each correct answer in multiple-answer questions (i.e., questions n. 13, 16, 18, 19, 20), and 0 to wrong answers. For each question, a total score per student was then obtained, and the frequency of responses was determined.

Furthermore, the difficulty index ($I_{difficulty}$) and the discrimination index ($I_{discrimination}$) were calculated according to [49] to determine the validity of the questionnaire items for data analysis. The $I_{difficulty}$ (from 0 to 1) corresponds to the ratio between the number of correct answers and the number of students, according to Equation (1):

$$I_{difficulty} = \frac{(S_{max} - S_w)}{S_{max}} \quad (1)$$

with S_{max} being the maximum score for n students and S_w being the score associated with wrong answers for n students. Questions were classified as "difficult" ($I_{difficulty} < 0.2$), "acceptable" ($0.2 < I_{difficulty} < 0.8$), and "easy" ($I_{difficulty} > 0.8$) for the student sample, and only acceptable questions were considered for further analysis.

The $I_{discrimination}$ (from -1 to 1) was used to measure the ability of each question item to discriminate between high-performing students (who reached the highest scores in the questionnaire) and the worst-performing ones. $I_{discrimination}$ is often used to evaluate

the robustness of a questionnaire in pilot studies [49]. To this aim, the database for the Knowledge quantitative items was listed on Excel (v. 2404) in a decreasing order based on the total score of each student. Then, for each question, the sum of the score in the first n rows (i.e., students performing well) was subtracted from the sum of the score in the last n rows (i.e., students performing poorly) according to (2):

$$I_{discrimination} = \frac{(\sum \text{first n rows} - \sum \text{last n rows})}{\text{nrows}} \quad (2)$$

with n corresponding to the 25% percentile in large datasets. Positive values of the $I_{discrimination}$ are associated with a high ability of the question to discriminate students' performances, whereas values close to 0 or negative suggest potential random false results and/or the bad formulation of the question.

In line with similar studies [49], the $I_{discrimination}$ was considered "not reliable" for values < 0.2, "acceptable" for values between 0.20 and 0.29, "good" for values between 0.30 and 0.39, and "excellent" for values > 0.40.

2.4. Statistical Analysis

Regarding Knowledge quantitative items, differences in the total score of the students associated with gender within the single groups as well as in the whole student sample were assessed through the Mann–Whitney test. The same test was applied to determine significant differences in the total score of the students between the groups (i.e., BS + NS vs. other degree courses). These analyses were performed using GraphPad Prism version 5 for Windows, GraphPad Software, San Diego, CA, USA.

The correlation between knowledge and perception or behaviour toward plastic pollution and between perception and behaviour was assessed using the Kendall rank correlation, following a Shapiro–Wilk test to assess the normality of the data, using Past version 4.03 for Windows. To this aim, the Knowledge total score for each student was correlated to question n. 3 "Are you worried about the impacts of plastic pollution on the environment and the human beings?" expressing their level of concern (Likert scale from 1 to 5; see Section 2.1) or their habits (questions n. 23 "How often do you buy food wrapped in plastic?" (Very often = 0, Sometimes = 0.5, Hardly ever = 1) and n. 25 "Which kind of water do you drink?" (In plastic bottle = 0, In glass bottle = 0.5, Tap water = 1) in the Attitudes section), for which answers were ranked to obtain ordinal data. The other questions related to the students' attitudes (i.e., n. 22 and 24, see Section 3.3) were not considered, as it was difficult to define a rank for all the answer options.

3. Results

3.1. Profile of the Respondents and Level of Awareness

The questionnaires received (n = 220) were filled by 146 students enrolled in BS + NS, 29 from Mathematics, 20 from Informatics, 19 from Biotechnologies, and 6 from Geology. The whole student sample was composed by 137 female and 83 male students.

A total of 95.5% of the respondents expressed their concern or high concern (4 and 5 points on the Likert scale, respectively) about the impacts of plastic pollution and MNPs (question n. 3) and the need for actions to mitigate the problem. The remaining respondents (4.5%) expressed an average level of concern (3 points).

Students indicated that plastic is essential in our daily life (question n. 4) because it is a long-lived, light, and resistant material, with a low cost of production that allows for the high availability of products for manifold applications. Some students (n = 41) also underlined the lack of valid alternative materials.

To the question n. 5 "Which are the main problems associated with plastic waste dispersion in the environment?", most of the students chose environmental pollution (43%) and impacts on wildlife, like gut blockage and internal injuries (41%), while a lower number indicated "they are harmful to human health" (12%) and "they obstruct drains and sewers" (4%).

Before this questionnaire, most students (n = 205, 93%) had previously heard about microplastics, mainly at school (45%), on television (40%), and within the family (15%) (question n. 6).

Other questions about MNP perception (see Supplementary Information) included the following: "During which of these activities you could be most exposed to microplastics?" (question n. 7). A total of 50% of the respondents chose eating seafood (mussels, clams), while others selected washing teeth (18%), eating lettuce (10%), and washing a cotton t-shirt (10%).

To question n. 8 "Which of these MNP effects seems more serious to you?", students mostly selected options such as "physical damages on growth and reproduction of marine animals" (26%) and "suffocation and malnourishment of marine animals" (18%). "Bioaccumulation in animals which are eaten by humans" was also chosen by a portion of the respondents (29%). Fewer students selected other options, such as "MNP are a cocktail of other contaminants, such as pesticides and drugs present in the environment" (14%) and "inhalation/ingestion in human beings through air transport and fallout" (13%) as the most serious effects they perceived.

3.2. Level of Knowledge about Plastic and MNP Pollution

Regarding the knowledge about plastic and MNP pollution, no significant difference related to gender was found in the total score obtained by each student when considering the whole group of UNIMORE science-oriented Bachelor's students who participated in the survey (n = 220) (Mann–Whitney test, $p = 0.7805$) (Figure 1A). Likewise, no significant difference related to gender was found within students' groups, corresponding to BS + NS and other science-oriented degree courses (Mann–Whitney test, BS + NS: $p = 0.7581$; Other: $p = 0.3245$).

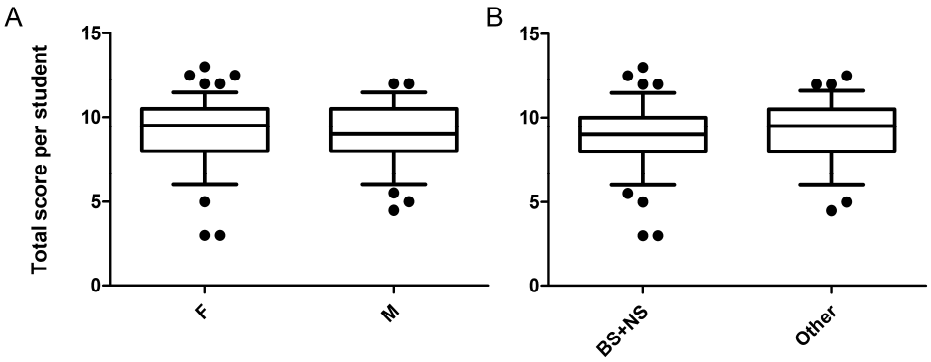

Figure 1. Box and whisker plots with 5–95% confidence interval showing total score about plastic and MNP pollution knowledge obtained by UNIMORE respondents grouped by (**A**) gender (F, female; M, male) and (**B**) degree courses (Biological Sciences and Natural Sciences degrees, BS + NS, vs. others, i.e., Biotechnologies, Mathematics, Informatics and Geology).

No significant difference in knowledge about plastic and MNP pollution was found between the two groups of students considered: BS + NS (n = 146) and other science-oriented degree courses (n = 74) (Mann–Whitney test, $p = 0.2400$) (Figure 1B).

Given the lack of difference between the groups of students, the frequency (%) of correct answers to the Knowledge questions is reported in Table 1 as referring to the whole student sample. Overall, most of the questions (9) displayed an acceptable level of difficulty ($I_{difficulty}$ range 0.43–0.80) for the students, with 6 out of 9 questions associated with a frequency of correct answers >60%.

Table 1. Frequency (%) of the correct answers to the Knowledge question items about MNP occurrence and impacts in the University student sample, difficulty index ($I_{difficulty}$), and discrimination index ($I_{discrimination}$). Not acceptable values are displayed in bold.

Knowledge Items														
Question		**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Correct answers	**100%**	62.73	92.27	88.18	68.64	80.45	68.18	69.09	43.64	81.36	7.73	58.64	60.45	42.73
	50%	-	-	-	-	19.55	-	-	22.73	-	55.91	35.45	37.73	-
	0%	37.27	7.73	11.82	31.36	0	31.82	30.91	33.64	18.64	36.36	5.91	39.55	57.27
$I_{difficulty}$		0.63	**0.92**	**0.88**	0.69	0.80	0.68	0.56	0.44	**0.81**	**0.08**	0.59	0.60	0.43
$I_{discrimination}$		0.49	0.20	0.36	0.51	0.31	0.65	0.71	0.82	0.55	0.54	0.56	0.57	0.98

Question n. 18 "What are the main sources that release microplastics directly into the environment?" was the only one that was too difficult for the students (7.7% frequency of correct answers, $I_{difficulty}$ = 0.08). However, for this multiple-answer question, 55.9% of the respondents selected at least one correct answer option, thus receiving 0.5 points. If these half-right answers are considered in the index calculation, the question item becomes acceptable ($I_{difficulty}$ = 0.36).

Three Knowledge questions (n. 10, 11, and 17) were too easy (Table 1), including "Which are the most abundant materials found as litter along the Italian coasts?" (n. 10, $I_{difficulty}$ = 0.92), potentially due to the extensive media coverage of marine plastic litter in the last decade. Differently, the ease of question n. 11 "Will there be more plastic waste than fish (by weight) in the sea by 2050?" ($I_{difficulty}$ = 0.88) is probably related to its formulation as a true-or-false question, thus having only a single distractor. The figure associated with question n. 17 "What is the main source of microplastics?" could have suggested the correct interpretation, facilitating the answer ($I_{difficulty}$ = 0.81).

Nevertheless, $I_{discrimination}$ values were always acceptable, with 10 out of 13 questions associated with excellent $I_{discrimination}$ values and 2 associated with good values (Table 1). Question 10, which was also considered too simple ($I_{difficulty}$ > 0.9), is the only one falling in the acceptable category of $I_{discrimination}$ (0.2), at the lower limit of not reliable values, indicating that this question item should be modified for future surveys to better differentiate students who perform well from the others.

The Radar chart in Figure 2 shows the total score per student (%) obtained for pair of questions grouped in categories, such as microplastics definition (questions n. 15 "What shape do microplastics have?" and 16 "Which of these products can be identified as microplastics?"), sources (questions 17 "What is the main source of microplastics?" and 18 "What are the main sources that release microplastics directly into the environment?", based on [50]), environmental distribution (questions n. 10 "Which are the most abundant materials found as beach litter in Italy?" and 19 "Microplastic pollution also affects rivers and their concentration can vary considerably (. . .). What could these variations be due to?", based on [51]), impacts (questions n. 13 "To date, plastic has been found in the gastrointestinal system of 90% of sea birds (. . .). Which type of impact can plastic have on their health?" and 14 "Can the size of ingested plastic fragments influence the type of damage?"), and human exposure (questions n. 20 "Can human beings assimilate microplastics? If so, how?" and 21 "How much microplastic a person can ingest in a week?", based on [6]). Students were more informed about the environmental occurrence and distribution of MNPs (score > 80%) and impacts on wildlife (score of 79%), while more knowledge gaps could be identified in the definition of microplastics, their sources, and pathways for human exposure (score ranging from 58 to 67%).

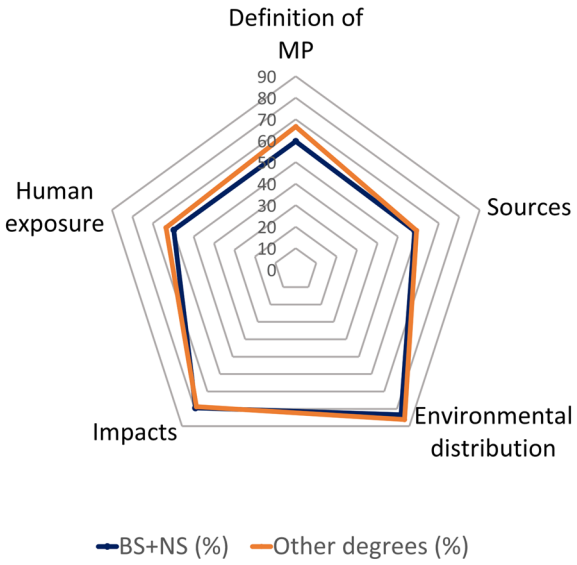

Figure 2. Level of knowledge (total score per student, %) about plastic litter and MNPs of Bachelor's students from the University of Modena and Reggio Emilia (Biological Sciences and Natural Sciences degrees, BS + NS, and other degrees, i.e., Biotechnologies, Mathematics, Informatics and Geology) according to five categories: definition of microplastic (MP), its sources, environmental distribution, impacts, and human exposure.

3.3. Students' Behaviour and MNP Input

Data associated with students' attitudes are summarised in Table 2. This section allowed us to collect information about potential sources of MNPs linked to students' attitudes, making them reflect about their role in MNP spread, further explored in the last section "For a less-plasticised life. . ." (see Supplementary Information).

Table 2. Attitudes of science-oriented Bachelor's students from the University of Modena and Reggio Emilia participating in the study.

Question	Answer	BS + NS n (%)	Other Degrees n (%)	Total n (%)
n. 22 Which is the composition of the clothes you are wearing?	Natural fibres (e.g., cotton, linen, wool)	26 (18%)	18 (24%)	44 (20%)
	Mixed fibres (e.g., cotton and nylon, as jeans)	106 (73%)	52 (70%)	158 (72%)
	Synthetic fibres (e.g., nylon, polyester)	14 (10%)	4 (5%)	18 (8%)
n. 23 How often do you buy food wrapped in plastic?	Very often	91 (62%)	46 (62%)	137 (62%)
	Sometimes	51 (35%)	24 (32%)	75 (34%)
	Hardly ever	4 (3%)	4 (5%)	8 (4%)
n. 24 How do you start your day?	With a cup of tea (using a tea bag)	35 (24%)	19 (26%)	54 (25%)
	With a coffee (capsule)	21 (14%)	7 (9%)	28 (13%)
	With a coffee (moka)	42 (29%)	20 (27%)	62 (28%)
	With a mug of milk	48 (33%)	28 (38%)	76 (35%)
n. 25 Which kind of water do you drink?	In plastic bottle	68 (47%)	25 (34%)	93 (42.5%)
	In glass bottle	28 (19%)	6 (8%)	34 (15%)
	Tap water	50 (34%)	43 (58%)	93 (42.5%)

The results obtained clearly show the importance of plastic-based products in students' everyday life. Indeed, for question n. 22 "Which is the composition of the clothes you are wearing?", most of the respondents indicated that their clothes were composed of mixed natural and synthetic fibres (n = 158, 70%), such as jeans, and that they very often buy food wrapped in plastic (n = 137, 62%). Other questions such as n. 24 "How do you start your day?" about breakfast preferences and n. 25 "Which kind of water do you drink?", with a

choice between tap and bottled water further underlined the importance of the students' everyday choice in contributing, unintentionally, to MNP contamination, such as drinking water in plastic bottles (n = 93, 42%) or using coffee capsules and tea bags often made of plastic.

Results of the correlation analysis are shown in Table 3. A positive correlation between the students' level of concern and their knowledge (τ = 0.11211, p-value = 0.013341) or their behaviour (τ = 0.16899, p-value < 0.001) was found. Differently, no correlation between students' knowledge and behaviour towards plastic and MNP contamination was found (τ = 0.026284, p-value = 0.5618).

Table 3. Correlation (Kendall's τ coefficient) between students' knowledge (question n. 9–21), level of concern (question n. 3), and habits (question n. 23 and 25) towards plastic pollution. * and ** indicate significant correlation at $p < 0.05$ and 0.001, respectively.

	Knowledge	**Level of Concern**	**Attitude/Behaviour**
Knowledge		0.11211 *	0.026284
Level of Concern	0.11211 *		0.16899 **
Attitude/Behaviour	0.026284	0.16899 **	

4. Discussion

4.1. Students' Sample Size

The present study represents one of the very few [43] conducted in Italy on levels of awareness and attitudes of young citizens towards MNP contamination so far. Since the questionnaire was administered on a voluntary basis to students from selected science-oriented courses of a medium-sized university (UNIMORE), the sample size is subject to this constraint, reflecting overall 25% of the number of undergraduate students in their first and second years, with differences depending on the degree course (Table S1). The number of questionnaires received is yet in line with previous survey-based studies [24,37,38,41]. In particular, [38] focused on a broader and more diversified sample considering the same number of students as in this study (220), but from various institutions across a whole country (India) and at different education levels/fields, thus with a higher heterogeneity of the participants.

Since our questionnaire "Micro for life—Plastic that lasts" was made available only to some degree courses and years and for a limited period (two months), this research is still exploratory, and results cannot be generalized to the whole University population. Future studies should extend this survey to a larger portion of University students. Moreover, since these results are skewed to the voluntary-based items, potentially selecting people already highly interested in these environmental problems, future questionnaires could be administrated to all University students, for example, as a part of a course on the transversal skills for sustainability, e.g., in [52], which are now offered by several universities as a part of Agenda 2030 targets.

4.2. MNPs as an Environmental and Health Issue: Perceptions and Knowledge Gaps

Regarding the wording in the questionnaire, the $I_{discrimination}$ confirmed the robustness of the question items. The analysis of the $I_{difficulty}$ for multiple-answer questions suggested that the use of specific terms within question n. 18 could have favoured the high frequency of partially right answers, since these ones could have been too difficult for Bachelor's students to recognise (e.g., primary microplastics, directly released into the environment). Upon adopting this survey, future studies should thus implement this instrument considering, for example, the results from $I_{difficulty}$ to select relevant questions.

UNIMORE science-oriented Bachelor's students displayed a similar level of knowledge about plastic litter and MNPs, regardless of their gender and field of study. As mentioned, since the students volunteered to participate in the survey, we can assume that they were interested in the topic and probably sensible to environmental issues. Indeed,

UNIMORE students expressed high concern towards the impacts of plastic waste and MNP contamination on the environment and human beings (question n. 3 "Are you worried about the impacts of plastic pollution on the environment and the human beings?").

Students' awareness about the effect of plastic waste and the nature of MNPs were mainly linked to previous education (i.e., high school) and mass media influencing their perception (question n. 6 "Before this activity, had you ever heard about microplastics?", answer options: Yes, at school; Yes, on television; Yes, within the family; No). These data are in line with what has been found in other questionnaires on students' conceptions about microplastics, where the media field emerged as a major source of information [36] compared to school [37]. Indeed, in contradiction to what we expected, descriptive analysis revealed that knowledge about plastic pollution and MNP was not associated with the degree course of the students (i.e., ecology-oriented vs. other science-oriented degree courses). Our findings are in contradiction with [41] but in line with [36,39].

Results from the Awareness section underline a general partial knowledge about MNPs of the respondents. While they seem fully aware of the breadth of the usage of plastic, they are unaware of potential alternatives (e.g., plastics that are bio-based and/or biodegradable), maybe because these ones are still less accessible to the population (see question n. 4 "In your opinion, why is plastic an essential part of our daily life?"). Likewise, the highest percentage of the respondents refers to plastic waste dispersion as the source of environmental problems; people tend to associate plastic pollution to floating debris and sea life and seem unaware of its implications in everyday consumables [38]. Indeed, MNPs are poorly perceived as a problem for human health and for sewage systems as well. Students mostly selected environmentally oriented options (e.g., for questions n. 5 "In your opinion, which are the main problems associated with plastic waste dispersion in the environment?", 7 "During which of these activities you could be most exposed to microplastics?", and 8 "Which effects of microplastic seem more serious to you?"), possibly given the extensive media coverage about the physical damages attributed to marine litter (macro- and mesoplastic) to marine wildlife and the notorious accumulation of substances in large fish predators (e.g., the presence of heavy metals, like mercury, in tuna). These topics are often well acknowledged compared to MNP contamination in air, fresh waters, and soil and for human health. Indeed, the health impacts, sources, and transport of MNPs in different environmental compartments (including densely populated areas) are still poorly investigated [16,53] and hardly acquired by the public domain [36]. A percentage of students also indicated that washing a cotton t-shirt could expose humans to microplastics, suggesting some knowledge gap and/or misinformation derived by mass/social media or poor media coverage.

These findings could be possible starting points for future citizen-based studies and outreach activities on MNPs. We suggest exposing University students to novel overlooked topics such as air-transported MNPs from urban sources, such as microfibers and tyre particles, or their effects on soil fauna to spread and differentiate knowledge and improve awareness.

4.3. What Drives Students' Pro-Environmental Behaviours?

The questionnaire (see full text in the Supplementary Information) also provided noteworthy information on the attitudes and behaviours of science-oriented Bachelor's students. A large proportion of students wear clothes made up of mixed materials, composed partly of natural and synthetic fibres (question n. 22 "Which is the composition of the clothes you are wearing?"). Synthetic textile fibres, obtained from plastic polymeric materials, constitute another important source of release of microplastics into the environment [17]. Thus, the more synthetic materials we wear, the more microfibres we release both indoors and outdoors. During washing, due to mechanical stress, temperature, and chemical attack, synthetic microfibres are released into domestic wastewater. Treatment plants effectively retain most of the suspended microfibres, with a removal rate of 85% on average globally and over 95% in industrialized countries [54]. Nevertheless, a quantity of 200,000–500,000 tons

of textile microfibres not retained by wastewater treatment plants has been estimated to reach aquatic environments annually [54].

A high percentage of university students (63.06%), spending a good part of the day away from home, often consumes prepackaged food wrapped in plastic (question n. 23 "How often do you buy food wrapped in plastic?"). At the European level, during the period 2018–2021, Italy stood out for its demand and use of plastics, mainly in packaging, and was second only to Germany [1]. The huge amount of plastic packaging used for the sale and storage of food items is one of the main sources of plastic waste into the environment. Plastic packaging is in fact short-lived and, given its function, becomes waste very quickly when it is not recycled or properly disposed [55]. To cope with the downsides of plastics waste, especially disposable and packaging products, within the Zero pollution action plan, the European Union has implemented the EU Eco-Green Directive 2019/904, including targets to be achieved in Europe by 2030 which foster the reduction of waste (in favour of more recyclable and sustainable products), CO_2 emissions, and environmental damages. National and international measures like this one will likely impact consumers' choices in the near future, lowering the use of plastic packaging and single-use plastics.

In question n. 25, "Which kind of water do you drink?", tap water and water in plastic bottles were the most consumed among the students considered. The differences between degree courses (i.e., BS + NS and others) may be due to the prevalence and thus accessibility of water dispensers in UNIMORE. Water dispensers are not yet equally present in all University buildings, while plastic bottles remain readily available in the vending machines. Data from the Italian National Institute of Statistics [56] reported that in 2021, 28.5% of Italian households stated that they did not trust drinking tap water. This negative perception has been declining sharply in recent decades [56]. However, in 2015, about 11 billion polyethylene terephthalate (PET) bottles for packaged water or beverages were placed in the United States and about 70% of these were not recycled, becoming waste [57]. Moreover, PET packaging accounted for 12% of global solid waste in 2021 [58].

Recent studies have reported that both tap and bottled waters contain MNPs of different shape, nature, and size (mostly < 10 µm) and may therefore constitute an important exposure pathway for humans [59]. MNP contamination in water for human consumption is still an emerging line of research (e.g., [59,60]), and the studies that have been published so far do not always determine which type of water may constitute a major exposure pathway for humans [59]. The system of extrusion at high temperatures, which ensures the microbiological safety of the product, results in the micronization of plastic bottle caps and, therefore, in the release of MNPs [13].

The results of the correlation analysis indicate that the students displaying high levels of concern towards plastic-related environmental issues were also those reaching the highest score in the Knowledge questions and/or displaying pro-environmental behaviours, such as drinking mostly tap water and avoiding plastic food packaging while shopping. On the other hand, higher knowledge on plastic topics was not necessarily associated with a more positive attitude, in line with [38]: if there is no baseline level of concern or sensitivity toward the problem, the level of knowledge seems not to lead to changes in students' behaviour. Ref. [61] also highlighted a significant correlation between the level of concern about plastic pollution and behavioural changes, i.e., trying to avoid and reduce the use of one-time plastic bags or stop using plastic straws in teenagers and high school students.

It is probable that students mostly display individual behaviours driven by their willingness, as suggested by [39], and related to their former (environmental) education and media narratives that provide a common but partial background on environmental issues. This was also underlined more in general in relation to sustainability and United Nations Agenda 2030 actions by [34]. Such knowledge could be implemented through dedicated initiatives carried out at earlier education levels, as the youngest generations usually have a limited understanding of environmental risks, plastic waste, and its impacts [62,63] compared to high school or University students [39,61]. As underlined by [34,41], envi-

ronmental education increases both cognition and consciousness in young citizens, thus leading to sustainable behaviours.

4.4. Recommendations

Overall, MNP contamination represents one of the most significant emergencies, not only for the environment, but also for human health. Hence, the assessment of citizens' awareness of the problem and how daily life activities may affect the issue of MNP release in the environment is becoming an increasing priority [14,15,64]. In this study, the responses of the UNIMORE students who voluntarily participated in the survey suggested to us a partial knowledge on plastic waste, on the possible consequences that MNP exposure could have on human health, and on what habits tend to promote environmental contamination and personal exposure to particles.

Environmental education plays a crucial role in promoting and tackling knowledge and awareness towards environmental issues, such as plastic pollution, which, to date, seem to be entrusted mainly to the mass and social media, with the risk of spreading inaccuracies and influencing risk perception [37,38].

Increasing the (young) population's knowledge and awareness would enhance risk perception and make all individuals more active actors for environmental safety, reducing MNP contamination. As suggested by [37], this should be a priority for European countries (including Italy), which have high educational standards but account for over 50 million tonnes of the total plastic demand worldwide (2021 data, [1]).

Virtuous actions according to the principles of the "3Rs" (i.e., reduce, reuse, recycle) and sustainable development (e.g., plastic circular economy, increase in recycled/bio-based plastics or alternative materials) should be strongly encouraged and conveyed to ew generations [65], since they will be responsible for future policies [39] and mitigation actions to handle the global plastic waste problem; students are thus promising social actors to focus on with targeted actions to promote economic, societal, and environmental sustainability [34,35].

Recommendations for effective initiatives on MNPs carried out at the University level include the following: (i) active lessons, fieldwork [30,31], or laboratory experiences conceived in environmental education programs and their syllabi [65]; (ii) set up activities (seminars, quizzes such as [29,34]) in a dedicated sustainability course; (iii) encouraging on-campus clean-up activities and discussion to reduce plastic waste, involving students' organizations; (iv) set up University achievable targets (install drinking fountains, provide reusable water bottles, increase the number of recycle bins. . .) that are easily perceived by students to shape sustainable behaviours at all stages. These examples will encourage the spread of knowledge and awareness in young citizens not only on the negative implications of the mass use of plastic on ecosystems and humans but also, more broadly, on the importance of the sustainability consciousness.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/su16114637/s1. Table S1, Questionnaire "Micro for life—Plastic that lasts".

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References

1. Plastics Europe. *Plastics—The Facts 2022*; Plastics Europe: Brussels, Belgium, 2022.
2. Wang, C.; Liu, Y.; Chen, W.Q.; Zhu, B.; Qu, S.; Xu, M. Critical Review of Global Plastics Stock and Flow Data. *J. Ind. Ecol.* **2021**, *25*, 1300–1317. [CrossRef]
3. Chamas, A.; Moon, H.; Zheng, J.; Qiu, Y.; Tabassum, T.; Jang, J.H.; Abu-Omar, M.; Scott, S.L.; Suh, S. Degradation Rates of Plastics in the Environment. *ACS Sustain. Chem. Eng.* **2020**, *8*, 3494–3511. [CrossRef]
4. Andrady, A.L. The Plastic in Microplastics: A Review. *Mar. Pollut. Bull.* **2017**, *119*, 12–22. [CrossRef] [PubMed]
5. Corsi, I.; Bellingeri, A.; Bergami, E. Progress in Selecting Marine Bioindicators for Nanoplastics Ecological Risk Assessment. *Ecol. Indic.* **2023**, *154*, 110836. [CrossRef]
6. Senathirajah, K.; Attwood, S.; Bhagwat, G.; Carbery, M.; Wilson, S.; Palanisami, T. Estimation of the Mass of Microplastics Ingested—A Pivotal First Step towards Human Health Risk Assessment. *J. Hazard. Mater.* **2021**, *404*, 124004. [CrossRef] [PubMed]
7. Pahl, S.; Wyles, K.J. The Human Dimension: How Social and Behavioural Research Methods Can Help Address Microplastics in the Environment. *Anal. Methods* **2017**, *9*, 1404–1411. [CrossRef]
8. Corsi, I.; Bergami, E.; Allan, I.J.; Gigault, J. Nanoplastics in Urban Waters. In *Microplastics in Urban Water Management*; John Wiley & Sons, Inc.: New York, NY, USA, 2023; pp. 407–444. [CrossRef]
9. Gong, J.; Xie, P. Research Progress in Sources, Analytical Methods, Eco-Environmental Effects, and Control Measures of Microplastics. *Chemosphere* **2020**, *254*, 126790. [CrossRef] [PubMed]
10. Su, L.; Xiong, X.; Zhang, Y.; Wu, C.; Xu, X.; Sun, C.; Shi, H. Global Transportation of Plastics and Microplastics: A Critical Review of Pathways and Influences. *Sci. Total Environ.* **2022**, *831*, 154884. [CrossRef] [PubMed]
11. Parolini, M.; Stucchi, M.; Ambrosini, R.; Romano, A. A Global Perspective on Microplastic Bioaccumulation in Marine Organisms. *Ecol. Indic.* **2023**, *149*, 110179. [CrossRef]
12. Oliveri Conti, G.; Ferrante, M.; Banni, M.; Favara, C.; Nicolosi, I.; Cristaldi, A.; Fiore, M.; Zuccarello, P. Micro- and Nano-Plastics in Edible Fruit and Vegetables. The First Diet Risks Assessment for the General Population. *Environ. Res.* **2020**, *187*, 109677. [CrossRef]
13. Diaz-Basantes, M.F.; Conesa, J.A.; Fullana, A. Microplastics in Honey, Beer, Milk and Refreshments in Ecuador as Emerging Contaminants. *Sustainability* **2020**, *12*, 5514. [CrossRef]
14. Prata, J.C.; da Costa, J.P.; Lopes, I.; Duarte, A.C.; Rocha-Santos, T. Environmental Exposure to Microplastics: An Overview on Possible Human Health Effects. *Sci. Total Environ.* **2020**, *702*, 134455. [CrossRef]
15. Wu, P.; Lin, S.; Cao, G.; Wu, J.; Jin, H.; Wang, C.; Wong, M.H.; Yang, Z.; Cai, Z. Absorption, Distribution, Metabolism, Excretion and Toxicity of Microplastics in the Human Body and Health Implications. *J. Hazard. Mater.* **2022**, *437*, 129361. [CrossRef] [PubMed]
16. O'Neill, S.M.; Lawler, J. Knowledge Gaps on Micro and Nanoplastics and Human Health: A Critical Review. *Case Stud. Chem. Environ. Eng.* **2021**, *3*, 100091. [CrossRef]
17. Zhang, Y.; Kang, S.; Allen, S.; Allen, D.; Gao, T.; Sillanpää, M. Atmospheric Microplastics: A Review on Current Status and Perspectives. *Earth Sci. Rev.* **2020**, *203*, 103118. [CrossRef]
18. Zhang, Q.; Xu, E.G.; Li, J.; Chen, Q.; Ma, L.; Zeng, E.Y.; Shi, H. A Review of Microplastics in Table Salt, Drinking Water, and Air: Direct Human Exposure. *Environ. Sci. Technol.* **2020**, *54*, 3740–3751. [CrossRef] [PubMed]
19. Jahandari, A. Microplastics in the Urban Atmosphere: Sources, Occurrences, Distribution, and Potential Health Implications. *J. Hazard. Mater. Adv.* **2023**, *12*, 100346. [CrossRef]
20. Dris, R.; Gasperi, J.; Mirande, C.; Mandin, C.; Guerrouache, M.; Langlois, V.; Tassin, B. A First Overview of Textile Fibers, Including Microplastics, in Indoor and Outdoor Environments. *Environ. Pollut.* **2017**, *221*, 453–458. [CrossRef]
21. Xiao, S.; Cui, Y.; Brahney, J.; Mahowald, N.; Li, Q. Long-Distance Atmospheric Transport of Microplastic Bers Depends on Their Shapes. *Nat. Geosci.* **2023**, *16*, 863–870. [CrossRef]
22. OSPAR Commission. *Assessment Document of Land-Based Inputs of Microplastics in the Marine Environment*; Environmental Impact of Human Activities Series; OSPAR Commission: London, UK, 2017.
23. Weber, C.J.; Santowski, A.; Chifflard, P. Investigating the Dispersal of Macro- and Microplastics on Agricultural Fields 30 Years after Sewage Sludge Application. *Sci. Rep.* **2022**, *12*, 6410. [CrossRef]
24. Locritani, M.; Merlino, S.; Abbate, M. Assessing the Citizen Science Approach as Tool to Increase Awareness on the Marine Litter Problem. *Mar. Pollut. Bull.* **2019**, *140*, 320–329. [CrossRef]
25. Kautish, P.; Sharma, R.; Mangla, S.K.; Jabeen, F.; Awan, U. Understanding Choice Behavior towards Plastic Consumption: An Emerging Market Investigation. *Resour. Conserv. Recycl.* **2021**, *174*, 105828. [CrossRef]

26. Widayat, W.; Praharjo, A.; Putri, V.P.; Andharini, S.N.; Masudin, I. Responsible Consumer Behavior: Driving Factors of Pro-Environmental Behavior toward Post-Consumption Plastic Packaging. *Sustainability* **2022**, *14*, 425. [CrossRef]
27. van Oosterhout, L.; Dijkstra, H.; Borst, D.; Duijndam, S.; Rehdanz, K.; van Beukering, P. Triggering Sustainable Plastics Consumption Behavior: Identifying Consumer Profiles across Europe and Designing Strategies to Engage Them. *Sustain. Prod. Consum.* **2023**, *36*, 148–160. [CrossRef]
28. Destoumieux-Garzón, D.; Mavingui, P.; Boetsch, G.; Boissier, J.; Darriet, F.; Duboz, P.; Fritsch, C.; Giraudoux, P.; Roux, F.L.; Morand, S.; et al. The One Health Concept: 10 Years Old and a Long Road Ahead. *Front. Vet. Sci.* **2018**, *5*, 14. [CrossRef] [PubMed]
29. Gericke, N.; Boeve-de Pauw, J.; Berglund, T.; Olsson, D. The Sustainability Consciousness Questionnaire: The Theoretical Development and Empirical Validation of an Evaluation Instrument for Stakeholders Working with Sustainable Development. *Sustain. Dev.* **2019**, *27*, 35–49. [CrossRef]
30. Nkoana, E.M. Exploring the Effects of an Environmental Education Course on the Awareness and Perceptions of Climate Change Risks among Seventh and Eighth Grade Learners in South Africa. *Int. Res. Geogr. Environ. Educ.* **2020**, *29*, 7–22. [CrossRef]
31. Arnocky, S.; Stroink, M.L. Variation in Environmentalism among University Students: Majoring in Outdoor Recreation, Parks, and Tourism Predicts Environmental Concerns and Behaviors. *J. Environ. Educ.* **2011**, *42*, 137–151. [CrossRef]
32. Chauhan, N.S.; Punia, A. Role of Education and Society in Dealing Plastic Pollution in the Future. In *Plastic and Microplastic in the Environment: Management and Health Risks*; John Wiley & Sons, Inc.: New York, NY, USA, 2022; pp. 267–281. [CrossRef]
33. Sandu, C.; Takacs, E.; Suaria, G.; Borgogno, F.; Laforsch, C.; Löder, M.M.G.J.; Tweehuysen, G.; Florea, L. Society Role in the Reduction of Plastic Pollution. *Handb. Environ. Chem.* **2022**, *112*, 39–65. [CrossRef]
34. Smaniotto, C.; Battistella, C.; Brunelli, L.; Ruscio, E.; Agodi, A.; Auxilia, F.; Baccolini, V.; Gelatti, U.; Odone, A.; Prato, R.; et al. Sustainable Development Goals and 2030 Agenda: Awareness, Knowledge and Attitudes in Nine Italian Universities, 2019. *Int. J. Environ. Res. Public Health* **2020**, *17*, 8968. [CrossRef]
35. Avelar, A.B.A.; Farina, M.C. The Relationship between the Incorporation of Sustainability in Higher Education and the Student's Behavior: Self-Reported Sustainable Behavior Scale. *Int. J. Sustain. High. Educ.* **2022**, *23*, 1749–1767. [CrossRef]
36. Janoušková, S.; Teplý, P.; Fatka, D.; Teplá, M.; Cajthaml, T.; Hák, T. Microplastics—How and What Do University Students Know about the Emerging Environmental Sustainability Issue? *Sustainability* **2020**, *12*, 9220. [CrossRef]
37. Raab, P.; Bogner, F.X. Conceptions of University Students on Microplastics in Germany. *PLoS ONE* **2021**, *16*, e0257734. [CrossRef]
38. Dowarah, K.; Duarah, H.; Devipriya, S.P. A Preliminary Survey to Assess the Awareness, Attitudes/Behaviours, and Opinions Pertaining to Plastic and Microplastic Pollution among Students in India. *Mar. Policy* **2022**, *144*, 105220. [CrossRef]
39. Boca, G.D.; Saraçli, S. Effects of Romanian Student's Awareness and Needs Regarding Plastic Waste Management. *Sustain. Sustainability* **2023**, *15*, 6811. [CrossRef]
40. Boca, G.D.; Işitan, A.; Çağlarer, E.; Saraçli, S. A Cross-Cultural Analysis for Plastic Waste Perception of Students from Romania and Turkey. *Sustainability* **2023**, *15*, 16594. [CrossRef]
41. Situmorang, R.O.P.; Liang, T.C.; Chang, S.C. The Difference of Knowledge and Behavior of College Students on Plastic Waste Problems. *Sustainability* **2020**, *12*, 7851. [CrossRef]
42. Qu, D.; Shevchenko, T.; Esfandabadi, Z.S.; Ranjbari, M. College Students' Attitude towards Waste Separation and Recovery on Campus. *Sustainability* **2023**, *15*, 1620. [CrossRef]
43. Cammalleri, V.; Marotta, D.; Antonucci, A.; Protano, C.; Fara, G.M. A Survey on Knowledge and Awareness on the Issue "Mi-Croplastics": A Pilot Study on a Sample of Future Public Health Professionals. *Ann. Ig.* **2020**, *32*, 577–589. [CrossRef]
44. Galati, A.; Alaimo, L.S.; Ciaccio, T.; Vrontis, D.; Fiore, M. Plastic or Not Plastic? That's the Problem: Analysing the Italian Students Purchasing Behavior of Mineral Water Bottles Made with Eco-Friendly Packaging. *Resour. Conserv. Recycl.* **2022**, *179*, 106060. [CrossRef]
45. Soares, J.; Miguel, I.; Venâncio, C.; Lopes, I.; Oliveira, M. Public Views on Plastic Pollution: Knowledge, Perceived Impacts, and pro-Environmental Behaviours. *J. Hazard. Mater.* **2021**, *412*, 125227. [CrossRef]
46. University of Catania Microplastiche: La Minaccia Delle Particelle Sintetiche. Available online: https://www.youtube.com/watch?v=k1xHfb9ZRHI (accessed on 1 May 2024).
47. Bryce, E. TED-Ed: What Really Happens to the Plastic You Throw Away. Available online: https://www.youtube.com/watch?v=_6xlNyWPpB8 (accessed on 1 May 2024).
48. National Geographic Plastics 101. Available online: https://www.youtube.com/watch?v=ggh0Ptk3VGE (accessed on 1 May 2024).
49. Das, N.; Ghosh, A. Psychometric Validation of a Nutrition Knowledge Questionnaire among Parents of 3-6-Year-Old Asian Indian Children in East Barddhaman District, West Bengal, India. *Indian. J. Community Med.* **2020**, *45*, 130–134. [CrossRef]
50. Boucher, J.; Friot, D. *IUCN Primary Microplastics in the Oceans: A Global Evaluation of Sources*; IUCN: Gland, Switzerland, 2017.
51. Yang, L.; Zhang, Y.; Kang, S.; Wang, Z.; Wu, C. Microplastics in Freshwater Sediment: A Review on Methods, Occurrence, and Sources. *Sci. Total Environ.* **2021**, *754*, 141948. [CrossRef]
52. Unimore Sostenibile. Available online: https://www.unimoresostenibile.unimore.it/competenze-trasversali-sulla-sostenibilita/ (accessed on 1 May 2024).
53. Miao, J.; Huang, W.; Pan, R.; Zhou, K. Research Progress and Hotspot Analysis of Soil Microplastics: A Bibliometrics-Based Review. *Front. Environ. Sci.* **2023**, *11*. [CrossRef]

54. Boucher, J.; Friot, D. International Union for Conservation of Nature a Global Evaluation of Sources Primary Microplastics in the Oceans. Available online: https://portals.iucn.org/library/node/46622 (accessed on 10 November 2023).
55. Rhein, S.; Schmid, M. Consumers' Awareness of Plastic Packaging: More than Just Environmental Concerns. *Resour. Conserv. Recycl.* **2020**, *162*, 105063. [CrossRef]
56. Italian National Institute of Statistics (Istat). *Le. Statistiche Dell'Istat Sull'acqua*; Italian National Institute of Statistics: Roma, Italy, 2022.
57. National Association for PET Container Resources. The Association of Plastic Recyclers. Report on Postconsumer PET Container Recycling Activity in 2015. 2016. Available online: https://plasticsrecycling.org/images/library/2015-APR-NAPCOR-rate-report.pdf (accessed on 19 March 2024).
58. Benyathiar, P.; Kumar, P.; Carpenter, G.; Brace, J.; Mishra, D.K. Polyethylene Terephthalate (PET) Bottle-to-Bottle Recycling for the Beverage Industry: A Review. *Polymers* **2022**, *14*, 2366. [CrossRef]
59. Kirstein, I.V.; Gomiero, A.; Vollertsen, J. Microplastic Pollution in Drinking Water. *Curr. Opin. Toxicol.* **2021**, *28*, 70–75. [CrossRef]
60. Zuccarello, P.; Ferrante, M.; Cristaldi, A.; Copat, C.; Grasso, A.; Sangregorio, D.; Fiore, M.; Oliveri Conti, G. Exposure to Microplastics (<10 μm) Associated to Plastic Bottles Mineral Water Consumption: The First Quantitative Study. *Water Res.* **2019**, *157*, 365–371. [CrossRef]
61. Wongklaw, A.; Woranitiyaowapha, S.; Worahan, R.; Lekawat, P.; Yeesin, P. Environmental Awareness and the Use of Disposable Plastic. *Int. J. Curr. Sci. Res. Rev.* **2020**, *3*, 199–202. [CrossRef]
62. Uehara, T. Can Young Generations Recognize Marine Plastic Waste as a Systemic Issue? *Sustainability* **2020**, *12*, 2586. [CrossRef]
63. Oturai, N.G.; Pahl, S.; Syberg, K. How Can We Test Plastic Pollution Perceptions and Behavior? A Feasibility Study with Danish Children Participating in "the Mass Experiment". *Sci. Total Environ.* **2022**, *806*, 150914. [CrossRef] [PubMed]
64. Ghosh, S.; Sinha, J.K.; Ghosh, S.; Vashisth, K.; Han, S.; Bhaskar, R. Microplastics as an Emerging Threat to the Global Environment and Human Health. *Sustainability* **2023**, *15*, 10821. [CrossRef]
65. Chun T'ing, L.; Moorthy, K.; Yoon Mei, C.; Pik Yin, F.; Zhi Ying, W.; Wei Khong, C.; Zhao Chern, G.; Zin Lin, T. Determinants of 3Rs Behaviour in Plastic Usage: A Study among Malaysians. *Heliyon* **2020**, *6*, e05805. [CrossRef] [PubMed]