

Article

Exploring the Factors Affecting the Recycling Behavior of Primary School Students

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Abstract: Education on recycling must be provided during the first school years because environmentally aware students are more likely to become environmentally aware citizens. The aim of the present study is to investigate the factors affecting the recycling behavior of students attending the last grade of primary school in the regional unit of Evros in Greece. To select the sample, multistage sampling was used, and to collect the research data, a questionnaire with closed-ended items was designed. The collected data were analyzed using descriptive statistics, the non-parametric Friedman test, and categorical regression. Our results showed that the students had positive views, attitudes, and behaviors in relation to recycling and were actively involved in it. Categorical regression analysis indicated that the other family members affected students' recycling behavior to a high degree, whereas students' parents' occupation and students' participation in environmental education programs at school exerted a lower influence on their recycling behavior.



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1. Introduction

Our planet faces severe environmental problems which tend to aggravate and lead to catastrophic consequences. Environmental problems are global and concern all people regardless of how they affect each person. Population increase, urbanization, modern lifestyle, consumerism, and economic development reduced natural resources and created the problem of waste management. In relation to the latter, the development of societies increased the volume of waste so that waste management is now a serious issue in every country [1]. Consequently, increased population together with the rising quantities of municipal solid waste resulted in persistent calls for recycling [2]. Sending waste to landfills or incineration poses severe risks to the environment and public health. Municipal governments across the globe stand at the forefront of political innovation, which aims to increase the rate of recycling and to reduce the rate of waste that ends up in landfills [2].

In a time when the lack of natural resources is more concerning than ever, recycling consists of both an environmental and a social need. Recycling is a factor that reduces the volume of waste that end up in landfills every year [3]. It also contributes to the conservation of natural resources and the space where waste is disposed while preventing the risk of pollution due to leakages in landfills and incinerator emissions [4].

All citizens including adults, adolescents, and children can play an important role and contribute to a cleaner planet [3]. As basic pillars of our society, children are not only the citizens of tomorrow but also those who will shape the future [5]. Children should thus develop positive environmental attitudes and behaviors as well as an eco-conscious attitude towards issues such as recycling. At the same time, they should gain a profound

understanding of the importance of the natural environment not only for humans but also for all creatures of nature [6].

Environmental education may contribute in this direction because children are mainly those who receive it. Environmental education is described as one of the most appropriate ways to ensure a healthy environment in the future and to create citizens who are actively involved in environmental issues [7]. Environmental education aims to raise students' awareness about the environment and to foster positive attitudes and behaviors towards environmental problems [8]. Therefore, education can provide to students information on proper waste management [9] as well as affect individuals' behaviors, encouraging an environmentally friendly lifestyle [4].

The aim of the present study is to investigate the views and the attitudes of primary school students in the Prefecture of Evros in Greece towards recycling. Moreover, it seeks to detect the factors affecting the practice of recycling. It is important that policymakers promote recycling as a social trend and provide adequate public facilities so that citizens can participate in recycling activities without difficulties [10].

2. Theoretical Background

Waste management is a severe issue in today's consumer society because the volume of waste ending up in landfills follows a rapidly rising trend. Recycling is one of the most sustainable and effective methods to tackle this issue and to mitigate the relevant environmental effects [11]. Recycling mitigates the need for landfills, lowers emissions, and protects the earth's natural resources. Beside these advantages, it offers economic benefits such as new jobs while saving the energy which would be required for creating new products from raw materials. Recycling, however, can also be beneficial for human society and psychology since it can shape positive environmental attitudes and behaviors and reinforces social participation [12].

Even though recycling programs are a positive step, it is crucial to change individuals' attitudes and behaviors. In this way, the volume of waste ending up in landfills can be reduced significantly [11]. To that end, steps must be taken in order to ensure that today's children contribute to the solution of environmental problems. Children should therefore be equipped with the necessary knowledge and develop positive attitudes and behaviors in relation to recycling and other environmental issues [13].

If the main goal is to exert efforts that lead to recycling behaviors, it is necessary to pay more attention to students' attitudes, behaviors, and awareness about recycling [3]. These are affected by various factors which can be categorized into the following: exogenous motives, endogenous motives, external factors, internal comfort factors, and demographic variables [14].

Exogenous motives involve money rewards and social influence. It was observed that, once money rewards cease, so do recycling behaviors [14]. Hence, rewards can lead to notable recycling behaviors; however, they are temporary. Schultz et al. [15] found that the provision of rewards aimed at eliciting recycling behaviors is more effective when individuals have low environmental concerns. However, the behavior of individuals with high environmental concerns is not affected by rewards, because their recycling behavior is driven by endogenous motives.

Social influence refers to the influence that individuals receive from their family, friends, and neighbors [14]. Interestingly, it plays a significant role in students' awareness about recycling as well as their recycling behavior [3,11,16,17]. For instance, students whose families do not recycle are indifferent to recycling as they are not encouraged or guided by their families to perform recycling [12,18,19]. Conversely, individuals whose families or friends approve of recycling shape more positive attitudes towards recycling [20,21].

Endogenous motives involve individuals' satisfaction with participating in actions which benefit society as well as satisfaction with avoiding waste and maintaining natural resources [14]. Along the same line of thought, it was observed that individuals are more motivated to take action when they perceive that recycling leads to desirable out-

comes and benefits society [22,23]. In other words, endogenous motives act as factors that prompt individuals to adopt positive recycling behaviors and attitudes. Moreover, they are more likely to be willing to recycle if they perceive recycling as a moral and personal obligation [12,24–26] or if they feel that the society values their effort to recycle [12].

In many cases, it is not sufficient to provide recycling motives, as some barriers inhibit recycling. Such barriers involve exogenous comfort factors such as time constraints, space, money, and personal effort [14]. Citizens often perceive that preparing, storing, and carrying recyclable materials requires time, space, money, and personal effort [14,19]. As a result, they regard recycling as a tiring and time-consuming process, which makes them unwilling to recycle [25]. McCarty and Shrum [27] indicated that the inconvenience associated with recycling exerts greater influence on individuals' behaviors than their beliefs in the importance of recycling. The location of recycling bins is another important factor, as previous research works showed that the amount of recyclable materials is reduced when recycling bins are located in a location which is inconvenient; however, the amount of recyclables is greater if recycling bins are located in more convenient locations [3,28].

Likewise, the lack of recycling bins is a major factor that contributes to students' reluctance to recycle [18,19,29]. That being said, the installation of recycling bins in convenient locations alone does not suffice to induce recycling. Recycling bins need also to display some information on the proper recycling of packages, which, as shown by Mrema [3], is required by students. Such difficulties can be overcome through environmental awareness, as individuals with pronounced environmental awareness tend to be more committed to recycling [30].

Internal comfort factors including knowledge about recycling programs have a positive effect on recycling attitudes. What prevents recycling is consumers' lack of knowledge about the importance of recycling and proper ways of recycling; another preventing factor is the perception that recycling is a time-consuming process [14]. In the case of students, the study of Mrema [3] showed that students do not recycle because they do not always know which packages can be recycled, while the study of Bao [31] indicated that students refrain from recycling when they are unaware of the destination of recyclables or the consequences of not recycling. Therefore, students must be knowledgeable about the proper way of recycling and its importance in order to commit to recycling and have awareness about it. Students can have access to such information through posters, leaflets, comics, and animation [3].

Demographic variables were also found to affect students' recycling behavior and attitudes. These variables may point to the proper techniques which contribute to recycling behaviors [32]. More specifically, female students use recycling bins more often and have more favorable recycling attitudes in comparison to male students [3,29,33–35]. Age is another influential factor that shapes recycling attitudes and behaviors, with younger students exhibiting a more positive attitude toward recycling compared to older ones [36].

A more careful analysis of the above factors affecting recycling enables us to conclude that the strongest predictive recycling factors are internal motives. These involve knowledge and awareness about recycling as well as knowledge about recycling programs. Social influence which stems from family, friends, and neighbors can also predict recycling behavior in contrast to financial motives which predict it to a much lower degree. In addition, internal satisfaction with recycling is closely linked to behavior prediction. Individuals who perceive that their actions are impactful and can contribute to the solution of environmental issues are more likely to recycle compared to individuals who regard that their actions have no impact [14].

Moreover, students' attitudes towards recycling consisted of the topic of many environmental education programs [37]. Beside these programs, subjective and perceived control of behavior exerts a great influence on behavior predictors [7,38]. The development of environmentally aware youngsters is very important, as it can secure a sustainable future [37]. Changes in attitudes can lead to behavioral changes, however, education is not enough to improve or change attitudes. What also matters is the reliability of information

sources as well as the way the relevant information is received. It thus becomes apparent that individuals who receive knowledge can change attitudes, whereas behavior changes depend on psychological factors stemming from a complex society system [39]. It is also worthwhile to note that attitudes are not always a reliable behavior predictor, as studies showed that various factors determine the attitude–behavior relationship [40].

The examination of recycling attitudes is without a doubt a crucial step in the effort to create a sustainable society. However, it is equally important to examine potential solutions for wastes recycling. To that end, researchers focused efforts on processes which can contribute to the solution of waste recycling. In specific, porous materials could be synthesized using wastes, and such processes could result in a high degree of recycling. Indicatively, Miricioiu and Niculescu [41] stressed the need to examine the properties of fly ash and analyze it as a possible raw material in order to obtain materials. Pyrolysis, a thermo-chemical treatment, is another interesting method. This treatment may be applied to every organic (that is, carbon-based) product. It may be applied both to pure products but also mixtures. In this process, the material is exposed to very high temperatures in the absence of oxygen. As a result, the material undergoes chemical and physical separation into different molecules [42,43]. This process enables us to obtain products with a different but more superior character than the initial residue. Consequently, pyrolysis is becoming a more significant process for industry because it can give much higher value to common materials and waste. Pyrolysis is widely applied to turn organic materials into liquid, gas, and solid residues [42,43]. Hence, processes such as the ones mentioned above not only reduce the volume of waste but also produce new products, thereby opening the way for a sustainable society with low environmental impact.

3. Materials and Methods

3.1. Study Area

The area of study was the geographical region in which the primary schools of the Prefecture of Evros are located. The Prefecture of Evros along with the Prefectures of Rhodopi, Xanthi, Drama, and Kavala constitute the region of Eastern Macedonia and Thrace—the northernmost administrative unit of Greece. In terms of geographical size, the Prefecture of Evros is the largest prefecture in Thrace that shares borders with Turkey and Bulgaria. The Prefecture of Evros involves the municipalities of Orestiada, Didymoteicho, and Alexandroupolis. In the continental part of the prefecture, there are 64 primary schools without estimating special education schools or schools with zero functionality. Specifically, there are 14 schools in the municipality of Orestiada, eight in the municipality of Didymoteicho, 13 in the municipality of Soufli, and 29 in the municipality of Alexandroupoli.

3.2. Data Collection

In order to achieve the aim of the study, a structured questionnaire was designed after the relevant literature was reviewed. Specifically, the literature on recycling published in national and international scientific journals and scholar works was examined. A structured questionnaire was considered the most appropriate research instrument because it can collect a large volume of information from respondents with different characteristics. Moreover, data collected through questionnaires can be analyzed quickly and easily.

3.3. Questionnaire Design

The questionnaire was designed based on relevant research works [3,25,35,44–46]. Then, the questionnaire was pilot tested in order to examine its accuracy. Based on the results of the pilot test, the questionnaire was revised slightly, leading to the final version of the questionnaire.

An introductory note on the top of the first page served to provide necessary information about the study. Here, it was stated that the survey was explicitly conducted by the Democritus University of Thrace and, more specifically, by the Department of Forestry and Management of the Environment and Natural Resources. This clarification served to

avoid possible misconceptions or doubts. For the same reason, the name and the contact details of the professor who is responsible for the survey were provided. The introductory note concluded by stating the objective of the survey and guaranteeing anonymity and confidentiality to the participants.

The questionnaire included 24 items and was four pages long. All questions were closed-ended and offered respondents a list of possible pre-defined answers to choose from. It took approximately 15 min to complete the questionnaire. The items were formulated to be understandable by students attending the last grade of primary school. The items collected information on respondents' demographics, perceptions, knowledge, habits, and behavior regarding recycling and the environment.

3.4. Sampling

As already mentioned, the continental part of the Prefecture of Evros, which involves five municipalities, was chosen as the study site. A multistage sampling technique was used for this study. In the first stage, the participation of all municipalities in the study was decided, and, in the second stage, a random sample of schools in each municipality was selected. A sample of 17 schools was selected according to the multistage sampling technique. Next, with the method of census, all students attending the last grade of primary school were censused. According to this census, the sample comprised 402 students who attended the last grade in the primary schools in the Prefecture of Evros. Questionnaires were administered to students with the consent of each school's headmaster, class teacher, and parents. Questionnaires were completed from September 2020 to October 2020.

3.5. Data Analysis

To analyze the collected data, descriptive statistics, the non-parametric Friedman test, and categorical regression were performed. The non-parametric Friedman test compares the values of three or more correlated groups of variables. The distribution of the Friedman test is Chi-square distribution with degrees of freedom (df) $df = k - 1$, where k is the number of teams or samples. This test classifies the values of variables for every subject separately and calculates the mean rank of classification values for each variable [47]. Categorical regression is an extension of the principles of classical linear regression and logarithmic analysis. Through scaling, it assigns values to each category of variables in such a way that they are optimum in terms of regression and reflect the characteristics of the original variables. Categorical regression scales nominal, ordinal, and numerical variables in an optimum manner, quantifying their categories so that the squared correlation between the quantified dependent variable and the linear combination of the quantified independent variables is maximized. The interpretations are related to the transformed variables, but they are also related to the original variables due to the relation that exists between the original variables and the transformed ones [48].

4. Results

First, results regarding respondents' demographic characteristics and their participation in environmental education programs are presented. Then, students' and students' parents' views and attitudes towards environmental issues as well as their recycling behavior are described. Finally, results are presented in two main categories; that is, students were divided into students who recycle and students who do not recycle. This segmentation is used in the following items to detect how students' responses differentiate according to their statement on recycling.

4.1. Demographic Characteristics

Students were asked whether they recycled. Of students who reported recycling, male students outnumbered slightly their female peers. However, the percentage of male students was higher (by 54.5%) in the group of students who reported not recycling (Table 1).

Table 1. Percentages of students' gender.

	Recycling (%)	Not Recycling (%)
Male	50.3	54.5
Female	49.7	45.5
Total	100.0	100.0

Students' family background was examined. As it can be seen in Table 2, most parents of students who recycle, whose students reported recycling, were employees. More specifically, 54.8% of fathers were public employees and 18.2% were private employees, while 36% of mothers were public employees and 19.6% were private employees. Moreover, an appreciable share of parents was freelancers: 14.3% of fathers and 13.1% of mothers. In addition, 9.5% of fathers were farmers, 16.1% of mothers were housewives, and 12.2% of mothers were unemployed. A similar distribution of parental occupations was observed in the group of students who do not recycle. In particular, 60.6% of students' fathers were employees with 53% being employed in the public sector and 7.6% being employed in the private sector. In addition, 42.4% of students' mothers were employees (22.7% were private employees and 19.7% were private employees). Moreover, 21.2% of students' fathers and 22.7% of students' mothers were freelancers. Finally, 13.6% of fathers were farmers and 19.7% of mothers were housewives (Table 2).

Table 2. Percentages of students' parental occupation.

	Recycling (%)		Not Recycling (%)	
	Father Occupation	Mother Occupation	Father Occupation	Mother Occupation
Public employee	54.8	36.0	53.0	22.7
Private employee	18.2	19.6	7.6	19.7
Freelancer	14.3	13.1	21.2	22.7
Household	0.0	16.1	0.0	19.7
Farmer	9.5	2.7	1.6	7.6
Unemployed	1.8	12.2	1.5	7.6
Pensioner	1.5	0.3	3.0	0.0
Total	100.0	100.0	100.0	100.0

In the group of students who reported recycling, it can be seen that the parents had a high education level, as 43.6% of fathers and 55.6% of mothers were degree qualified (Table 3). In addition, the percentage of parents who were high school graduates was significant, with fathers accounting for 49.4% and mothers 39.3%. Only few parents were primary school and middle school graduates.

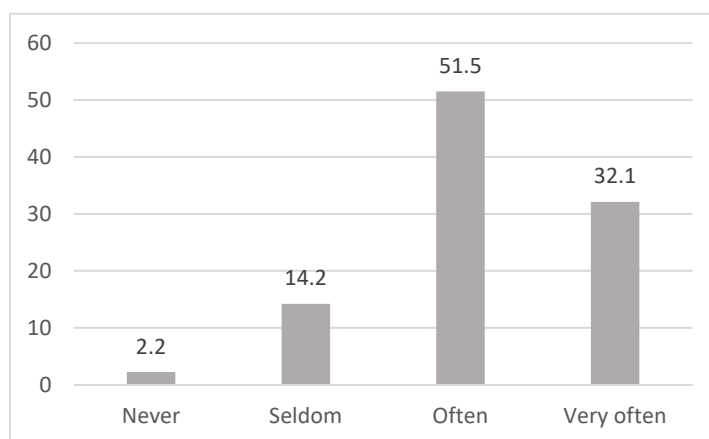
In comparison to the parents of students who recycle, the parents of students who do not recycle had a lower education level. Specifically, 53.1% of fathers and 48.5% of mothers were high school graduates, while substantial shares of parents were university or tertiary education graduates. Finally, as few as 10.6% of fathers and 3% of mothers were primary school graduates (Table 3).

Table 3. Percentages of students' parental education level.

	Recycling (%)		Not Recycling (%)	
	Education Level of Father	Education Level of Mother	Education Level of Father	Education Level of Mother
Primary school graduate	0.6	0.3	0.0	1.5
Middle school graduate	6.5	4.8	10.6	1.5
High school graduate	32.7	26.5	45.5	36.4
Technical/vocational high school graduate	16.7	12.8	7.6	12.1
Technical Institute graduate	6.3	12.5	13.6	7.6
University graduate	29.5	32.4	19.7	34.8
Masters degree holder	5.4	9.2	3.0	6.1
PhD holder	2.4	1.5	0.0	0.0
Total	100.0	100.0	100.0	100.0

4.2. Environmental Behavior

Students were then asked how often they recycle. As Figure 1 shows, 83.6% of students recycle often and very often whereas only 16.4% reported recycling rarely or never.

**Figure 1.** Percentages regarding performing recycling.

Students were also asked how often their families recycle. In Figure 2, it can be seen that, in the group of students who recycle, 95.3% of respondents stated that their family recycles often or very often. Only 4.5% stated that their families recycled seldom and 0.3% not at all. In the group of students who do not recycle, 57.6% stated that their families rarely recycled, 34.9% stated that their families recycled often or very often, and 7.6% stated that their families never recycled.

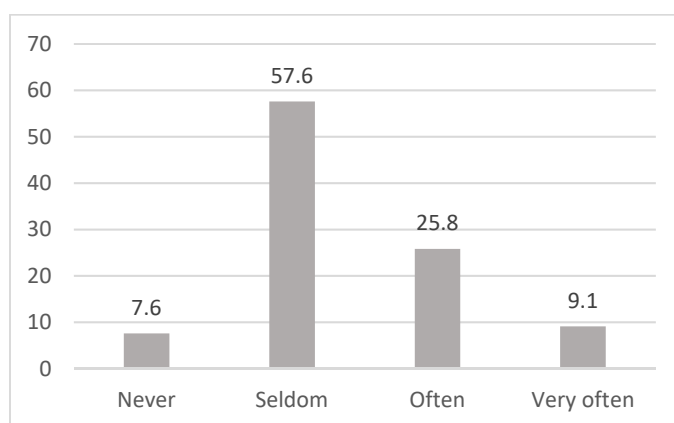


Figure 2. Percentages regarding the frequency with which students' families recycle.

4.3. Students' Participation in Environmental Education Programs

Then, students were asked whether they attended any environmental education programs and, as shown in Figure 3, the majority of students had done so, while the percentage of those who reported having attended such programs was higher by nine percentage units for students who recycle compared to students who do not recycle.

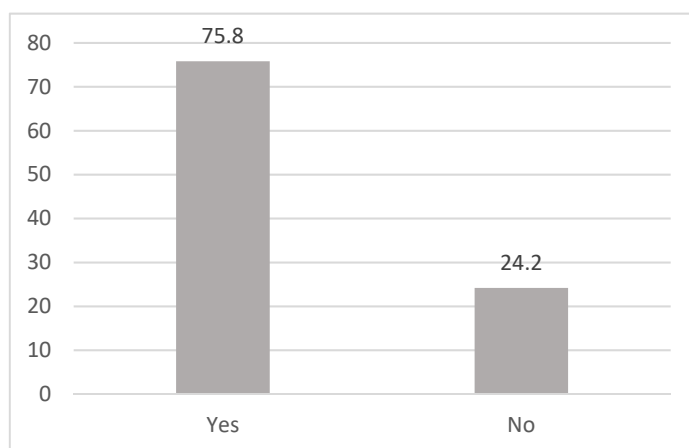


Figure 3. Percentages of students' participation in environmental education programs.

Students were asked also whether they attended an environmental education program focused explicitly on recycling. According to Figure 4, students who attended such programs recycle more often than the students who did not attend them.

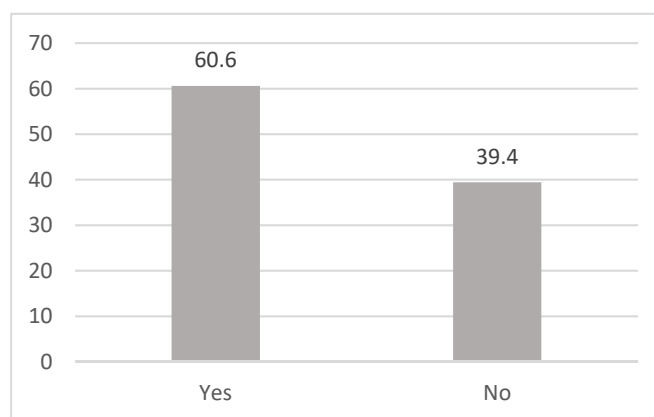


Figure 4. Percentages of students who have attended environmental education programs focusing on recycling.

4.4. Students' Views on the Environment

Respondents were asked to what degree they agreed that waste creates environmental and health issues. Both groups of students who reported recycling and not recycling perceived that waste creates problems in the natural environment and in human health (Figure 5).

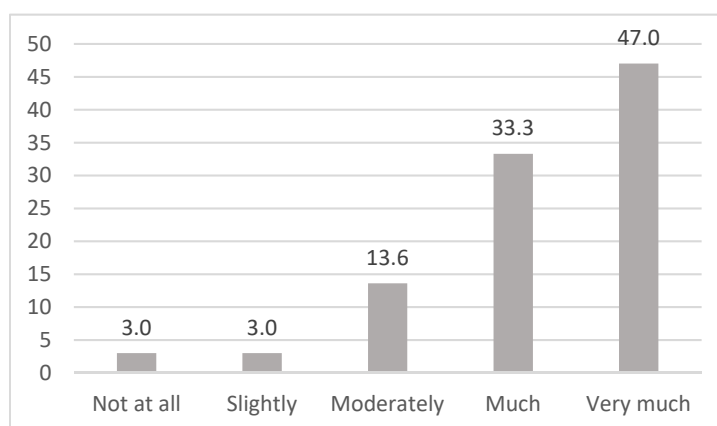


Figure 5. Percentages of students' level of agreement with the statement that waste creates environmental and health problems.

Then, respondents were asked whether they agreed that recycling contributes to the solution of environmental issues. As it can be seen in Figure 6, students in both groups perceived that recycling helps tackle environmental problems. Only 0.9% and 0.6% of each group thought that recycling makes a minor or no contribution to such issues.

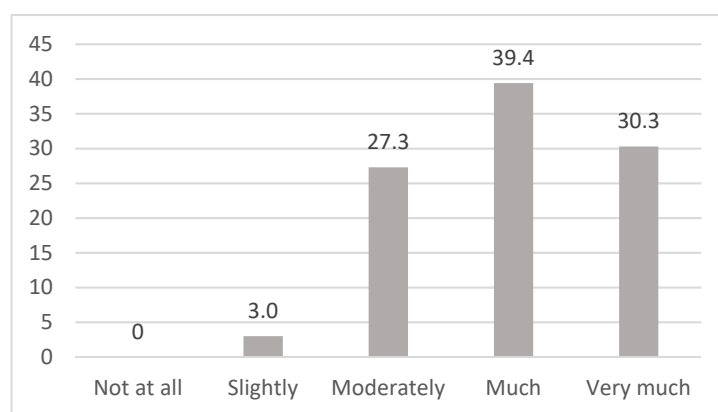


Figure 6. Percentages of students' views on the contribution of recycling to the solution of environmental issues.

Students' opinions on whether students should receive more information on recycling were then examined. In the group of students who recycle, 89.3% perceived that students have to be informed to a higher degree about recycling. As few as 1.8% did not regard the provision of more information as important (Figure 7).

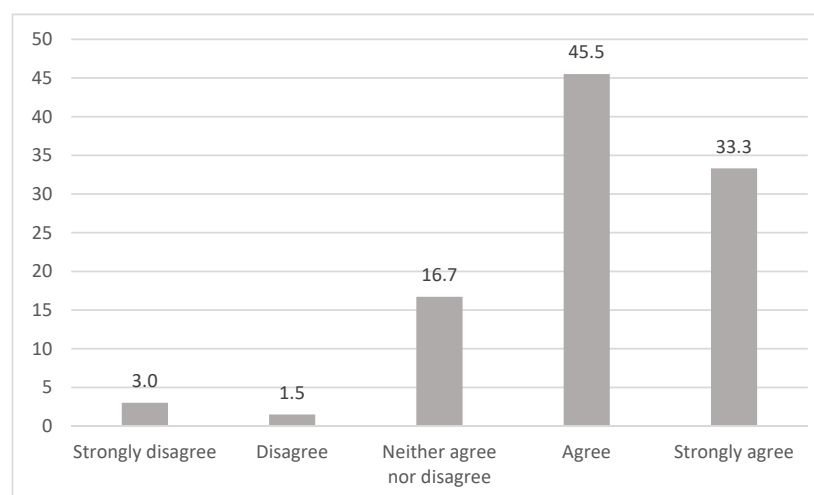


Figure 7. Percentages of students' views on the provision of more information on recycling.

In the group of students who do not recycle, 78.8% perceived that more recycling-related information is required. In addition, 16.7% seemed to be somewhat confused about this matter, as they neither agreed nor disagreed. Finally, only 4.5% regarded that more information on recycling should not be provided (Figure 7).

4.5. Environmental Attitudes

The non-parametric Friedman test was applied in order to detect any statistical differences among the daily practices of both student groups (those who recycle and those who do not recycle) (Table 4). For the students who recycle, switching off air-conditioners when leaving the house was the practice that ranked first (with a mean rank of 9.27). This was followed by the practice of turning off the water tap while brushing teeth (mean rank 8.89). The lowest ranked practices were keeping the windows closed on hot summer days (4.99), using pressure cookers at home (4.94), and avoiding drying clothes on heaters (mean rank 3.75).

Table 4. The application of the non-parametric Friedman test for students' daily practices.

	Recycling	Not Recycling
	Mean Rank	
Opening the fridge door only after deciding what to eat	6.31	6.23
Using a pressure cooker at home	4.94	4.83
Switching of the lights when leaving a room	8.38	7.95
Closing shutters in winter	8.13	8.33
Unplugging phone chargers when not using them	7.01	6.48
Avoiding drying clothes on heaters	3.75	4.17
Parents not using electric stove during at midday in summer	5.12	6.05
Keeping the windows closed on hot summer days	4.99	5.55
Ventilating the house only at night on hot summer days	7.74	7.90
Turing off the tap while brushing teeth	8.89	8.64
Turning off the water tap while lathering in the shower	8.57	8.44
Having a bath without filling the tub to have a bubble bath	7.92	7.39
Switching off the air-conditioner when leaving the house	9.27	9.04
	N = 336 Chi-square = 975.574, df = 12, $p < 0.001$	N = 66 Chi-square = 141.689, df = 12, $p < 0.001$

Almost the same results were recorded for the group of students who do not recycle. As shown in Table 4, switching off air-conditioner when leaving the house was the highest ranked daily practice (mean rank 9.04) followed by turning off the tap while brushing teeth (mean rank 8.64). As with the previous group, the lowest ranked daily practices were using pressure cookers (mean rank 4.83) and avoiding drying clothes on heaters (mean rank 4.17).

4.6. Factors Affecting Students' Recycling Behavior

Categorical regression was performed in order to investigate the factors that affect students' recycling behavior. In this analysis, "Performing recycling" was the dependent variable, and the variables explaining better the research objectives were used as the independent variables. The application of the test on some categorical regression models showed a multicollinearity problem in Pratt's relative importance measures and tolerance measures. More specifically, some independent variables presented high correlation, high negative coefficient values in Pratt's relative importance index, and low tolerance values. Since these independent variables made the model unstable, it was necessary to remove them. The removal of these variables was performed by taking into account the value of the F-statistic, as this determines if the removal of an independent variable with the inclusion of the others reduces the predictive abilities of the model. It is also worthwhile to note that these independent variables were not removed simultaneously, but each time only one independent variable was removed based on the value of the F-statistic. Many tests were performed, however, here, we present only the most significant Pratt's relative importance coefficients, β standardized coefficients, transformation diagrams, and relevant descriptions. Finally, all these analyses showed that the following independent variables account for students' recycling behavior the best.

The analysis with these variables gave a coefficient of multiple determination $R^2 = 0.484$ as well as $F = 14.081$, which is statistically important. The standardized regression coefficients (Betas) of the independent variables showed that "Performing recycling" was mostly affected by the following variables: "Participation in environmental education programs focusing on recycling", "Participation in environmental education programs", "Desire for

more information related to recycling”, “Students’ mother’s occupation”. In addition, the F value of each independent variable indicated that the removal of variables with high F value made the model weak. However, the removal of the variable “Students’ fathers’ occupation” had a negligible effect on the predictive ability of the model. Moreover, the relative importance measures of the independent variables denote that the variables “The other members of students’ family perform recycling” (85.3%) followed by “Participation in environmental education programs focusing on recycling” (5.8%) made the greatest contribution to the dependent variable (Table 5). Variables’ transformation plots (Figure 8) combined with the signs of the standardized coefficient enabled us to infer that:

- The more the members of students’ family recycle, the more the students themselves recycle;
- Students who attended environmental education programs focusing on recycling recycle more than students who attended other kinds of environmental education programs.

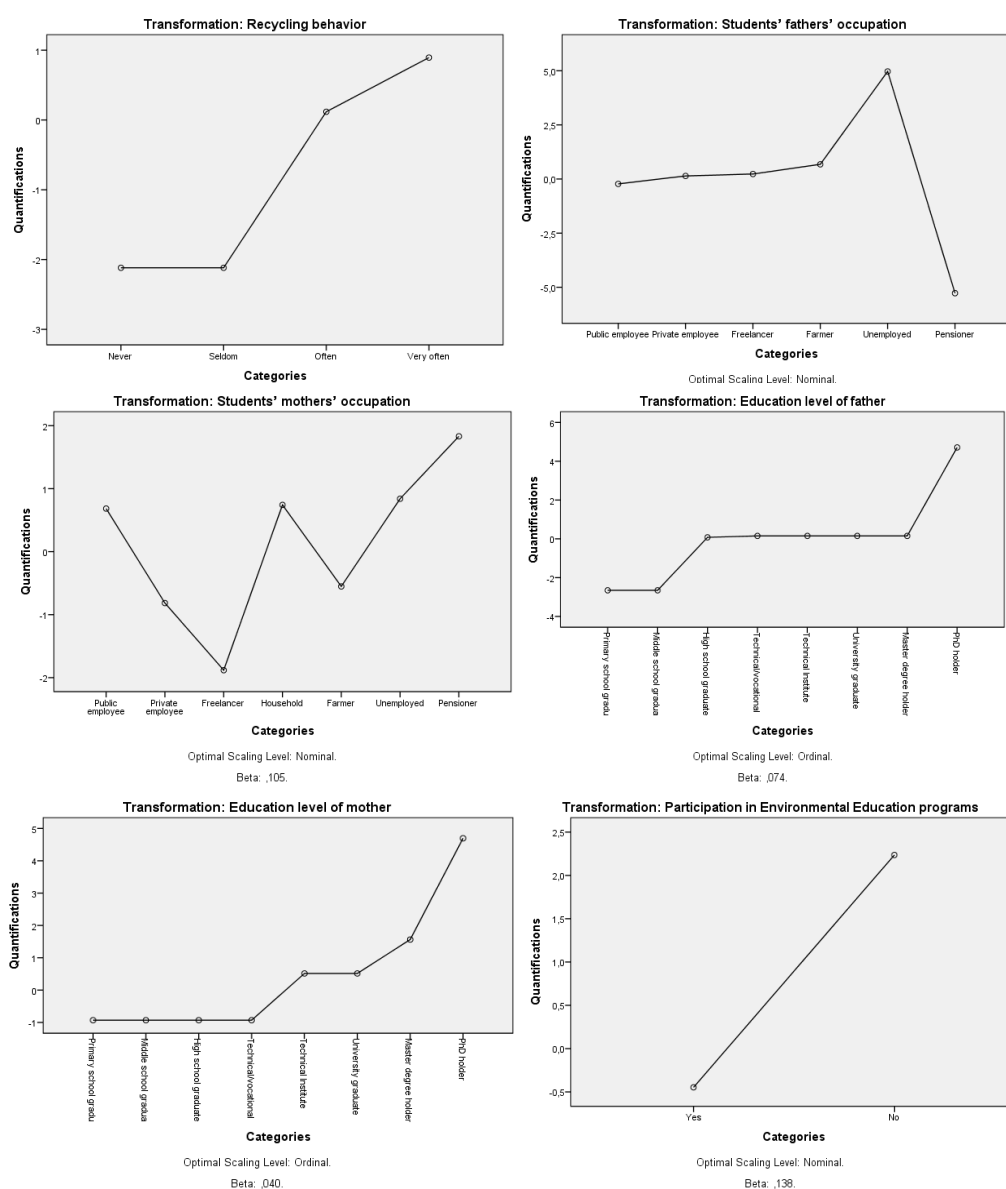


Figure 8. Cont.

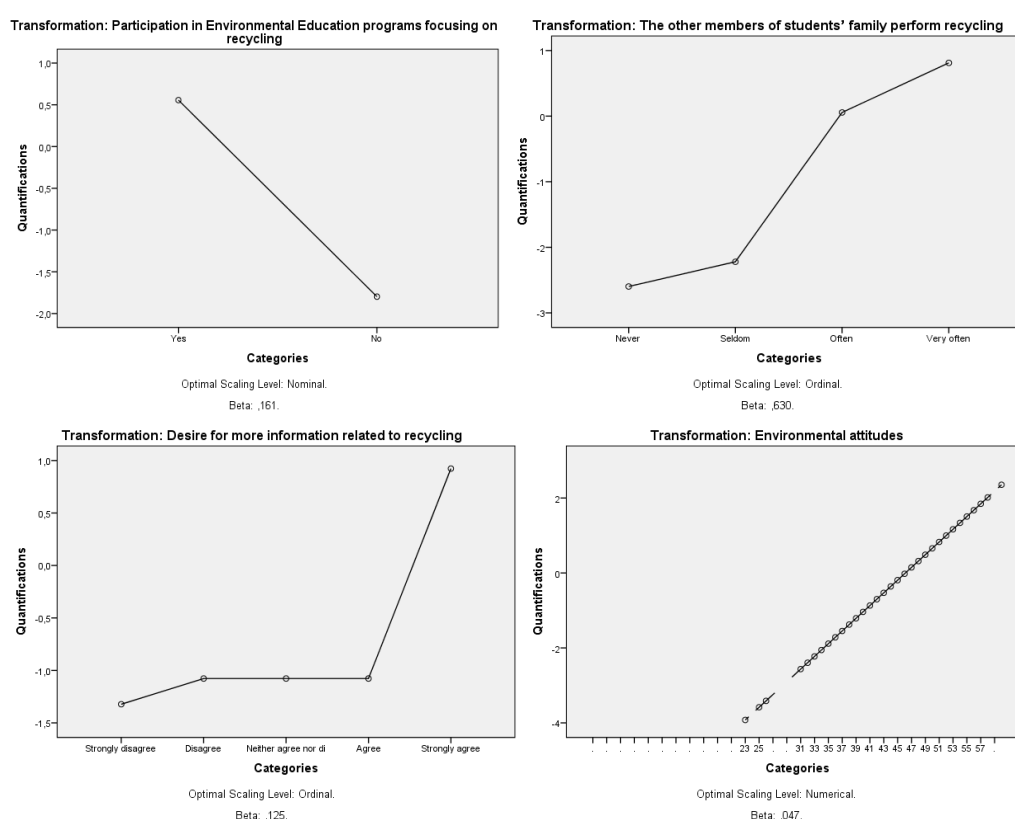


Figure 8. Transformation plots of dependent and independent variables.

Table 5. Factors affecting students' recycling behavior.

Independent Variables	Beta	F	Sig.	Pratt Index of Relative Importance
Students' fathers' occupation	0.059	3.509	0.004	0.000
Students' mothers' occupation	0.105	8.709	0.000	0.025
Education level of father	0.074	0.386	0.763	0.014
Education level of mother	0.040	0.174	0.914	0.007
Participation in environmental education programs	0.138	3.233	0.073	0.027
Participation in environmental education programs focusing on recycling	0.161	3.999	0.046	0.058
The other members of students' family perform recycling	0.630	144.788	0.000	0.853
Desire for more information related to recycling	0.125	3.694	0.026	0.050
Environmental attitudes	0.047	1.119	0.291	0.019

5. Discussion

The present study sought to examine the views and the attitudes towards recycling among students attending the last grade of primary school. The main findings revealed students' participation in recycling and their positive views and attitudes towards recycling while highlighting the crucial role of family in students' recycling behavior.

In this study, the respondents reported recycling on a frequent basis. This finding correlates with the study of Embong et al. [49] who indicated that students recycle on a weekly and monthly basis. However, Kalaitzoglou [29] and Sobri and Rahman [19] found that students' participation in recycling is moderate, and Naquin et al. [50] indicated that the number of students who recycle regularly is minor. The different levels of recycling

may be attributed to students' age; that is, the respondents in this study were primary school students, whereas the respondents in the study of Kalaitzoglou [29] were middle school students. Age can be greatly influential when it comes to recycling, as primary school students were found to express a higher willingness to recycle in comparison to middle school students [50].

Regarding students' recycling behavior, it was shown that family is a rather important factor. This is in line with the findings of Clay [11], Long et al. [16], Mrema [3], and Schwab et al. [17] who detected that the influence of family on recycling matters can raise students' awareness about recycling and instigate recycling behaviors. Therefore, students perform recycling when their family does so as well. This conclusion can be supported by the studies of Matthies et al. [20] and Seacat and Northrup [21], who indicated that students shape favorable attitudes towards recycling when their family supports recycling. Conversely, students who rarely or never recycle belong to families who did not adopt recycling behaviors in their daily lives [12,18,19].

The effect of demographic variables on recycling behaviors is another worthwhile point to discuss. Gender presented no discernible effect on recycling, as male students outnumbered only slightly their female counterparts in the group of students who recycle and in the group of students who rarely or never recycle. This resonates with Eagles and Demare [51] and Yilmaz et al. [52], who found that gender does not differentiate the environmental attitudes and behaviors of primary school students. That being said, the studies of Mrema [3], Ugulu [34], Kalaitzoglou [29], and Psarra [35] concluded that female students participate more actively in recycling compared to their male peers.

The occupation of students' parents was another interesting variable and, specifically, it was shown that most parents of students who recycle or rarely/never recycle were either employed in the public or the private sector. Significantly fewer parents were freelancers and farmers. Hence, it seems that the occupation of students' parents does not play a significant role in students' recycling attitude and behavior. This, however, does not resonate with the study of Malandrakis and Chatzakis [53], who indicated an important effect of parental occupation on their children's attitudes and behaviors. In addition, this study found that students' parents who recycle are more educated compared to those parents whose children are not committed to recycling.

It was also remarkable that students in this study perceived that they should be more informed about recycling, thereby expressing a pronounced interest in recycling and thus the environment. Students would like to receive relevant recycling information through participating in environmental education programs which would be focused on recycling. This perhaps reveals students' high appreciation of environmental education programs with most respondents having participated in such programs. Their participation is what might enable them to recognize the important role of environmental education in recycling and choose it as the most appropriate means to receive information on recycling. In addition, students' participation in environmental education programs may explain most students' commitment to recycling. Environmental education is crucial both in recycling and in other environmental issues and especially contributes to the education of primary school students. Primary school students are in the best age to learn and become aware of recycling which, in turn, can lead them to develop proper environmental attitudes and adopt pro-environmental behaviors later as adults. The importance of age was previously confirmed by Eagles and Demare [51], who indicated that attitudes are shaped until the beginning of adolescence, while changes in behavior are more possible in younger individuals. The positive effect of environmental education was also shown by Bradely et al. [54], who observed that the students who attended environmental education not only increased their environmental knowledge but also developed positive attitudes towards the environment.

In addition, this study showed that the respondents follow pro-environmental daily practices. Hence, it could be stated that pro-environmental behavior can predict the engagement of individuals in recycling. The conclusion that students follow practices

which aim at environmental protection resonates with Naquin et al. [50], who also observed that primary school students wish to perform environmentally friendly practices.

Even though the relevant literature confirms many of the findings presented in this study, the findings can be generalized only to primary school students in the Prefecture of Evros. However, they are not generalizable to all Greek primary school students. Hence, it is recommended to conduct similar studies in other Greek regions and urban centers in order to learn more about the factors affecting students' recycling behavior.

6. Conclusions

With regard to the findings presented and discussed in this paper, certain conclusions may be drawn. First, family is a highly influential recycling factor; students whose family members recycle were found to recycle to a greater degree compared to those students whose family members do not recycle on a frequent basis. Therefore, decision makers involved in efforts aiming at improving the recycling behavior of students should also include students' parents. However, it is difficult to arrive at any conclusions regarding the finding that the education level of parents has a discernible effect on the recycling behavior of students, with students whose parents are more educated having adopted more consistent recycling behaviors. A future qualitative study could perhaps point to the way that parents' education level affects the recycling behavior of children. In addition, students' positive attitudes toward environmental education programs and their stated desire for recycling information allow us to infer that students respond positively to environmental education programs focusing explicitly on recycling and providing relevant useful information and guidelines. Finally, students who follow pro-environmental practices in their everyday life are more actively engaged in recycling in comparison to those who do not follow pro-environmental practices. Hence, this study confirmed previous findings showing that environmental awareness can induce individuals to adopt recycling behaviors.

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