

## **A consumer behaviour approach to analyse the sustainability of food purchasing**

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**ABSTRACT:** In this study, a survey has been carried out to analyse the purchase choice regarding several packaging options of four basic foods (water, milk, bread and meat). We conducted a segmentation by age to analyse whether the purchasing behaviour changes depending on this variable, and whether it is related to environmental attitudes measured on the New Ecological Paradigm (NEP) scale and to recycling behaviour. Among the results we found that, although young people seem to be slightly more environmentally aware, this does not translate into more sustainable purchases.

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### **Aproximación al comportamiento del consumidor para analizar la sostenibilidad de la compra de alimentos**

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**RESUMEN:** En este artículo se ha realizado una encuesta para analizar la elección de compra en cuanto a varios envases de cuatro alimentos básicos. Se ha llevado a cabo una segmentación por edad para analizar si el comportamiento de compra difiere en función de esta variable y si tiene relación con actitudes medioambientales medidas en la escala NEP y con el comportamiento de reciclado. Los resultados muestran que, aunque los jóvenes parecen tener una conciencia medioambiental ligeramente mayor, esto no se traduce en compras más sostenibles.

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**KEYWORDS / PALABRAS CLAVE:** Age, Purchase choice, Plastic packaging, Segmentation, Sustainability / *Edad, Elección de compra, Envases de plástico, Segmentación, Sostenibilidad.*

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## 1. Introduction

Plastic is an important and universal material that has multiple functions. However, in recent years, there has been an increase in global pollution from plastic waste. Overuse by industry, low public awareness and a lack of knowledge about possible alternatives are causing this product that we routinely use to threaten the survival of ecosystems and to cause health problems among the population.

According to Greenpeace (2018), in 2016, global plastic production reached 335 million tonnes. Beverage producers alone generate more than 500 billion single-use plastic bottles each year. In Europe, plastic production in 2016 reached 60 million tonnes and only one third of this material is recycled.

It is estimated that 95 % of the value of plastic packaging material is lost in the economy after a short first-use cycle. Each year, the production and incineration of plastic emits around 400 million tonnes of CO<sub>2</sub> globally, part of which could be avoided through better recycling (European Parliament, 2018).

According to Geyer *et al.*, 2017, a reference study in this field, in 2015, 9 % of generated plastic waste was recycled, 12 % incinerated, and 79 % ended up in landfills or the natural environment.

The largest market sector for plastic resins is packaging, in other words, materials designed for immediate disposal (Plastics Europe, 2018). The European Parliament says that the production of plastic related to packaging accounts for 40 % of the total.

A large part of the plastic packaging that generate these environmental and health problems are of food origin (Nemat *et al.*, 2019). There are several reasons for this, such as “over-packaging” (Monnot *et al.*, 2019), a lack of knowledge of more environmentally-friendly purchasing alternatives (Hoek *et al.*, 2017; Herbes *et al.*, 2018; Ketelsen *et al.*, 2020) or poor waste management at the household level (Lea & Worsley, 2008; Monnot *et al.*, 2015; Elgaaïed-Gambier, 2016).

In response, the European Commission (2018) approved the first European Strategy on Plastics in January 2018, as part of the transition to a more circular economy. This strategy aims to reduce consumption of single-use plastics and restrict the international use of microplastics (European Commission, 2018). Stepping up the recycling of plastics can bring significant environmental and economic benefits. Nevertheless, in the EU, the potential for recycling plastic waste remains largely unexploited. Reuse and recycling of end-of-life plastics remains very low, particularly compared with other materials such as paper, glass or metals (European Commission, 2018).

Furthermore, there is some debate regarding the various behaviours and attitudes towards the environment depending on age. Some studies note that there are indications of an improved environmental attitude among younger people, whereas others say there is greater real commitment among older people (Grønhøj & Thøgersen, 2017; Wiernik *et al.*, 2016; Naderi & Van Steenburg, 2018; Sun *et al.*, 2019).

Although prior research has analysed several types of environmental behaviours (recycling, composting, limiting energy consumption or sustainable purchasing), the

specific case of alternatives regarding the purchasing of packaged foods has been scarcely studied.

This project is an exploratory study whose objective is to analyse the purchasing preferences of consumers among different types of food packaging, and to verify whether there are differences in said preferences by age groups. Likewise, it aims to analyse the relation between age and other types of environmental behaviours resulting from the consumption of packaged foods (such as recycling) and several environmental attitudes.

In essence, we aim to detect if young people, faced with a complicated and uncertain environmental future, express their concern and behave actively to improve it.

## 2. Background

### ***2.1. Consumers, food packaging and the environment. The role of environmental awareness in consumer behaviour.***

In spite of the large body of research dealing with food consumer purchasing behaviour in relation to packaging attributes, only few studies specifically analyse the environmental aspects. Traditionally, regarding the choice of packaging – a choice made when a desired product comes in different packages –, functional package characteristics such as convenience of use, design and aesthetics have been at the forefront.

One of the first evidences of an increased interest in the environmental consequences of packaging was shown by Bech-Larsen (1996). His study, conducted in Denmark, highlighted that (a) many consumers take a personal interest in the environmental consequences of packaging, and that (b) this can result in a preference for sustainable packaging, although (c) this preference seldom influences consumers' actual purchasing decisions. The latter is due to the fact that consumers are unable to distinguish between the environmental consequences of different packaging, a fact that is still apparent two decades later (Ketelsen *et al.*, 2020).

Since then, several studies have analysed the importance of the “package sustainability” attribute among the preferences of consumers regarding packaged foods.

Despite the differences provided by experimental designs, in a majority of the revised studies, the importance of price is greater than package sustainability (Rokka & Usitalo, 2008; Duizer *et al.*, 2009; Van Birgelen *et al.*, 2009; Martinho *et al.*, 2015). The same happens with the quality of the product: few consumers are willing to sacrifice this attribute in exchange for more environmentally-sustainable packaging (Martinho *et al.*, 2015; Jerzyk, 2016; Nørgaard Olesen & Giacalone, 2018).

Regarding the brand, there are discrepancies among prior studies. For example, Rokka & Usitalo (2008) found that the brand is less important than package sustainability. However, for consumers who were part of the study of Baruk & Iwanika (2016), the brand is ahead of the sustainability attribute.

As regards origin, Baruk & Iwanika (2016) and Nørgaard Olesen & Giacalone (2018) found that it has greater importance than package sustainability.

Other specific packaging attributes such as “convenience of use” (Rokka & Uusitalo, 2008), “size of packaging” (Duizer *et al.*, 2009; Baruk & Iwanika, 2016), “ease of use” (Aday & Yener, 2014; Baruk & Iwanika, 2016) or “packaging design” (Martinho *et al.*, 2015) have also been compared with package sustainability, with uneven results.

Other line of research has studied the general sustainability of food production, including aspects that are not exclusively related to the product’s attributes, such as production systems, animal well-being or seasonality, for example. In this type of studies and in these cases, the relevance of environmentally-friendly packaging is higher. For example, in Clonan *et al.* (2010) the highest priority for British consumers in terms of sustainable food was how the food had been produced, followed by packaging and seasonality. In their study in Norway, Hanss & Böhn (2012) indicated that consumers rated recyclable packaging and low-energy packaging as important product attributes for sustainable products, whereas product attributes related to natural wholesomeness, animal protection, and economic attributes were perceived as less relevant.

Focusing on the types of packaging materials, several studies compare the sustainability perceived by consumers for each one of them. As was already mentioned, there are discrepancies between consumer perception on the environmental impact of different packaging options, probably due to a lack of knowledge of consumers in order to determine which materials are more sustainable (Herbes *et al.*, 2018; Ketelsen *et al.*, 2020). In a majority of the studies revised, the materials perceived as the most sustainable are paper-based or carton, whereas plastic is seen as the least ecological material (Lindh *et al.*, 2016; Herbes *et al.*, 2018; Petljak *et al.*, 2019, Klaiman *et al.*, 2016; Steenis *et al.*, 2017). The discrepancies are greater in materials such as glass, which in some cases is seen as sustainable (Steenis *et al.*, 2017, Herbes *et al.*, 2018), and in others, as non-sustainable (Petljak *et al.*, 2019).

However, many studies reveal that consumers view a decreased use of food packaging as one of the most important items to help the environment (Lea & Worsley, 2008; Tobler *et al.*, 2011; Jeżewska-Zychowicz & Jeznach, 2015; Heidbreder *et al.*, 2019).

In short, consumers perceive packaging as an important attribute with a relevant influence in their purchase decisions, mainly due to its environmental implications, and they consider plastic to be the least sustainable type of packaging material.

## **2.2. Age and environmental attitudes versus behaviour**

In earlier studies on age and green marketing, the general belief is that younger individuals are likely to be more sensitive towards environmental issues, with the most common argument being that those who have grown up in a time period in

which environmental concerns were a salient issue at some level, are more likely to be sensitive to these issues (Straughan & Roberts, 1999).

Furthermore, ample research shows that younger people report being more environmentally concerned than older people. In this context, studies using intentional commitment measures of the behavioural domain (Zeidner & Shechter, 1988; Grønhøj & Thøgersen, 2017; Kaufmann *et al.*, 2012; Wiernik *et al.*, 2016; Rahim *et al.*, 2017) have often found that age is negatively related to (intended) environmental behaviour. In other words, younger people are more likely to state that they will commit more resources to protecting the environment in the future.

However, as Gifford & Nixon (2014) states, environmental *concern* is not the same as environmental *behaviour*.

Studies employing indicators of current behaviour have found that older people display higher levels of green behaviour (e.g., Van Liere & Dunlap, 1980; Schahn & Holzer, 1990; Vining & Ebreo, 1990; Scott & Willits, 1994; Otto & Kaiser, 2014; Liobikienė & Juknys, 2016; Shiel *et al.*, 2020). For example, some studies discovered that older people are more devoted to making environmentally-friendly purchases (Samdahl & Robertson, 1989; Vining & Ebreo, 1990; Roberts, 1996; Gilg *et al.*, 2005; Aytakin & Çelik, 2017; Shahsavar *et al.*, 2020) or recycling packaging (Kelly *et al.*, 2006; Martin *et al.*, 2006; Saphores & Nixon, 2014) compared with younger individuals. Older people also engage with other food-related environmental behaviours such as composting, possibly because they have performed these behaviours throughout their lives and therefore continue to do so out of habit (Lea & Worsley, 2008; Wu *et al.*, 2019).

In the study by Twenge *et al.* (2012), taking action to help the environment, an area purported to be of particular concern to young millennials, instead showed one of the largest declines in comparison with previous generations. It is possible that such inconsistencies are due to a lack of resources among younger members of the population to support environmental causes. In this sense, Naderi & Van Steenburg (2018) consider that millennials grasp the environmental consequences of their actions and have the education, motivation and social awareness to participate in the green movement. However, they have not truly begun to fully integrate their beliefs and actions.

### 2.3. Recycling behaviour

Among the different environmental behaviours, one of the most commonly studied has been the recycling behaviour in homes. Three major categories of individual determinants of recycling behaviour have been identified (Guiot *et al.*, 2019): internal dispositions like attitudes, values and the level of knowledge and concern about environmental problems (Tonglet *et al.*, 2004; Knussen *et al.*, 2004; Izagirre-Olaizola *et al.*, 2015; Prakash & Pathak, 2017), external motivations such as social norms, financial incentives, and available information (Tonglet *et al.*, 2004; Klaiman *et al.*, 2016; Wu *et al.*, 2019; Guiot *et al.*, 2019) and demographic

characteristics (Miliute-Plepiene *et al.*, 2016; Guiot *et al.*, 2019), such as gender or age.

In this research, we are particularly interested in studying the relationship between age and recycling behaviour. In this sense, the results of age's impact on recycling behaviour are ambiguous (Guiot *et al.*, 2019). Some authors have found a relationship between recycling behaviour and age, but others report no significant correlation (Miafodzyeva & Brandt, 2013).

For example, Diamantopoulos *et al.* (2003) found that older people tend to undertake higher levels of recycling activities, whereas Meneses & Palacio (2005) reported that the people whose age is far from the working population's average have more barriers in order to recycle. Miafodzyeva & Brandt (2013) found a weak but positive correlation between age and recycling frequency in respondents between 31 and 60 years of age. However, this study also reveals that age indirectly influences household recycling behavior. Klaiman *et al.* (2016) found that age exhibits a U-shaped effect on demand for recyclability. Individual WTP for packaging recyclability was the highest for young and elder consumers, while it was the lowest at age 59.

In summary, even though the different studies show a link between age and recycling behaviour, there is no clear associated age profile.

### 3. Method

To achieve the objective, a virtual survey was carried out using social networks Facebook and Whatsapp between January and February 2019. It is a non-discriminatory exponential snowball sampling. We collected 366 responses, of which 350 were valid.

The questionnaire included questions about the amount and type of format in which a number of daily foods were consumed: bottled water, milk or vegetable drink, bread and meat.

It also included a question to find out the predominant type of packaging purchased for each of the products being analysed. The options are shown in Table 1. A non-consumption option was also included for each type of food. To facilitate identification, pictures of the different packaging options were included.

TABLE 1  
Types of packaging in the sample of food products

Water	Milk or Vegetable Drink	Bread	Meat
<ul style="list-style-type: none"> <li>• Small plastic bottle</li> <li>• Plastic Bottle 1 l</li> <li>• Plastic container 5-8 l</li> <li>• Glass Bottle</li> </ul>	<ul style="list-style-type: none"> <li>• Carton</li> <li>• Plastic Bottle</li> </ul>	<ul style="list-style-type: none"> <li>• Paper bag</li> <li>• Plastic bag</li> <li>• Without bag</li> </ul>	<ul style="list-style-type: none"> <li>• Plastic disposable tray</li> <li>• Butcher paper</li> </ul>

Source: Own elaboration.

In order to characterise the sample by their environmental attitudes, we used The New Ecological Paradigm (NEP) scale. It was designed by Dunlap *et al.* (2000) to measure the environmental concern of groups of people using a survey tool composed of 15 statements. Participants rated each of the 15 NEP scale statements on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Since its creation, the NEP scale has been broadly used to measure environmental attitudes (Hawcroft & Milfont, 2010) and it has been applied around the world to different areas and populations. In relation to food behaviour, NEP scale measurements have been examined as predictors of food and sustainability-related behaviours for community supported agriculture members (Uribe *et al.*, 2012), determinants of willingness to pay for food miles (Greibitus *et al.*, 2013) or predictors of sustainable food choices (Campbell-Arvai *et al.*, 2014). Also, Schuldt & Hannahan (2013) analysed whether consumer perceptions of organic food compared to conventional food regarding two attributes (healthfulness and taste quality) vary as a function of environmental concern (NEP scale).

Participants were also asked about the frequency of their involvement in environmentally-sustainable behaviours such as recycling. Responses ranged from 'Always' to 'Never' on a 5-point Likert scale. The survey also included questions on purchasing habits and socio-demographic characteristics.

### **3.1. Data analysis**

Results were analysed using the Statistical Package for Social Sciences IBM SPSS version 25.

To analyse the data, we conducted a segmentation of the sample population by age.

In order to look for differences among segments, we created a cross-tabulation table with a column proportions test for nominal variables. The statistical tool used to contrast the hypothesis of independence between categorical variables was the Pearson chi-square. Specifically, the cross-tabulation tables and chi-square test were used to analyse the existence of significant differences between segments with respect to the following variables: place of purchase, purchase format, recycling behaviour and NEP scale.

## **4. Results**

The socio-demographic characteristics of the sample are summarised in Table 2.

TABLE 2  
**Sample demographic characteristics (in percentage)**

Characteristic	%	Characteristic	%
Gender		Children	
Female	62.8	Yes	31.4
Male	37.2	No	68.6
Age		Level of Income	
18-25 years old	37.8	< 1000 €	15.6
26-34 years old	13.2	1001-2000 €	33.1
35-50 years old	29.9	2001-3000 €	25.4
51-65 years old	16.4	> 3001 €	10.1
> 66 years old	2.7	I'd rather not say	15.8
Household size		Level of studies	
1	8.2	Primary school	8.2
2	22.1	Secondary school	26.6
3	26.5	Ongoing University	26.9
4	35.2	University or Upper Degree	38.2
5	5.5		
> 5	2.5		

Source: Own elaboration.

The general behaviour of the sample as regards the product format purchased is shown in Graphs 1 to 4.

For bottled water, the frequency of purchase of the 1-litre plastic bottle (59.3 %) stands out, as it is perhaps one of the most polluting containers. A more ecological option, which would be to acquire larger containers (5-8 litres) is the option chosen by 16.9 % of the sample, while 23.0 % of households do not consume bottled water.

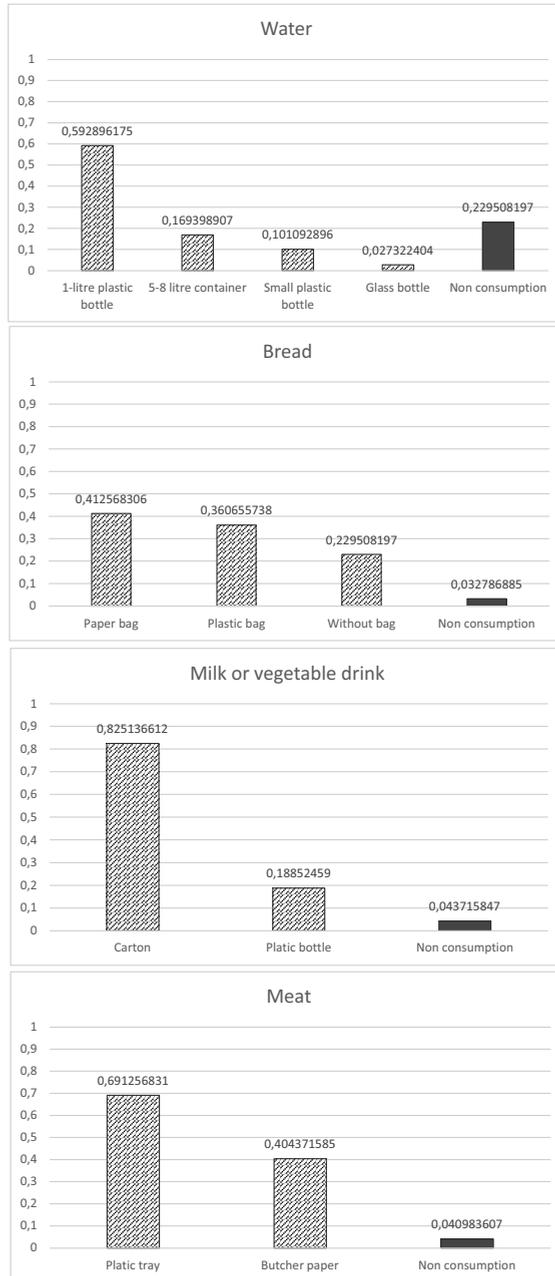
As for milk or vegetable drinks, carton (82.5 %) is the most common option. One of the reasons could be that most brands of milk or vegetable drinks in Spanish supermarkets offer this product in carton packaging. In any case, there is no clear opinion on what the most polluting packaging is, since carton is very difficult to recycle.

As for bread, both plastic bags (41.3 %) and paper bags (36.1 %) surpass the ecological option of buying bread without a bag (23.0 %).

Regarding meat, the plastic tray or packaging (69.1 %) surpasses the more traditional and less polluting option of butcher paper (40.4 %).

GRAPHS 1-4

Percentage of the sample buying different formats of packaged foods and beverages



Source: Own elaboration.

#### 4.1. Age segmentation

In order to investigate the hypothetical relationship between age and sustainable purchasing behaviour, a segmentation by age was conducted, classifying consumers into four groups<sup>1</sup>:

- Segment 1 (37.8 % of the sample): Under 25 years old
- Segment 2 (13.2 % of the sample): 26-34 years old
- Segment 3 (29.8 % of the sample): 35-50 years old
- Segment 4 (19.2 % of the sample): Over 50 years old

To investigate the differences among segments we performed a cross-tabulation table with a column proportions test.

Table 3 shows the percentage of consumers who buy food once a week or more in different places of purchase, as well as the differences between segments in the frequency of purchase in these places.

The usual place of purchase of most respondents is the supermarket, where 88.3 % do their shopping once a week or more, followed by neighbourhood shops (61.5 % do the shopping once a week or more). Frequent purchase over the Internet or directly from the producer is only practiced by 13.2 % and 15.5 % of the sample respectively.

The segments do not differ from each other in their frequency of purchase in supermarkets, but they do in the other three places of purchase. Consumers in segment 1 buy less frequently in local shops, over the Internet and directly from the producer. Consumers in Segment 2 also buy directly from the producer less frequently. On the contrary, there is a greater number of consumers over 50 who do the shopping in these places. This result seems logical in the case of purchases in neighbourhood shops or directly from the producer, but is surprising in the case of the Internet, where young people would be expected to have the highest frequency rate.

TABLE 3

#### Percentage of consumers who buy once a week or more in different places of purchase

	Segment 1	Segment 2	Segment 3	Segment 4	Total
Supermarkets	84.6 %	94.4 %	91.3 %	84.5 %	88.3 %
Local shops*	43.6 % <sub>a</sub>	61.1 % <sub>a, b</sub>	67.4 % <sub>b</sub>	75.9 % <sub>b</sub>	61.4 %
Internet*	2.6 % <sub>a</sub>	8.3 % <sub>a, b</sub>	18.5 % <sub>b</sub>	20.7 % <sub>b</sub>	12.9 %
Directly from the producer*	5.1 % <sub>a</sub>	5.6 % <sub>a</sub>	20.7 % <sub>b</sub>	27.6 % <sub>b</sub>	15.5 %

Source: Own elaboration.

\* and \*\* indicate significance at the 5 % and 10 % levels, respectively.

Each subscript letter denotes a subset of Age categories whose column proportions do not differ significantly from each other.

Chi Squared values for place of purchase frequency are: Supermarkets  $X^2 = 3.950$ ,  $df = 3$ ,  $p = 0.267$ ; Local shops  $X^2 = 16.946$ ,  $df = 3$ ,  $p = 0.001$ ; Internet,  $X^2 = 13.784$ ,  $df = 3$ ,  $p = 0.003$ ; Producer,  $X^2 = 17.430$ ,  $df = 3$ ,  $p = 0.001$ .

<sup>1</sup> This segmentation is what has made it possible to maximize the differences between the groups, taking into account the limitations of sampling.

Table 4 shows the differences between the segments regarding the various types of packaging. We found significant differences in all analysed products. In the case of water, the “not consumed” option is included, since the percentage of individuals who do not buy bottled water was high. In the other products, the percentage of people who chose the “not consumed” option was less than 5 %, so we decided to eliminate it from the segment analysis.

In total, 31.3 % of people over 50 years old claimed not to consume bottled water, compared to 16.2 % of participants under 25 years of age. With regard to the 1-litre bottle, consumers in segment 4 were those who purchased this format the least again (43.3 %). In the remaining segments, more than 60 % consume water in this type of container. Compared to consumers in segments 2 and 3, the 5-8-litre container is preferred by consumers in segment 4 (19.4 %) and segment 1 (15.4 %). We did not find significant differences in the percentage of individuals who buy water in small bottles.

Regarding milk or vegetable drinks, young consumers choose carton and older ones go for the plastic bottle.

As for bread, there are significant differences in the plastic bagging. As many as 45.9 % of young people buy the product in plastic packaging, compared to the over-50s, where only 26.9 % buy it in this format. In the intermediate age segments, around 35% buy their bread in plastic packaging. There are no significant differences in the purchase of bread in paper bags or without packaging.

Regarding meat, there are significant differences in the purchasing of both plastic tray/packaging and butcher paper. Consumers under 50 years of age choose to buy meat on plastic trays in greater proportion. Butcher paper is largely chosen by those over 50 (43.1 % compared to 29.9 % on average).

TABLE 4

**Differences between segments depending on the purchase format of water, milk, bread and meat**

	Segment 1	Segment 2	Segment 3	Segment 4	Total
<b>Bottled water*</b>					
$X^2 = 20.993$ , $df = 9$ , $p = 0.013$ ;					
Not consumed	16.2 % <sub>a</sub>	27.7 % <sub>a, b</sub>	26.7 % <sub>b</sub>	31.3 % <sub>b</sub>	23.7 %
1-Litre Bottle	64.7 % <sub>a</sub>	68.1 % <sub>a</sub>	60.0 % <sub>a</sub>	43.3 % <sub>b</sub>	59.7 %
5-8-litre container	15.4 % <sub>a, b</sub>	4.3 % <sub>c</sub>	7.6 % <sub>b, c</sub>	19.4 % <sub>a</sub>	12.4 %
Small plastic bottle	3.7 % <sub>a</sub>	0.0 %	5.7 % <sub>a</sub>	6.0 % <sub>a</sub>	4.2 %
<b>Milk*</b>					
$X^2 = 9.036$ , $df = 3$ , $p = 0.029$					
Plastic bottle	16.2 % <sub>a</sub>	27.7 % <sub>a, b</sub>	26.7 % <sub>b</sub>	31.3 % <sub>b</sub>	23.7 %
Tetrabrick	64.7 % <sub>a</sub>	68.1 % <sub>a</sub>	60.0 % <sub>a</sub>	43.3 % <sub>b</sub>	59.7 %

	Segment 1	Segment 2	Segment 3	Segment 4	Total
<b>Bread*</b>					
$X^2 = 5.656, df = 1, p = 0.017$					
Plastic bag	45.9 % <sub>a</sub>	36.4 % <sub>a,b</sub>	35.9 % <sub>a,b</sub>	26.9 % <sub>b</sub>	38.0 %
Paper bag	35.3 % <sub>a</sub>	45.5 % <sub>a</sub>	39.8 % <sub>a</sub>	47.8 % <sub>a</sub>	40.3 %
Without bag	18.8 % <sub>a</sub>	18.2 % <sub>a</sub>	24.3 % <sub>a</sub>	25.4 % <sub>a</sub>	21.6 %
<b>Meat**</b>					
$X^2 = 7.273, df = 3, p = 0.064$					
Plastic disposable tray	75.4% <sub>a</sub>	70.2% <sub>a,b</sub>	71.8% <sub>a</sub>	56.9% <sub>b</sub>	70.1%
Butcher paper	24.6% <sub>a</sub>	29.8% <sub>a,b</sub>	28.2% <sub>a</sub>	43.1% <sub>b</sub>	29.9%

Source: Own elaboration.

\* and \*\* indicate significance at the 5 % and 10 % levels, respectively.

Each subscript letter denotes a subset of Age categories whose column proportions do not differ significantly from each other.

Table 5 shows the differences in recycling behaviour for three materials: paper, glass and plastic.

Segment 2 (between 25 and 36 years old) has turned out to be the one with the worst recycling behaviour, since 52 %, 41.7 % and 45.8 % never or almost never recycle paper, glass and plastic respectively. Compared to this behaviour, there is a significantly higher proportion of people over 50 who always or almost always recycle paper (61.4 %), glass (68.6 %) and plastic (68.6 %). A high proportion of younger people (under 25) curiously always or almost always recycle glass, but not paper. With regard to plastic, they behave in a similar way to the average.

TABLE 5

**Differences between segments depending on the recycling behaviour of paper, glass and plastic**

Frequency of recycling	Segment 1	Segment 2	Segment 3	Segment 4	Total
<b>Paper*</b>					
$X^2 = 22.7870, df = 6, p = 0.001$					
Never or almost never	50.7 % <sub>a</sub>	52.1 % <sub>a</sub>	33.0 % <sub>b</sub>	21.4 % <sub>b</sub>	40.0 %
Sometimes	13.0 % <sub>a</sub>	12.5 % <sub>a</sub>	19.3 % <sub>a</sub>	17.1 % <sub>a</sub>	15.6 %
Always or almost always	36.2 % <sub>a</sub>	35.4 % <sub>a</sub>	47.7 % <sub>a,b</sub>	61.4 % <sub>b</sub>	44.4 %
<b>Glass**</b>					
$X^2 = 11.906, df = 6, p = 0.064$					
Never or almost never	26.8 % <sub>a,b</sub>	41.7 % <sub>b</sub>	27.5 % <sub>a,b</sub>	17.1 % <sub>a</sub>	27.1 %

Frequency of recycling	Segment 1	Segment 2	Segment 3	Segment 4	Total
Sometimes	13.0 % <sub>a, b</sub>	6.3 % <sub>b</sub>	18.3 % <sub>a</sub>	14.3 % <sub>a, b</sub>	14.0 %
Always or almost always	60.1 % <sub>a</sub>	52.1 % <sub>a</sub>	54.1 % <sub>a</sub>	68.6 % <sub>a</sub>	58.9 %
Plastic*					
X <sup>2</sup> = 15.914, df = 6, p = 0.014					
Never or almost never	34.1 % <sub>a</sub>	45.8 % <sub>a</sub>	30.3 % <sub>a</sub>	15.7 % <sub>b</sub>	31.0 %
Sometimes	13.8 % <sub>a</sub>	10.4 % <sub>a</sub>	20.2 % <sub>a</sub>	15.7 % <sub>a</sub>	15.6 %
Always or almost always	52.2 % <sub>a</sub>	43.8 % <sub>a</sub>	49.5 % <sub>a</sub>	68.6 % <sub>b</sub>	53.4 %

Source: Own elaboration.

\* and \*\* indicate significance at the 5 % and 10 % levels, respectively.

Each subscript letter denotes a subset of Age categories whose column proportions do not differ significantly from each other.

Finally, Table 6 shows the NEP scale statements for which significant differences between segments have been found<sup>2</sup>. We have observed that, for four of the five statements, young people display a more ecocentric vision. In other words, they are significantly more in agreement with growth limits or with the equality of rights between nature, plants, animals and human beings.

On the other hand, older people have a more anthropocentric view, in the sense that they believe to a greater extent that humans have the right to govern nature, and that the latter will be able to mitigate the effects of our activities.

**TABLE 6**  
**Differences between segments depending on the environmental attitudes measured by NEP**

	Segment 1	Segment 2	Segment 3	Segment 4	Total
We are approaching the limit of the number of people the earth can support *					
X <sup>2</sup> = 15.924, df = 6, p = 0.014					
Disagree	17.5 % <sub>a, b</sub>	8.5 % <sub>b</sub>	28.7 % <sub>c</sub>	28.8 % <sub>a, c</sub>	21.8 %
Indiferent	20.4 % <sub>a</sub>	29.8 % <sub>a</sub>	26.9 % <sub>a</sub>	27.3 % <sub>a</sub>	24.9 %
Agree	62.0 % <sub>a</sub>	61.7 % <sub>a, b</sub>	44.4 % <sub>c</sub>	43.9 % <sub>b, c</sub>	53.4 %
Plants and animals have as much right as humans to exist **					
X <sup>2</sup> = 11.920, df = 6, p = 0.064					
Disagree	7.4 % <sub>a</sub>	4.3 % <sub>a</sub>	10.2 % <sub>a, b</sub>	16.7 % <sub>b</sub>	9.6 %
Indiferent	2.9 % <sub>a</sub>	10.9 % <sub>b</sub>	8.3 % <sub>a, b</sub>	9.1 % <sub>a, b</sub>	6.7 %
Agree	89.7 % <sub>a</sub>	84.8 % <sub>a, b</sub>	81.5 % <sub>a, b</sub>	74.2 % <sub>b</sub>	83.7 %

<sup>2</sup> We have grouped levels 1 (totally disagree) and 2 (disagree) into the “Disagree” category and levels 4 (agree) and 5 (totally agree) into the “Agree” category.

	Segment 1	Segment 2	Segment 3	Segment 4	Total
The balance of nature is strong enough to cope with the impacts of modern industrial nations*					
$X^2 = 12.682$ , $df = 6$ , $p = 0.048$					
Disagree	84.6 % <sub>a</sub>	76.6 % <sub>a</sub>	75.9 % <sub>a</sub>	76.9 % <sub>a</sub>	79.5 %
Indiferent	11.8 % <sub>a</sub>	19.1 % <sub>a</sub>	10.2 % <sub>a</sub>	10.8 % <sub>a</sub>	12.1 %
Agree	3.7 % <sub>a</sub>	4.3 % <sub>a, b</sub>	13.9 % <sub>b</sub>	12.3 % <sub>b</sub>	8.4 %
The earth is like a spaceship with very limited room and resources**					
$X^2 = 11.273$ , $df = 6$ , $p = 0.080$					
Disagree	32.8 % <sub>a</sub>	17.0 % <sub>b</sub>	28.7 % <sub>a, b</sub>	27.7 % <sub>a, b</sub>	28.6 %
Indiferent	27.7 % <sub>a, b</sub>	42.6 % <sub>b</sub>	25.9 % <sub>a</sub>	18.5 % <sub>a</sub>	27.5 %
Agree	39.4 % <sub>a</sub>	40.4 % <sub>a</sub>	45.4 % <sub>a</sub>	53.8 % <sub>b</sub>	44.0 %
Humans are meant to rule over the rest of nature**					
$X^2 = 22.7870$ , $df = 6$ , $p = 0.065$					
Disagree	77.4 % <sub>a</sub>	66.0 % <sub>a, b</sub>	67.6 % <sub>a, b</sub>	61.5 % <sub>b</sub>	70.0 %
Indiferent	15.3 % <sub>a</sub>	19.1 % <sub>a</sub>	13.9 % <sub>a</sub>	15.4 % <sub>a</sub>	15.4 %
Agree	7.3 % <sub>a</sub>	14.9 % <sub>a, b</sub>	18.5 % <sub>b</sub>	23.1 % <sub>b</sub>	14.6 %

Source: Own elaboration.

\* and \*\* indicate significance at the 5 and 10% levels, respectively.

Each subscript letter denotes a subset of Age categories whose column proportions do not differ significantly from each other.

There is just one item where this pattern is not observed: there are significantly more older people than younger people who agree that “Earth is like a spaceship with a very limited amount of space and resources”. However, we can see that, unlike with other statements where younger people were in agreement or in disagreement in a clearer way, in this item there is more ambiguity, with almost the same amount of young people being in agreement and in disagreement.

## 5. Discussion and conclusions

In general, our study showed a high consumption of packaged food and drink, even in those cases where there are unpackaged alternatives, such as water, in which one of the most polluting formats (1-litre bottle) is used by 59.3 % of the sample. In this sense, we agree with Orset *et al.* (2017) that policies are needed on a public level to decrease the specific consumption of plastic water bottles; policies that should be expanded to decrease the consumption of plastic containers in general (Heidbreder *et al.*, 2019). We find especially interesting the information policy proposed by Orset *et al.* (2017), a policy which shows people the varying impact of all kinds of plastic bottles on the environment.

The segment analysis showed pessimistic data with respect to the youngest segment. Although on the NEP scale they seem to be slightly more aware than the older segments, coinciding with other studies (Grønhøj & Thøgersen, 2017; Wiernik *et al.*, 2016), this does not translate into a more sustainable purchasing behaviour. Of

the four products analysed, young people choose less sustainable purchasing formats even though there are other alternatives for water (1-litre plastic bottle), bread (plastic bagging) or meat (plastic tray). In addition, this is combined with a lower frequency of recycling than the older segments.

Our results are consistent with those of Lea & Worsley (2008) who found that older people were more likely to perform certain food-related environmental behaviours, such as green purchasing (Gilg *et al.*, 2005; D'Souza *et al.*, 2007; Aytekin & Çelik, 2017) or composting (Lea & Worsley, 2008; Wu *et al.*, 2019). These behaviours can be explained by the habit acquired throughout their lives (Lea & Worsley, 2008), by a greater level of attention given to matters such as personal health and quality of life, and therefore to the environment, when one gets older (Sun *et al.*, 2019), or by repeated exposure to environmental crises over their lifespans, which may lead to higher levels of environmental awareness (Otto & Kaiser, 2014).

Regarding the study's limitations, we have not taken into account the availability of public facilities for recycling which, as Boz *et al.* (2020) suggest, can influence sustainable behaviours related to packaging. We have also not established whether the different types of formats were available to the consumers in their usual place of purchase. However, the available type of format can be linked to the place where the food is purchased (for example, in large supermarkets the possibility of buying in bulk has only recently been implemented). This last aspect (place of purchase) has been taken into account in our study, finding that older people are more prone to buy straight from the producer or in local shops (where it is easier to find bulk goods).

This study is exploratory and as such the results have to be interpreted. Similar work should be done with a larger and more representative sample of the population to obtain more conclusive results. However, we can conclude that much more needs to be done in terms of consumer education and information. This should be directed along two main lines: to raise awareness on the consequences that purchasing packaged food has on the environment, and to inform about more sustainable alternatives, if these exist.

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