



## Research article

# Consumer willingness to pay more for pro-environmental packages: The moderating role of familiarity<sup>☆</sup>

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## ABSTRACT

Institutional regulations and market trends are spurring companies to invest more in pro-environmental and sustainable products. Within the pro-environmental offer, there are several packaging alternatives, from sustainably packaged to unpackaged products – so-called bulk – and/or labels, compelling companies into making a complex investment choice. Further, the required higher investments do not always find consumers' approval. Consumers often consider pro-environmental packaging as excessively expensive. Within this context, this study seeks to understand how to exploit the consumers' greater attention to sustainability and well-being to boost consumers' willingness to pay more for pro-environmental products. In doing so, the study compares two packaging options (i.e., sustainably packaged products and bulk products). Additionally, the study assesses differences between highly and slightly familiar consumers, evidencing how to properly encounter the expectations of the two segments. The findings, derived by a multigroup structural equation model conducted on 278 structured questionnaires, reveal that health concern impact is more relevant to highly familiar consumers while environmental concern is for slightly familiar consumers. For the latter, label influence plays a primary role in enhancing their willingness to pay more for pro-environmental products. Overall, sustainably packaged products are preferred to unpackaged products.

## 1. Introduction

The impact of climate change on the environment and individuals' lives, and the overproduction and waste generation are themes both contemporary and meantime diverse. On one hand, climate and environmental issues are increasingly relevant in common sense: there is a widespread sensitivity to their impact on the ecosystem. On the other hand, production grows year by year, leading to the growth of waste and pollution determined by intensive production (Saira and Shanthakumar, 2023). The World Bank estimates that global solid waste will grow from 2.24 billion tons in 2020 to 3.88 billion tons in 2050 – its growth will double the world population growth in the same period (The World Bank, 2022). By 2030, packaging waste is estimated to increase by 19%, with plastic waste rising by 46% (European Commission, 2022). Plastic waste accounts for 221 kg/person in the United States, 114 kg/person in the EU, and 69 kg/person in countries such as Korea and Japan (OECD, 2022).

Worldwide institutions and manufacturers are turning the spotlight

on a more pro-environmental offer. Particularly, fast-moving consumer goods (FMCG) packaging represents the main cause of waste production. The EU's Packaging and Packaging Waste Directive (PPWD – Directive 94/62/EC) is fostering “reusable packaging options, get rid of unnecessary packaging, limit overpackaging, and provide clear labels to support correct recycling” (European Commission, 2022). Likewise, the UN 2030 Sustainable Development Goals (SDGs) agenda is spurring companies to provide more sustainable packaging and recycling systems to be able to guarantee social, economic, and environmental sustainability (Walsh et al., 2020).

Even on the consumer side, the concern about environmental issues has been increasing over the last few years, sparking newfound consumer interest in pro-environmental campaigns and commitment. Pro-environmental purchases are considered an opportunity to impact the environment less, take care of people's health, and support local companies (Werther and Chandler, 2011). Nowadays, consumers are more environmentally aware and are devoted to adopting healthy lifestyles (Pícha and Navrátil, 2019). As they tend to consider the package as a

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source of waste, they favor buying more environment friendly packaged goods (Rokka and Uusitalo, 2008), or when available, unpacked goods (Fuentes et al., 2019).

Thus, to fulfill their corporate social responsibility (CSR), companies are adapting their production processes to attain emerging consumers' values (D'Attoma and Ieva, 2022; Werther and Chandler, 2011). To address institutional requests and the growing consumers' pro-environmental sensitivity, companies are called to identify economically sustainable packaging options (Gardas et al., 2019). Furthermore, CSR pro-environmental strategies provide positive externalities. Companies may lead consumers to display environment-friendlier behaviors by offering easily recyclable or compostable packaging or by eliminating superfluous packaging (De Canio et al., 2021). Consequently, companies are improving their pro-environmental offer by selling sustainably packaged products or bulk products. The former option consists of packages developed by "alternative materials from renewable resources" that may be recyclable or degradable (Andrade et al., 2022, p. 1). The latter are packaging-free products to help address the "zero waste" issue (Gordon-Wilson et al., 2021). In 2020, the worldwide sustainable packaging market accounted for \$258 billion and is forecasted to grow up to \$385 billion by 2028 (Fortune, 2021). Similarly, zero-waste packaging in the worldwide market is valued at \$241 billion, with a growth forecast of 9.3% by 2030 (Grand View Research, 2022). Albeit these growing trends, not all consumers act equally. On one hand, consumers are willing to pay a higher price for green products (Biswas and Roy, 2015) and packages (Hao et al., 2019). On the other hand, although consider the packaging harmful to the environment, they are not willing to sacrifice for it (Fuentes et al., 2019).

Further, "distorted choices of pro-environmental behavior may be caused by a lack of familiarity with pro-environmental behaviors and a lack of information about their benefits and costs" (Welsch and Kühling, 2010, p.408). The pro-environmental familiarity represents the level of knowledge and degree of confidence consumers have about the pro-environmental concern. The level of familiarity is key to influencing the decision process. Highly familiar consumers require less cognitive effort to process information (Alba and Hutchinson, 1987). Conversely, slightly familiar consumers tend to rely on extrinsic cues, such as the packaging, during their shopping process (Herédia-Colaço, 2022). Previous studies found consumers with long-term environmental knowledge to be more willing to spend extra money on pro-environmental products (Ogbeide et al., 2015).

Due to contrasting findings emerging in the literature and the increasing need of companies to manage higher costs to advance their pro-environmental offer, not always in line with consumers' price expectations (Yadav et al., 2022), this study aimed to address the following research questions:

**RQ1.** Are sustainably packaged and bulk products similarly perceived by consumers?

**RQ2.** How does the consumer's familiarity with pro-environmental issues influence their willingness to pay more for pro-environmental packaging options?

By implementing the Theory of Reasoned Action (Ajzen and Fishbein, 1980) to develop the Motivation-Intention-Behavior model, the study considers several ethical values, attitudes, and intentions that may influence sustainable consumption (Hao et al., 2019; Vermeir and Verbeke, 2008). Specifically, this study evaluates how the attitude toward the environmental concern (EC) and the health concern (HC) by influencing consumers' intention to buy sustainably packaged products (SPPI) or bulk products (BPPI) leads to a higher consumers' willingness to pay more for pro-environmental products (WTP). The label influence (LAB) is considered a direct driver of the willingness to pay. Motivations of highly and slightly familiar consumers are compared.

Considering the consumer's perspective, this study seeks to

understand which aspects can lead consumers to opt for a sustainable consumption choice and recognize pro-environmental products along with the right price able to cover the investments made by companies changing their production process. This paper aims to fill the "action gap" in the environmental domain (Barber et al., 2014).

## 2. Literature review and hypotheses development

### 2.1. Environmental concern

Environmental concern refers to a consumer's general attitude toward preserving the environment (Wei et al., 2018). It is considered a driver of pro-environmental behavior as it can influence consumer practices and motivates people to adopt a more sustainable lifestyle, to minimize the impact of human actions on the planet (Newton et al., 2015). Thus, environmental concern has been widely acknowledged as a significant factor that motivates consumers to act in a pro-environmental manner (German et al., 2022). Previous studies have confirmed the positive relationship between environmental concern and consumer behavior (Scott and Vigar-Ellis, 2014). Thus, environmental concern shapes consumers' buying habits (Yadav et al., 2022) and may lead to the purchase of pro-environmental products (De Canio et al., 2021). Studies have confirmed the positive impact of the attitude toward the environment on consumers' purchase intentions (Hartmann and Apaolaza-Ibañez, 2012). Based on the discussion above, the following hypotheses can be proposed:

**H1a.** Environmental concern positively impacts the intention to buy sustainably packaged products.

**H1b.** Environmental concern positively impacts the intention to buy bulk products.

### 2.2. Health concern

The relationship between the environment and human health is getting increasingly relevant from both the institutional perspective (e.g., the EU Commission) and the literature (Pietzsch et al., 2017). The relationship between environment and health concerns was also tested in the case of over-processed meals which are considered unhealthy, energy-consuming, and highly waste-producing (Beitzen-Heineke et al., 2017). Accordingly, health and safety concerns are becoming driving forces in shaping people's attitudes toward the environment (Dursun et al., 2016). Health concern represents consumers' awareness about the quality and health of their lives. It exerts a strong influence on food choices, such as organic (Voon et al., 2011) and veg food (De Canio et al., 2021). Pícha and Navrátil (2019) clustering LOHAS consumers (i.e., Lifestyle of Health and Sustainability) claim that health concern is a powerful driver of pro-environmental buying behavior. Accordingly, hypotheses are drawn as follows:

**H2a.** Health concern positively impacts the intention to buy sustainably packaged products.

**H2b.** Health concern positively impacts the intention to buy bulk products.

### 2.3. Intention to buy sustainably packaged and bulk products

The theory of reasoned action (TRA - Ajzen and Fishbein, 1980) and its model extensions have been widely applied to consumers' buying decisions to understand drivers of pro-environmental product buying behaviors (e.g., De Canio et al., 2021; German et al., 2022). Buying behavior is expressed through purchase frequency or willingness to pay (Barber et al., 2012). In their study, the authors show that those with a stronger intention to purchase express the higher price for environmentally friendly wine (Barber et al., 2012). The positive relationship between consumers' intention and their willingness to pay was

confirmed by [Irfan et al. \(2020\)](#) in the renewable power generation technologies adoption context. However, the authors point out that numerous variables can modify the relationship between purchase intention and willingness to pay ([Irfan et al., 2020](#)). For example, [Krystallis and Chrysosoidis \(2005\)](#) showed that consumers who are not sufficiently convinced that the packaging meets environmental care are unwilling to pay a premium price. [Lindh et al. \(2016\)](#) found that the Swedish are willing to pay different prices based on packaging materials. Accordingly, although a positive relationship exists between intention to buy and willingness to pay, it might differ based on the product's packaging. Thus, based on this we postulate hypotheses as follows:

**H3.** The intention to buy sustainably packaged products positively impacts consumers' willingness to pay more for pro-environmental products.

**H4.** *The intention to buy bulk products positively impacts consumers' willingness to pay more for pro-environmental products.*

#### 2.4. Label influence

Companies use labels to emphasize their environmental engagement and encourage consumers to purchase pro-environmental products. The information stated on labels is useful for consumers as they might infer the level of sustainability of the products they are about to buy. A previous study showed a positive correlation between green labels and consumers' intention to buy pro-environmental products ([Rahbar and Wahid, 2011](#)). In this line, [Scott and Vigar-Ellis \(2014\)](#) stated that packaging and labels play a key role in affecting consumers' perception and willingness to buy. Further studies highlighted that green labels can positively influence the consumer's willingness to pay the extra money, as labels can remind them of the possible environmental consequences of products or packaging ([Chekima et al., 2016](#); [Scott and Vigar-Ellis, 2014](#); [Vermeir and Verbeke, 2008](#)). Based on the discussion above, the following hypothesis can be proposed:

**H5.** Label influence positively impacts consumers' willingness to pay more for pro-environmental products.

The theoretical model includes several demographic variables to spread the results ([Fig. 1](#)). This study considers gender, age, and income as potential control variables of the willingness to pay more for pro-

environmental products.

### 3. Methods

#### 3.1. The survey protocol

To pursue the scope of the present research, the Italian population was selected for the empirical analysis. A previous study showed that Italian individuals are spurring pro-environmental behaviors. A total of 43% of Italians base their food purchases on the packaging's impact on the environment and 20% of them consider a transition to sustainable packaging mandatory ([De Canio et al., 2021](#)). Similarly, national and European institutions are also pushing toward a sustainable packaging transition in Italy. The Italian NextGenerationEU recovery plan supports the environmental transition, allocating more than 35% of its budget to foster pro-environmental behaviors among companies and citizens ([The International Investor, 2022](#)). Additionally, the European Commission is improving the current Waste Framework Directive (WFD) with a regulation that will lead all EU countries to reduce packaging waste and strengthen waste collection to increase the use of recyclable packaging. Italy is one of the main countries for bulk sales ([Cosmeticobs, 2022](#)).

#### 3.2. Research design and data collection method

Due to restrictions imposed by the worldwide COVID-19 pandemic, we gathered data by conducting an online survey through social network sites. The use of social network sites is becoming increasingly common in consumer research ([Plohl and Stern, 2020](#)). It dramatically increased during COVID-19 lockdowns ([Flanagan and Priyadarshini, 2021](#)) as this ensured a lower transmission of the virus and assures the lack of physical contact ([Kim and Hall, 2022](#)).

The Google Forms link was shared on Facebook thematic pages discussing pro-environmental shopping and consumption, green economy, and zero waste topics to intercept interested and engaged consumers, highly sensitive to the impact of the packaging on waste produced by their consumption. Using a snowball method, participants were also invited to share the survey link with others such as their friends and relatives interested in the topic. To reduce opportunistic responses, participation was voluntary, and no remuneration was dispensed. Respondents were assured of the academic scope of the

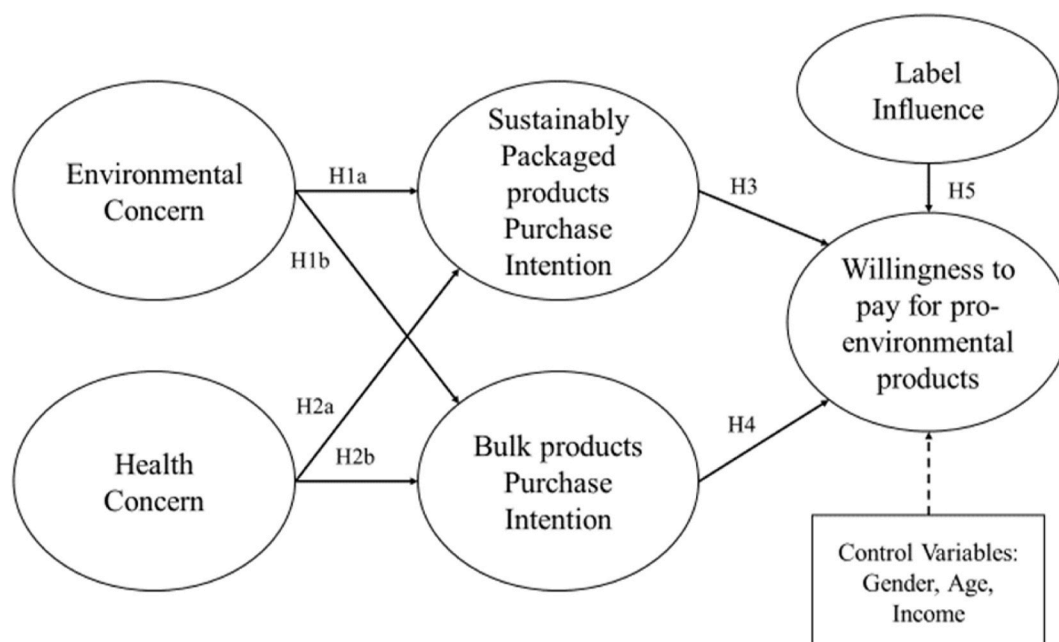


Fig. 1. Theoretical model.

survey and the confidentiality of responses.

Among the 299 questionnaires collected, 21 responses were eliminated due to missing data.

### 3.3. The sample characteristics

The pooled dataset comprises 278 subjects. The descriptive statistics conducted on the sample (Table 1) show that females are the main respondents as they usually carry out the primary role of grocery shopping, in line with the Italian trends. Younger respondents were found to be more sensitive to the issue and showed greater participation in the survey. Respondents had a high educational level: 67% achieved a university degree, and 32% a high school degree. Most of the respondents were gainfully employed (56%) or students (34%) with the remaining being unemployed (5%) or in retirement (5%). Almost half of the subjects declare a low annual income – lower than 36,000€ – and 41% a middle-annual income, i.e., between 36,000€ and 70,000€. Respondents buy pro-environmental products, on average, a couple of times a week.

### 3.4. Measures of the structured questionnaire

The structured questionnaire was developed using scales derived from the main literature on pro-environmental management and consumer behavior and was adapted to the scope of this research. When items were adapted, they were reworded; however, the semantic structure was left close to the original scale. Items were measured on a seven-point Likert scale (1 = completely disagree, 7 = completely agree).

Question 1 was designed to observe differences in respondents' familiarity with pro-environmental issues and create into two groups (Appendix). We used a 5-point single item (i.e., How familiar are you with the pro-environmental issue?), to identify "highly familiar consumers" – categories 4 to 5 – and "slightly familiar consumers" – categories 1 to 3 (Raju, 1977).

A six-item scale was used to assess the consumer's willingness to pay for pro-environmental products (Biswas and Roy, 2015; Wei et al.,

**Table 1**  
Socio-demographic profiles of surveyed subjects.

Characteristics	Distribution	Respondents	Percentage
Gender	Male	94	34%
	Female	184	66%
Age	<20	13	5%
	21–30	141	51%
	31–40	46	17%
	41–50	26	9%
	>50	52	19%
Annual Income	< € 36,000	138	50%
	€ 36,000–70,000	115	41%
	€ 70,000–100,000	16	6%
	> € 100,000	9	3%
Education	Middle school	6	2%
	High school	88	32%
	Bachelor degree	66	24%
	Postgraduate	118	43%
Employment	Student	95	34%
	Unemployed	15	5%
	Employed: full-time	121	44%
	Employed: part-time	33	12%
Times of pro-environmental purchases in a week	Retired/ housewife	14	5%
	Never	65	23%
	1-2 times	141	51%
	3-4 times	49	18%
	5-6 times	10	3%
7 or more	13	5%	

2018). The two scales aimed at measuring the intention to buy bulk products and pro-environmental products were derived by Qi and Ploeger (2019). The influence of labels on consumer choice (LAB) was measured using five items derived by Van der Merwe et al. (2014). Environmental concern was measured by using five items adapted from the original scale of Wei et al. (2018). Health concern was measured with six items from Michaelidou and Hassan (2008). Measures are detailed in Table 2.

### 3.5. Measure invariance between groups

Since the respondents were divided into two groups based on their familiarity with the concept of eco-sustainability – highly familiar vs slightly familiar – the multigroup measurement invariance was assessed. A MICOM three-step procedure was conducted following suggestions of Henseler et al. (2016), using the software Smart-PLS 3.3.9. Compositional Invariance between the two groups was determined since the items and the nature of constructs used in the estimation of the measurement models were the same -  $c = 1$  within the lower and upper limits of the 95% confidence intervals are not significant.

The equality of means could not be confirmed between highly and slightly familiar consumers, since in some cases, the difference in latent variable means scores fell outside the 95% confidence interval limits (Table 3). With all, partial measurement invariance was established as the minimum condition to compare standardized path coefficients across groups (Hair et al., 2021).

### 3.6. Common method bias

In surveys, two potential errors may influence the overall validity of the empirical method. To control for random error, constructs were developed on psychometric scales measured on multiple items (see Table 2). Further, all scales were derived from previous studies. Conversely, to control for systematic error, several techniques were implemented (Podsakoff et al., 2012). First, to correct for potential linguistic bias the questionnaire was double-translated from English to Italian and from Italian to English (Maneesriwongul and Dixon, 2004). Second, the survey was pre-tested on a sample of 20 students attending the Languages and Economics MRes (Klaiman et al., 2017) to ensure the quality of measures. The survey was developed on an online system that allows for shuffling items to reduce response bias.

To control for a-posteriori common method bias (CMB), we used Harman's single-factor method (Podsakoff et al., 2003). The single-factor variance is significantly lower than the multi-factor solution showing no CMB. Lastly, as none of the correlations between latent constructs is higher than 0.9 (Bagozzi et al., 1991), we can confirm the absence of CMB (see Table 4).

## 4. Results

The structural equation model was developed using the partial least squares (PLS) technique by employing the software SmartPLS 3.3.9 (Ringle et al., 2015). Standardized coefficients, standard errors, and t-statistics were evaluated using the bootstrap method for 5,000 resamples (Hair et al., 2021). A two-step approach was implemented to assess, first the measurement model validity, and second the paths among latent constructs.

### 4.1. Measurement model validity

The results of the confirmatory factor analysis assessed the dimensionality and validity of measures. The measurement scale validity was assessed being the standardized loadings above 0.7 and significant at 99% (Table 2). Values for Cronbach's Alpha ( $\alpha$ ), the reliability of coefficients ( $\rho_A$ ), and Composite Reliability (CR) are all above their 0.7 cut-offs, and the average variance extracted (AVE) was also above the

**Table 2**  
Items and factor loadings.

Constructs	Items	Standardized Factor Loadings	T-value	
Willingness to pay for pro-environmental products (WTP)	I am willing to pay more money to buy environment-friendly products.	0.889***	46.675	
	I am willing to pay more money to buy products with sustainable packaging (e.g., compostable, glass, aluminum ...)	0.886***	57.946	
	I am willing to pay more money to buy eco-friendly products.	0.876***	51.941	
	I am willing to spend more money to buy bulk products.	0.833***	33.515	
	I believe it is acceptable to spend extra money on bulk products.	0.738***	18.910	
	I believe it is acceptable to spend extra money on products with sustainable packaging (e.g. compostable, glass, aluminum ...).	0.840***	36.551	
	Bulk products Purchase Intention (BPPI)	When I can choose between two comparable products, I choose bulk products.	0.850***	32.335
		If I had a choice, I would buy products in bulk.	0.930***	100.167
If there were more bulk products in supermarkets, they would be my choice.		0.927***	79.521	
Sustainably Packaged products Purchase Intention (SPPI)	When I purchase products, I always make a conscious effort to buy those products that are low in pollutants.	0.904***	58.127	
	When I have a choice between two equal products, I always purchase the one with sustainable packaging	0.918***	77.916	
	When there is a choice, I always choose the product which contributes to the least amount of pollution	0.938***	106.035	
Label Influence (LAB)	Eco-labels influence my buying habits.	0.738***	19.020	
	When I look at eco-labels, I think of reasons why I will buy environmentally friendly products.	0.781***	22.698	
	Eco-labels inform consumers about the environmental safety of a product	0.803***	28.521	
	Products endorsed by eco-labels are credible	0.787***	23.624	
Environmental Concern (EC)	Eco-labels are a reliable source of information about the environmental quality and performance of a product	0.826***	29.302	
	If all of us, individually, contributed to environmental protection, it would have a significant effect.	0.882***	34.581	
	Everyone is responsible for protecting the environment in their everyday life.	0.904***	43.760	
	Preserving and protecting the environment should be one of our priorities.	0.883***	31.640	

**Table 2 (continued)**

Constructs	Items	Standardized Factor Loadings	T-value
Health Concern (HC)	We should take responsibility for environmental issues, as we are the cause of environmental damage.	0.872***	32.272
	I am very concerned about the number of artificial additives and preservatives in food	0.717***	18.759
Health Concern (HC)	I often reflect on my health	0.885***	46.053
	I am very self-conscious about my health	0.898***	71.115
	I am alerted to changes in my health	0.872***	34.934
	I am usually aware of my health	0.883***	41.700
	I take responsibility for the state of my health	0.817***	26.399
	I am aware of the state of my health as I go through the day	0.807***	31.646

Note: \*\*\*p < 0.001.

minimum thresholds of 0.5, confirming the convergent validity (Hair et al., 2021) (see Table 4).

We confirm the discriminant validity of the measurement model, as none of the correlations between latent constructs is higher than the square root of AVE for all samples (Fornell and Larcker, 1981) (Table 5). The lower heterotrait-monotrait ratio of correlations (HTMT) than the suggested threshold of 0.9 confirms the same (Henseler et al., 2015).

#### 4.2. Structural model results

To verify the proposed hypotheses, we estimated the Partial Least Square Structural Equation Model (PLS-SEM) for the pooled sample. Standardized path coefficients and t-values are presented in Table 6. The variance explained for the three endogenous variables offers evidence for the good predictive ability of our structural model. Particularly, for the pooled sample, the structural model explains 33.1% of the variance of the intention to purchase sustainably packaged products ( $R_{SPPI}^2 = 0.331$ ), 50.9% of the variance of the intention to purchase bulk products ( $R_{BPPI}^2 = 0.509$ ), and 54.7% of the variance of the willingness to pay extra-money for pro-environmental products ( $R_{WTP}^2 = 0.547$ ). Using a blindfolding cross-validated redundancy procedure the predictive relevance values for all the dependent variables were assessed. Stone-Geisser's  $Q^2$  for all the variables is larger than 0 (Hair et al., 2021):  $Q_{SPPI}^2 = 0.273$ ,  $Q_{BPPI}^2 = 0.408$ ,  $Q_{WTP}^2 = 0.387$ .

The substantive impact of independent variables on dependent variables ( $f^2$ ) shows that, largely, structural paths among latent variables carry a large effect size.

Results show that consumers highly and slightly familiar with pro-environmental issues differently approach the pro-environmental system due to their familiarity with pro-environmental issues, i.e., caring for various aspects. On the one hand, highly familiar consumers evaluate pro-environmental solutions for their environmental and health-related vocation. Sustainable packaging is preferable to bulk products, especially since these customers pay higher than the average market price. For highly familiar consumers, labels are not relevant owing to the in-depth knowledge of the pro-environmental concept. On the other hand, slightly familiar consumers are likely to consider the pro-environmental products due to their environmentally friendly process, while their personal health concern has no relevance (Table 6). Sustainably packaged products are preferred, above all, when they have to spend extra money. In their decision-making process, labels play a fundamental role in enhancing the customer's willingness to pay more

**Table 3**  
Measurement invariance test (MICOM).

Construct	Compositional Variance		Equal Means?		Equal Variance?	
	c value (=1)	Permutation p-value	Difference	Permutation p-value	Difference	Permutation p-value
WTP	0.999	0.067	0.720***	0.000	-0.050	0.779
BPPI	1.000	0.311	0.736***	0.000	-0.579**	0.012
SPPI	1.000	0.142	0.851***	0.000	-0.551***	0.005
LAB	0.999	0.774	0.546***	0.000	-0.184	0.339
EC	0.999	0.429	0.476***	0.000	-0.967**	0.018
HC	0.999	0.290	0.586***	0.000	-0.483**	0.048
AGE	1.000	0.276	0.106	0.363	-0.183	0.159
GENDER	1.000	0.244	-0.041	0.696	-0.028	0.781
INCOME	1.000	0.226	0.207	0.068	0.569**	0.016

Note: 95% confidence interval; \*\*\*p < 0.01; \*\*p < 0.05.

**Table 4**  
Reliability and validity of measures.

Constructs	α	Rho_A	CR	AVE
Willingness to pay for pro-environmental products (WTP)	0.920	0.929	0.937	0.714
Bulk Products Purchase Intention (BPPI)	0.886	0.891	0.930	0.816
Sustainably Packaged products Purchase Intention (SPPI)	0.909	0.911	0.943	0.847
Label Influence (LAB)	0.847	0.851	0.891	0.620
Environmental Concern (EC)	0.905	0.907	0.931	0.730
Health Concern (HC)	0.930	0.933	0.945	0.741

Note: α = Cronbach's alpha; rho\_A = reliability coefficient; CR = composite reliability; AVE = average variance extracted.

for pro-environmental products. Results of the pooled sample and subsamples show that the intention to buy sustainably packaged products impacts WTP more than the intention to buy bulk products, answering RQ1.

**Table 5**  
Discriminant validity.

Constructs	WTP	BPPI	SPPI	LAB	EC	HC	AGE	GEN	INC
WTP	<b>0.845</b>	0.671	0.739	0.588	0.627	0.476	0.041	0.109	0.134
BPPI	0.606	<b>0.903</b>	0.722	0.566	0.772	0.638	0.067	0.251	0.024
SPPI	0.686	0.644	<b>0.920</b>	0.572	0.615	0.515	0.153	0.125	0.040
LAB	0.529	0.493	0.514	<b>0.787</b>	0.659	0.549	0.128	0.138	0.053
EC	0.574	0.693	0.559	0.576	<b>0.854</b>	0.699	0.060	0.223	0.054
HC	0.445	0.584	0.475	0.488	0.642	<b>0.861</b>	0.043	0.198	0.044
AGE	0.033	-0.030	0.144	-0.108	.026	-0.042	<b>1.000</b>	0.182	0.135
GENDER	-0.099	-0.238	-0.120	-0.128	-0.212	-0.192	0.182	<b>1.000</b>	0.154
INCOME	0.131	0.012	-0.051	-0.045	0.038	0.038	0.135	0.154	<b>1.000</b>

Note: values along the main diagonal, in bold, correspond to the square root of the AVE. Values below the diagonal represent the correlations between factors, while values above the diagonal represent the HTMT indicators.

**Table 6**  
Structural paths among latent constructs.

Relationship	Overall Sample		Slightly familiarity		Highly familiarity	
	Standardized Coefficient (t-value)	f <sup>2</sup>	Standardized Coefficient (t-value)	f <sup>2</sup>	Standardized Coefficient (t-value)	f <sup>2</sup>
EC → SPPI	0.432*** (6.218)	0.165	0.563*** (5.974)	0.247	0.306*** (2.735)	0.099
EC → BPPI	0.541*** (7.399)	0.353	0.662*** (7.015)	0.483	0.410*** (3.707)	0.226
HC → SPPI	0.198*** (2.605)	0.034	-0.028 (0.278)	0.001	0.338*** (2.615)	0.121
HC → BPPI	0.236*** (3.217)	0.067	0.068 (0.696)	0.005	0.370*** (3.274)	0.184
SPPI → WTP	0.439*** (6.926)	0.217	0.413*** (5.718)	0.293	0.436*** (3.892)	0.165
BPPI → WTP	0.229*** (3.815)	0.062	0.248** (3.599)	0.111	0.182* (1.795)	0.030
LAB → WTP	0.196*** (3.454)	0.058	0.311** (4.225)	0.187	0.113 (1.336)	0.016
AGE → WTP	-0.022 (0.473)		0.044 (0.809)		-0.072 (0.917)	
GENDER → WTP	0.018 (0.430)		-0.051 (0.963)		0.087 (1.158)	
INCOME → WTP	0.121*** (2.740)		0.092* (1.780)		0.155** (2.049)	

Note: \*\*\*p < 0.01; \*\*p < 0.05; \*p < 0.10.

4.3. Differences among segments: highly vs slightly familiar consumers

To assess the moderation of familiarity with the overall structural equation model, we performed a multigroup MGA-PLS analysis using two sub-samples defined by the level of familiarity with pro-environmental issues. Although the PLS-SEM results showed different paths among the two groups of consumers, it is essential to verify if the differences in subsamples are statistically significant (Sarstedt et al., 2011). MGA-PLS results are reported in Table 7.

Results reported in Table 7 are in response to RQ2. Highly familiar consumers differ from slightly familiar consumers on the causal relationship between health concerns and intentions to purchase sustainably packaged and bulk products. The health concern appears to be statistically more relevant for highly familiar consumers than for slightly familiar consumers. Conversely, the impact of environmental concern on the intention to purchase sustainably packaged and bulk products is more relevant for slightly familiar consumers. Finally, the two groups evidence a statistically significant difference in the influence the label plays on the intention to pay extra money for pro-environmental products.

**Table 7**  
Multi-group analysis results.

Structural path (High vs Low)	Difference	p-value
EC → SPPI	-0.257*	0.076
EC → BPPI	-0.252*	0.088
HC → SPPI	0.367**	0.025
HC → BPPI	0.302**	0.048
SPPI → WTP	0.023	0.847
BPPI → WTP	-0.067	0.592
LAB → WTP	-0.197*	0.080
AGE → WTP	-0.116	0.232
GENDER → WTP	0.138	0.132
INCOME → WTP	0.063	0.497

Note: \*\*\*p < 0.01; \*\*p < 0.05; \*p < 0.10.

## 5. Discussion

Product packaging constitutes consumers' main waste (Rokka and Uusitalo, 2008). Particularly plastic, due to its relatively low recycling percentage of 9% (OECD, 2022), presents the main problem for manufacturers and policymakers. This led waste management and pro-environmental scholars to open the debate on how to reduce packaging waste by acting on consumers' behaviors (Khatami et al., 2023). The European directives and the SDG agenda are urging companies to implement environmental, social, and economic sustainable solutions. Equally, consumers being increasingly aware of pro-environmental issues, request products with a minimal impact on the environment and individuals' health. Consequently, new solutions are needed. By innovating product design and packaging companies may achieve environmental benefits and accelerate their path to sustainability (D'Attoma and Ieva, 2022; Pietzsch et al., 2017). Nevertheless, the high investments necessary to turn the production process toward pro-environmental packages are forcing companies to increase the price of their products, thus exceeding the consumer price expectations (Yadav et al., 2022). Sustainably packaged products crafted with degradable materials (Andrade et al., 2022), and bulk products (Gordon-Wilson et al., 2021) have been emerging as the main valuable solutions. Although aware of environmental issues, consumers are not prone to sacrifice to adopt pro-environmental behaviors (Fuentes et al., 2019). Therefore, it is becoming essential for companies to boost consumers' willingness to pay extra money for pro-environmental products.

Analyzing the Italian market as it is the European country with the highest recycling rate – 72% compared to 53% of the European average (Circular Economy Network, 2022) – and a high sensitivity for bulk products (Cosmeticobs, 2022), we demonstrate the positive impact of environmental and health concerns in altering consumers' behaviors. First, findings show an overall tendency to spend more on pro-environmental products mainly determined by environmental concerns. Second, an overall preference for sustainably packaged products instead of bulk products has emerged, confirming Cammarelle et al. (2021) findings, showing Italians' preference for plant-based biodegradable materials. Third, when segmenting respondents for their familiarity, some differences emerge between the two groups. Slightly familiar consumers consider pro-environmental products an environmentally sustainable choice. For this segment, the label is key to influencing their willingness to pay more for pro-environmental products. Data corroborate the previous findings of Laureti and Benedetti (2018) evidencing the primary role of environmental concern to boost pro-environmental behaviors. In their study, the authors found a positive and significant correlation between the label information and consumers' buying behaviors (Laureti and Benedetti, 2018). Conversely, highly familiar consumers grasp both environmental and health concerns shedding new light on the topic.

Findings offer practical solutions for manufacturers aimed at implementing their pro-environmental offer. First, companies are called to find out a more effective way to reuse recycled materials. Indeed, the

EU Commission is going to cut the overall amount of packaging waste – independently by the material – leading companies to opt for new machinery to be able to manage blends of recyclable materials and reduce packaging waste in favor of recyclable packaging. Second, distinct communicational campaigns will entice different segments – slightly vs highly familiar consumers – to pay extra money for pro-environmental packages. Unfamiliar consumers will benefit from both greater communication in favor of environmental sustainability and label information. Familiar consumers will respond better to campaigns enhancing environmental-friendly and health-friendly aspects of packages. Third, the results indicate that sustainable packaging is the most valuable option. In Italy, consumers prefer sustainably packed products. Zero plastic and plant-based biodegradable materials represent the best option for the Italian market (Cammarelle et al., 2021). However, consumers still struggle with separate waste collection (Crociata et al., 2016). Thus, national governments should improve and facilitate their waste collection. To date, the percentage of recycled packaging concerning the product is still very residual at a European level of 10 kg per capita recycled packaging in 2020 compared to the 35 kg per capita of generated plastic packaging waste (Eurostat, 2022). Separate waste collection policies remain very effective at both the national and EU levels. To make industrial investments more effective, it would be desirable for all EU states to harmonize the waste collection rules and methods. So, a product – and its packaging – made in a country can be freely sold and recycled in all EU states. Finally, a recent study showed that often Italians complain about a scarce variety of bulk products (Cosmeticobs, 2022). The need to strengthen the zero-waste offer, based on a wider assortment of bulk products, remains a valuable strategy.

## 6. Future research agenda

This study analyzes the role of environmental and health concerns of consumers on their willingness to pay for pro-environmental packaging. Although this study has important theoretical and managerial relevance, still several points should be addressed in future studies. Data collection may suffer from sample selection bias, as data were collected using social networks. Further, the results focus on the Italian market, a single case study as an example. Consequently, the study's results cannot be generalized. Future studies should use less non-probabilistic data collection methods and extend the empirical analysis to other countries with different trends of separate waste collection, waste production, or bulk product sales. Additionally, previous studies highlighted the existence of interrelation between culture and pro-environmental behaviors (e.g., Welsch and Kühling, 2010). Our results reveal that consumers can be classified using their familiarity with environmental issues. Future studies should assess the existing differences among consumers based on their country of origin, race, culture, or language. The study is developed based on psychometric variables, and it is not possible to test the influence of environmental and health concerns on consumers' buying behaviors, but only on their intention and willingness to pay. Hence, future studies should be conducted using behavioral data, preferably by collaborating with a retailer. Additionally, the present study focuses on the overall pro-environmental concept and does not investigate the relationship between the category product and its packaging. Future studies should test how the category product may influence the preference for sustainably packaged or unpackaged options. A final recommendation for future studies is to integrate the proposed model with further variables, such as institutional pressure (e.g., laws, regulations, or SGD indexes) or social norms and responsibility that may influence consumers' pro-environmental behaviors.

## Credit author statement

**Francesca De Canio:** Conceptualization, Data curation, Methodology, Writing- Reviewing and Editing.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Data will be made available on request.

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## Appendix A. Supplementary data

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