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Insect-based food consumption: Hedonic or utilitarian motives? Moderation and segmentation analyses

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ABSTRACT

The ethical and environmental rhetoric employed by institutions and companies to foster insect-based food consumption neglects individualistic motives that can prompt consumers to buy this novel food. To fill this gap, this paper reports a study in which consumers' hedonic and utilitarian motives and the relative consumer profiles for insect-based food consumption were investigated. Drawing on the Theory of Planned Behavior, the study collected data from 929 participants and applied a structural equation modeling analysis to evaluate the moderating effect produced by hedonic and utilitarian motives on the intention to consume insect-based food. Based on the same dataset, then performed was a cluster analysis to define the profile of consumers according to the level of acceptance of insect-based food. The results indicated that hedonic motives have a positive impact on consumers' intention to consume insect-based food, while utilitarian-ethical and utilitarian-health motives have no and a negative impact, respectively. These findings suggest that promoting the hedonic aspects of insect-based foods would be more effective in increasing consumer acceptance than emphasizing only ethical and health utilitarian values; and they also highlight the importance of creating an emotional and experiential connection with consumers in order to improve the effectiveness of marketing efforts.

1. Introduction

Over the past two decades the relationship between food consumption and environmental sustainability has assumed a strong ethical meaning. The food system itself is a significant contributor to climate change, accounting for 21 % to 37 % of annual greenhouse gas emissions (IPCC, 2019; Rosenzweig et al., 2020). One of the most impactful food sectors is the meat industry, which produces 54 % of all greenhouse gas emissions (FAO, 2020). Furthermore, the UN is alarmed about the state of soil degradation and the losing fertile soil at a rate of 24 billion tons per year (UN, 2017).

In this context, by embracing environment-friendly food options, consumers can daily play an active role in reducing the impact of their diets on the environment and contribute to the creation of a more sustainable food system for future generations.

Among the sustainable food solutions, insect-based food and entomophagy (i.e., the practice of eating insects) represent an emerging and quite practical solution to the aforementioned problems. Indeed, in the face of growing threats of a future global food crisis, insects are a viable source of food for humans and feed for animals (Ordoñez-Araque et al., 2022; Van Huis et al., 2013), and they are a suitable form of responsible consumption. In this regard, the interest in edible insects has grown over time. The value of the insect food market in 2018 was estimated at $406 million, and it is expected to increase to over $1.18 billion by 2023 and to $8 billion by 2030 (Statista, 2019). In addition, investments in the insect sector – which currently amount to ca. $1 billion – are likely to reach $3 billion by 2030 (IPIFF, 2021).

In this new market, pioneering companies offering insect-based food are largely leveraging on narratives which draw upon values of ethicality, sustainability, and healthfulness to confer legitimacy on them and to foster a positive image of this novel food. By using these familiar narratives, companies can tap into existing consumer values and beliefs, and make their products more appealing to potential customers (Entomo Farms, 2023; Micronutris, 2023; AliaInsectFarm, 2023).

The literature on edible insects has grown massively in recent years, and it has primarily dealt with the identification and analysis of the factors that can either prevent consumers from accepting, trying, and consuming this emergent category of novel food or prompt them to do so (see Table 1 for a brief overview of the literature to date).

In this regard, while the barriers such as disgust (Castro and

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Table 1
Literature review on barriers, facilitating and motivational factors influencing consumer responses to insect-based foods.

Scientific article	Country	Methods	Barriers, facilitating and motivational factors	Key findings
Castro & Chambers (2019)	USA, Mexico, Peru, Brazil, UK, Spain, Russia, India, China, Thailand, Japan, South Africa, Australia	Online survey	Disgust, safety	Seeing insect fragments, disgust, and the idea that they are dangerous to health and dirty are the most important barriers in the countries studied.
Gmuer et al. (2016)	Switzerland	Online survey	Positive and negative expectations	Besides disgust, further negative emotional expectations towards insects are feeling dissatisfied, irritated, strange, or uneasy.
La Barbera et al. (2018)	Italy	Lab experiment	Implicit attitudes, disgust, food neophobia, ingredients	Disgust has a greater negative influence on WTE than food neophobia. The type of food ingredients has no influence on the WTE. A better implicit attitude reduces the perception of disgust.
Lorenz *et al.* (2014)	USA	Survey	Disgust	Disgust for insects is similar to disgust for pathogens, to such an extent that both can be considered part of the same construct.
Hartmann et al. (2015)	Germany, China	Online survey	Food neophobia, previous experience with insects, attitude, demographics	Country, food neophobia and previous experience with insects are the main predictors of WTE with respect to both processed and unprocessed insects.
Palmieri et al. (2019)	Italy	Online survey	Food neophilia, attitude, aspect, taste, demographics	Food neophilia, taste expectations, health/ environmental/ethical motivations and previous experiences with insect-based food are the main drivers of WTE
Balzan *et al.* (2016)	Italy	Focus group	Attitude, social influence, health, self-efficacy	The factors that drive acceptance are appearance, farming and sustainability. Lack of knowledge about how to cook insects is the main barrier to their consumption.
Caparros Megido et al. (2014)	Belgium	Survey	Taste, knowledge, demographics	Older people have a greater knowledge of insects and have a greater propensity to taste. Tasting experience is a predictor of acceptance of insect foods. Insects can be integrated into traditional meals.
Tan et al. (2015)	Netherlands, Thailand	Focus group	Cultural differences	Culture has an effect on openness to insects, because it makes one familiar with them as a source of food. Regardless of cultural background, familiarity with insects promotes the willingness to try.
Menozzi et al. (2017)	Italy	Online survey	Attitude, subjective norm, perceived behavioral control, taste	Attitude and perceived behavioural control are the strongest predictors of behavioural intention. Actual insect food tasting behaviour is most strongly predicted by consumption intention and perceived behavioural control.
Tuccillo et al. (2020)	Italy	Online survey, survey	Attitude, emotions, food neophobia, demographics, taste	Males are more open to tasting insects than females. The positive emotions evoked are adventurous, daring and wild, while the main barrier is food neophobia. Foods in which insects are less visible are preferred.
Sogari et al. (2019)	Italy	Survey	Food neophobia, sensory proprieties, taste, demographics	The strongest predictors of the intention to try and actually taste insects are being male, young, with previous experience, with a low level of neophobia.
Szendrő et al. (2020)	Hungary	Online survey	Knowledge, disgust, preparation, motivation, attitude, demographics	The willingness to consume insects is greater in men with a higher level of education. The main barrier is disgust.
Vartiainen et al. (2020)	Finland	Online survey	Attitude, social norm, perceived behavioral control, food neophobia, demographics	Food neophobia has a negative correlation with intention to consume. Attitude, social norm and perceived behavioral control have a positive impact on intention to consume. Women, students under the age of 25, and those living in rural areas are less likely to want to taste insects.
Verneau et al. (2020)	Italy, Denmark	Survey	Food-related lifestyle, perceived behavioral control, demographics	The perceived behavioral control is the most impactful driver of intention to consume. Novelty and benefits are correlated with increased interest in edible insects.
Schlup & Brunner (2018)	Switzerland	Survey	Benefits, behavioral patterns, demographics	Some of the factors behind behavioural patterns, including convenience, healthiness, need for familiarity have a relationship with the intention to consume insects. Food neophobia shows specific correlations with some of these behavioral patterns.
Barton et al. (2020)	Canada	Focus group, survey	Taste, previous experience, attitude, food neophobia	The taste of insect foods is an important predictor of willingness to consume them in the future and to recommend them to others.
Onwezen et al. (2019)	Netherland	Lab experiment, online survey	Food choice motives, emotions, attitude, social norm, perceived behavioral control, ambivalence, disgust, innovativeness	Affective variables are factors that can influence insect food acceptance.
Grasso et al. (2019)	UK, Netherlands, Poland, Spain, Finland	Online survey	Food choice motives, food fussiness, green behavior, dietary habits, demographics	Older males are more open to the consumption of insect-based foods. Among the food choice motives, the sensory one has a negative impact on the acceptance of insects.

(*continued on next page*)

Chambers, 2019; La Barbera et al., 2018; Pozharliev et al., 2023) and food neophobia (Hartmann and Siegrist, 2016; White et al., 2023) are well understood, it is crucial for the development of this market to identify the factors decisive in eliciting consumers' acceptance of edible insects. Previous studies have found that socio-demographic, psychological and social factors play important roles. Among the socio-demographic variables, determinants are gender, with male subjects showing greater openness than females (Marquis et al. 2023a; Tuccillo et al., 2020); age, with a large body of evidence that younger individuals have a greater propensity to consume insects (Caparros Megido et al., 2014; Palmieri et al., 2023 Sogari et al., 2019; Szendrő et al., 2020); education, with more highly-educated individuals proving to be those most willing to try this food (Bisconsin-Júnior et al., 2022; Vartiainen et al., 2020; Verneau et al., 2020). It has been found that social components related to entomophagy confirm that the opinions of others, especially when they are peers, experts or famous, are able to shape the degree of acceptance of greater openness (Park et al., 2022; Russell and Knott, 2021). Moreover, attention has been paid to motivational variables, which include hedonic (Berger et al., 2018; Marquis et al. 2023b), health (Batat and Peter, 2020; Pozharliev et al., 2023), and ethical motives (Michel and Begho, 2023; Schlup and Brunner, 2018).

Within the array of psychological aspects related to motivational drivers, the utilitarian and hedonic ones are most frequently studied, consistently with the fact that ethical and health levers are those most widely used in marketing strategies. This interest is due to the fact that utilitarian (i.e., ethical and health-related) and hedonic motives have exhibited a link with openness to entomophagy (Onwezen et al., 2019; Poortvliet et al., 2019; Schlup and Brunner, 2018).

In brief, utilitarian motives relate to consumption driven by a specific mission or task; and the benefits of the purchase depend on whether or not the mission has been efficiently accomplished (Hirschman and Holbrook, 1982; Batra and Ahtola, 1991; Engel et al., 1993). On the other hand, hedonic motives concern consumption behaviors that are driven by the desire for happiness, fantasy, awakening, sensuality, and enjoyment (Hirschman and Holbrook, 1982; Shao and Li, 2021). Hedonic motives are not task-driven: i.e. they are non-instrumental, but rather focus on the pleasure and satisfaction that is derived from the consumption experience.

In this regard, although hedonic and utilitarian motives have been analyzed separately, none of the studies conducted to date have compared them simultaneously in a direct manner (see Table 1). It is consequently still unclear if and to what extent utilitarian (i.e., ethicality and healthfulness) or hedonic motives are more effective in inducing consumers to try and to consume insect-based food.

Hence, the originality of the present study lies in its direct comparison of utilitarian and hedonic motives associated with the consumption of insect-based food. The findings of our study will help marketing and communication managers to promote entomophagy by using

Table 1 (*continued*)

Scientific article	Country	Methods	Barriers, facilitating and motivational factors	Key findings
Poortvliet et al. (2019)	Netherlands	Online survey	Food choice motives	Insect meat is perceived as both healthier but also as more disgusting than bovine meat. The use of insects for common products such as burgers is less liked than for less common products like skewers. Common products with insect meat are considered less healthy and more disgusting than uncommon products with insect meat.
Brunner & Nuttavuthisit (2020)	Switzerland, Thailand	Online survey, Interview	Cultural differences	In Switzerland, people with a higher level of education are those who are concerned about the healthiness and sustainability of food, have fewer traits of food neophobia and are more open to insect-based foods. In Thailand, the convenience aspect of insect consumption becomes relevant, and individuals with high health motivation are also those with more marked traits of food neophobia.
Verbeke (2015)	Belgium	Online survey	Demographics, familiarity, food neophobia, health, convenience, environment, taste	The main variables impacting on the acceptance of insect foods are male gender, young age, greater familiarity with insects, willingness to reduce meat consumption, lower food neophobia, strong orientation towards convenience and environmental impact of food choices.
Cicatiello et al. (2016)	Italy	Survey	Demographics, dietary habits, previous experience, attitude, appearance, taste, texture, safety	The strongest drivers in the acceptance of insects are familiarity with unusual foods, a higher level of education and being male. The main barrier is the negative expectation about their taste.
Legendre *et al.* (2019)	USA	Online survey	Familiarity, media trust, activism	Consumers who are more motivated to be involved in social causes, such as the edible insect movement, have a better perception of the taste of insect products and a higher purchase intention.
Legendre & Baker (2022)	USA	Online survey	Trust on regulators, risk perception, benefit perception, activism	Trust in regulators decreases perceived risks and increases perceived benefits. Perceived risks and perceived benefits respectively decrease and increase activism, which in turn has a positive impact on the intention to consume insect products.
Ruby et al. (2015)	USA, India	Online survey	Demographics, food neophobia, disgust, sensation seeking, political orientation, religiosity, health, environment, social influence	The main predictors of tasting insect-based foods are being male, the benefits of nutritional and environmental sustainability aspects, sensation seeking and the pleasure of telling others about eating unusual foods.
Berger et al. (2019)	Switzerland	Lab experiment	Social influence, taste	The influence of peers and experts has an enhancing effect on the acceptance of consuming insect-based foods.
Russell & Knott (2021)	UK	Survey	Disgust, moral concern, social influence, personality traits	Disgust and moral concerns are the main barriers to insect consumption. Social influence has the ability to reduce the level of disgust towards edible insects.

motivational drivers that increase insect acceptance.

Therefore, the aim of the analysis reported in this paper was primarily to bridge this gap and answer to the following research question: which drivers – namely utilitarian or hedonic – are more likely to prompt consumers' willingness to try insect-based food? In addition, are these variables suitable for identifying different clusters of consumers?

To provide answers to these questions, we developed and tested a theoretical framework based on the Theory of Planned Behaviour (TPB) (Ajzen, 1991; Ajzen and Madden, 1986) on a single sample of consumers. For this purpose we performed two analyses, namely structural equation modeling (SEM) and cluster analysis. The findings showed that only hedonic motives are able to positively moderate the relationship between the construct of perceived control and the intention to consume, whereas ethical and health-related motives (i.e., utilitarian ones) have no effect and a negative one respectively. On the basis of these results, the use of the same variables in the subsequent segmentation analysis made it possible to identify the characteristics of the group of consumers most receptive to the possibility of tasting insect-based foods.

2. Conceptual framework and hypotheses development

2.1. Predicting the intention to consume insect-based food

The Theory of Planned Behaviour (TPB) provided the theoretical background for the research reported in this study. The TPB posits that (consumption) behavior is driven by intention (to consume) which, in turn, is determined by attitude (i.e., the favorable or unfavorable evaluation of the behavior), subjective norm (consisting of the positive or negative opinion that other people have of the individual's behavior and his/her tendency to conform with that opinion), and perceived behavioral control (PBC) (i.e., the perception of being able to perform the behavior) (Ajzen, 1991; Ajzen and Madden, 1986). The TPB has been widely applied in many fields of research to explain and predict behavior, including food consumption (for instance, Adel et al., 2022; McDermott et al., 2015; McEachan et al., 2011; Zhu et al., 2013), genetically modified foods (Li and Bautista, 2020; Prati et al., 2012), innovative products such as functional foods (Nystrand and Olsen, 2020; Patch et al., 2005), and more recently insect-based foods (Chang et al., 2019; Lucchese-Cheung et al., 2020; Menozzi et al., 2017).

In regard to the construct of attitude, studies have confirmed its ability to positively predict the intention to consume insects (Bae and Choi, 2020; Elorinne et al., 2019; Fischer and Steenbekkers, 2018). In entomophagy research, analyses of the role of social influences have confirmed that subjective norm has a positive impact on the degree of acceptance of such products (Berger and Wyss, 2020; Elorinne et al., 2019; Hwang and Kim, 2021). They have also highlighted that different sources of influence have different outcomes. In fact, recommendations by famous people, experts, and the experiences of peers affect the acceptance of insects as food (Berger et al., 2019; Park et al., 2022), while the influence of other people, even if they are already consumers of insects, do not have an impact on willingness to consume (Russell and Knott, 2021). Finally, PBC has been considered in terms of control over the consumption of insect products (Menozzi et al., 2017; Verneau et al., 2020). In this regard, some studies have evidenced that PBC has a positive effect on consumer acceptance of insects (Mancini et al., 2019; Menozzi et al., 2017; Onwezen et al., 2022).

Given the above premises, the following research hypothesis was formulated:

H1: A positive attitude (H1a), subjective norm (H1b), and PBC (H1c) significantly predicts the intention to consume insect-based foods.

2.2. The moderation of hedonic motives

As mentioned above, foods can be classified on the basis of their hedonic and/or utilitarian qualities (Maehle et al., 2015; Otterbring et al., 2023). According to the general definition, variety-seeking is "the tendency of individuals to seek diversity in their choices of services or goods" (Kahn, 1995). Considered in the specific context of food, this construct has been described as "the motivational factor that aims at providing variation in stimulation through varied food consumption, irrespective of the instrumental or functional value of the food alternatives". Despite its unitary nature, this desire to vary one's choices can be stimulated by a differentiated set of psychological processes, such as boredom with the choice task, attribute satiation, curiosity (Van Trijp, 1995), and hedonism (Ratner and Kahn, 2002).

This inherent complexity is reflected in the diversity of the antecedents that can be related to it, which in turn can be divided between ones internal and external to the individual: in the first group, connections have been observed with hedonic shopping (Holbrook and Hirschman, 1982; Kahn et al., 1997), the need for uniqueness (Ariely and Levav, 2000; Rodrigues et al., 2022), self-expression (Kim and Drolet, 2003), the tendency to innovate in the form of the propensity to adopt new brands (Kwon et al., 2023) as well as gender (Chen et al., 2016; Wang et al., 2021) and age (Novak and Mather, 2007; Tarka et al., 2023). In the second group, product category drives a greater preference for variety with regard to sensory aspects or functional attributes, depending on whether the products are hedonic or utilitarian (Baltas et al., 2017). In the realm of insect-based food, although producers' marketing and communication strategies have predominantly stressed aspects of environmental sustainability, research has shown that the acceptance of insects is more likely if communication campaigns emphasize the hedonic meaning implied in consuming insects (Berger et al., 2018; Marquis et al. 2023a). Consistently with the literature that has shown that variety-seeking has a positive correlation with unfamiliar foods (Tuorila and Hartmann, 2020) – so that it is a key component in terms of the acceptance of market innovations also through its close relationship with the construct of curiosity (Stone et al., 2022) – and a strong association with the concept of pleasure that is inherent in the category of hedonism, the positive association between variety-seeking and willingness to taste has also been shown in the case of insect products (Modlinska et al., 2020). The reasons why we considered it appropriate to implement the construct of variety-seeking as a measure of hedonic motives was that this factor was originally developed for the food context (Van Trijp, 1995), and that it is strongly connected with hedonic consumption (Hirschman and Holbrook, 1982) in general and hedonic food motives in particular (Cadario and Morewedge, 2022; Inman, 2001).

On the basis of what has just been discussed, the following research hypothesis was developed:

H2: Variety-seeking moderates the relationship among attitude (H2a), subjective norm (H2b), PBC (H2c), and the intention to consume.

2.3. The moderation of utilitarian motives

As said, utilitarianism extends to social responsibility and ethical consumption. According to Crane and Matten (2007), ethical consumption is "the conscious and deliberate choice to make certain consumption choices due to personal and moral beliefs". It is frequently conceived as a broad and multidimensional construct encompassing the following areas: ecological-environmental consumption, social consumption, and animal protective consumption. The meanings associated with utilitarian motives have changed over time: utilitarianism is no longer limited to a product's ease of use, price, convenience, performance, or effort expectations (Akdim et al., 2022; Escobar-Rodríguez and Carvajal-Trujillo, 2013); it also extends to social responsibility, personal well-being, and health. These latter drivers have now been subsumed within the concept of 'responsible consumption' (Jain et al., 2022), which signifies the tendency of consumers to take the public

consequences of their private consumption into account and their attempt to use their purchasing power to bring about social change (Webster, 1975), as well as their determination to buy products and services perceived to have a positive (or less negative) influence on the environment, and to patronize businesses that attempt to achieve positive social change (Roberts, 1993).

In the food context, scholars have introduced the construct of 'ethical food choice motives' (EFCMs) to signify the degree to which food choices are driven by ethical reasons linked to the dimension of environmental sustainability and animal welfare (Lindeman and Väänänen, 2000; Vanhonacker et al., 2013). In this regard, evidence has emerged that sustainable behavior is linked to pro-social and altruistic motives (Otto et al., 2021) but analysis of the role of ethical and environmental concerns has provided results that are not entirely clear. Although it has been shown that ethical motives have indeed had a positive impact on purchase intention (Iqbal et al., 2021; Michaelidou and Hassan, 2010), there is research in which they have been found to be less significant (Dagevos and Taufik, 2023; Magnusson et al., 2003), and other research where they have not obtained any influence relationship (Jin et al., 2020). In addition, different effects of ethical and environmental motives on consumer purchasing behavior have emerged across different types of purchasing behavior, product categories, and the level of development of a country (Auroomooga and Nair, 2019; Schill et al., 2019; Xu et al., 2020). In the field of insect foods, several research studies have verified that awareness of their reduced environmental impact has had a positive impact on their acceptance (Bao and Song, 2022; Mancini et al., 2019; Menozzi et al., 2017; Ruby et al., 2015). However, one study noted that this effect might only concern the overall insect product format rather than processed insects (i.e., flour based) (Ruby et al., 2015). The decision to use the construct of ethics is threefold: firstly, it is part of the concept of utilitarian motivations (Fennell, 2012; Hartmann and Apaolaza-Ibáñez, 2009); secondly, it is one of the main dimensions considered within the construct of responsible consumption (Falcão and Roseira, 2022); finally, it has been widely used both in the context of food in general and in the specific context of insect-based foods.

The following hypothesis was accordingly introduced:

H3: Ethical motives moderate the relationships among attitude (H3a), subjective norm (H3b), PBC (H3c), and the intention to consume.

Consumers are becoming increasingly concerned about their health, and this is also reflected in their choice to purchase foods that provide adequate nutrition while reducing the risk of being harmful (Glanz et al., 1998). This tendency has been confirmed by studies that have observed how consumers are showing increased consciousness about their health to the point that they prefer to purchase natural and healthy food products (Hughner et al., 2007; Hasselbach and Roosen, 2015). In regard to this behavioral tendency, the model developed by Moorman and Matulich (1993) argued that it is defined by two general predictors: the former, called "health motive", is described as "consumers' goal-directed arousal to engage in preventive health behaviors" (MacInnis et al., 1991) and refers to the interest in implementing healthy behaviour. The latter, named "health ability", consists of "consumers' resources, skills, or proficiencies for performing preventive health behaviors". In the food market, motive and health consciousness have been shown to positively influence food consumption in relation to both the type of diet, e.g. omnivorous (Müssig et al., 2022; Siegrist and Hartmann, 2018) and vegan (Ghaffari et al., 2022), and to the type of food, such as functional and organic (Čolović and Mitić, 2023; Hauser et al., 2013). Although both health and environmental motives are positively associated with food purchasing, when they have been compared directly, the health motive has proved to be stronger in determining consumption behaviour (Magnusson et al., 2003). Likewise, in the context of entomophagy it has been verified that health motives are generally a positive predictor of the willingness to consume insects (Hartmann et al., 2018; Ordoñez López et al., 2023; Ruby et al., 2015), although there are also cases where no association has been found (Schlup and Brunner, 2018). We decided to use health motives because they represent, along with ethical concerns, a utilitarian driver (Pozharliev et al., 2023) that is part of the construct of responsible consumption (Falcão and Roseira, 2022) and is one of the motives most frequently used in food and insect research.

Therefore, the following hypothesis was derived:

H4: Health motives moderate the relationships among attitude (H4a), subjective norm (H4b), PBC (H4c), and the intention to consume.

The conceptual model based on the aforementioned hypotheses is set out in Fig. 1.

3. Materials and methods

In light of our research aims, we first assessed the hedonic, ethical and health motives behind the consumption of insect-based foods, exploring whether variety-seeking and ethical food choice motives moderate the intention to consume insect-based foods. As a second step, we used these variables to segment consumers according to their level of intention to consume insect-food. The two studies were conducted in Europe, when the European Union was authorizing the production, commercialization and consumption of insect-based food. In that research period, insect-based food was not yet available, so that consumers had not yet had the possibility to taste such food. Consequently, the hedonic variables related to the taste could not be considered for the study. Moreover, the two studies were conducted in Italy, a country characterized by a particular attachment to the dimension of traditionality as far as food is concerned, so that it is an optimal context in which to explore the levers best suited to stimulating the spread of innovations also in more conservative countries.

3.1. Questionnaire

The questionnaire consisted of two parts. The first section determined the respondents' demographic profile and previous experience of eating insects by means of questions concerning gender, age, education, and occupation. With reference to socio-demographic variables, we focused on the most common characteristics studied so far in the literature on insect foods. The second section gathered data about the constructs composing the TPB model and motives. More specifically, subjects first responded to the scales inherent to motivational factors (i.e., variety seeking, general health interest, and ethical food choice motives) and then those concerning the TPB model (i.e., purchase intention, attitude, subjective norm, and perceived behavioral control).

Baseline TPB scales were drawn from Ajzen (2002a) and adapted to the research context. Observed variables for variety-seeking (Van Trijp and Steenkamp, 1992) and ethical food choice motives (EFCMs) (Lindeman and Väänänen, 2000), were also drawn from the existing literature. To measure health motives, the general health interest (GHI) (Roininen et al., 1999) – a measure of the level of interest that people have in the health properties of food when purchasing it – was chosen. For all scales, the items were on a seven-point Likert scale, where (1) was 'completely disagree' while (7) was 'completely agree'.

Study 1a data were collected by means of a self-report questionnaire administered online to a sample of 1170 Italian participants between October 2021 and September 2022. After data cleaning, which excluded 241 subjects who answered the control questions incorrectly, the final sample consisted of 929 individuals (see Table 2).

3.1.1. Structural equation modeling

A structural equation modeling (SEM) was implemented by using the MPLUS 8 software (Muthén and Muthén, 1998–2012). We started by estimating the measurement model and assessed the reliability and

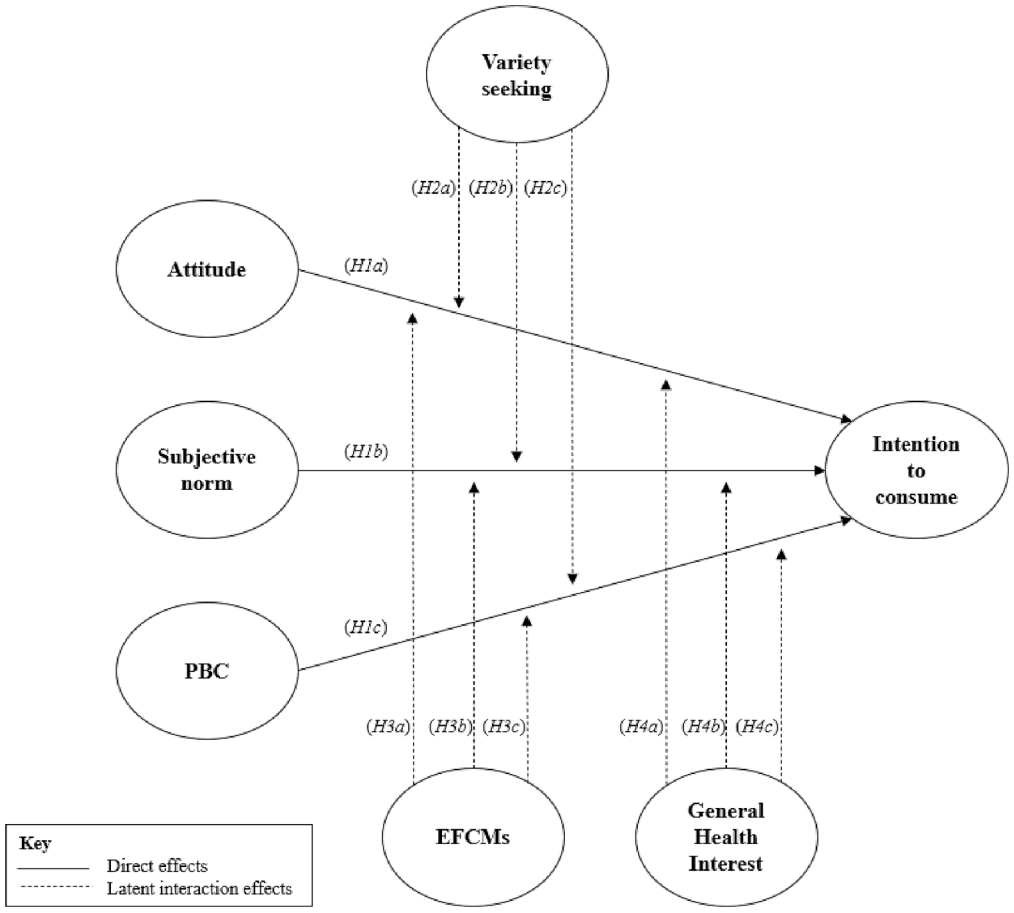

Fig. 1. Conceptual model.

Table 2
Demographic features of the subjects (N = 929).

Variables		N	%
Gender			
	Female	520	56.0
	Male	409	44.0
Age			
	< 18	84	9.0
	18–25	330	35.5
	26–30	74	8.0
	31–40	137	14.7
	41–50	114	12.3
	51–60	109	11.7
	> 60	81	8.7
Education			
	Primary-school	4	0.4
	Middle-school	126	13.6
	High-school	430	46.3
	University	352	37.9
	Ph.D.	17	1.8
Occupation			
	Student	337	36.3
	Employee	365	39.3
	Self-employed	81	8.7
	Entrepreneur	30	3.2
	Retiree	64	6.9
	Unemployed	52	5.6
Previous experience of eating insects			
	Yes	89	9.6
	No	840	90.4

validity of the multi-item constructs by using a prior exploratory factor analysis (EFA) and a subsequent confirmatory factor analysis (CFA) for each of the model's constructs (Anderson and Gerbing, 1988). Once the measurement model had been tested, we ran a structural model and analyzed the overall model fit and the path coefficients for the hypothesized relationships.

In order to assess the internal consistency and convergent validity of the scales, standardized factor loadings and reliability estimates (Cronbach's α; composite reliability; AVE) were calculated. As shown in Table 3, the coefficients of the factor loadings were greater than 0.60, which corresponds to the value recommended by (Hair et al., 2006); therefore, the factor loading value of each item ranged from.69 to.97. Moreover, Cronbach's α also had high values for all constructs considered in the model, ranging from.76 to.97. Finally, satisfactory estimates were obtained for composite reliability ranging from.76 to.97, and for AVE from.54 to.92. All alpha, composite reliability and AVE scores were above the acceptability thresholds required by the literature (Bagozzi and Yi, 1988; Nunnally, 1978). We also investigated whether the discriminant validity of the constructs was satisfactory. Specifically, such validity is demonstrated if the square root score of the AVE is higher than the correlation value that each factor has with every other construct in the model. All latent dimensions exhibited sufficient discriminant validity (see Table 4).

3.1.2. Structural equation modeling (SEM): Results

To test each hypothesis, two stages of analysis were conducted in accordance with the approach suggested by Maslowsky et al. (2015). In the first, we estimated the fit indices of the measurement model by simultaneously considering the constructs of the TPB model and the moderators. In the second. we progressively specified three models: the

Table 3
The results of internal consistency and convergent validity analyses.

	Factor loadings
Attitude	
I believe that eating insects or products containing insects is beneficial for my health	0.90
I believe that eating insects or products containing insects is right	0.92
I believe that eating insects or products containing insects is beneficial	0.88
Cronbach's α; composite reliability; AVE	**0.93; 0.93; 0.81**
Subjective norm	
I think that most of the people whose opinion I appreciate would approve of my eventual decision to consume insects or products containing insects	0.71
I believe that most of the people who are important to me would eat insects or products containing insects	0.91
I believe that most of the people whose opinion I appreciate would eat insects or products containing insects	0.95
Cronbach's α; composite reliability; AVE	**0.88; 0.90; 0.75**
PBC	
I believe that as soon as they are available, I might decide to try insects or products containing insects	0.94
If I wanted to, I could eat insects or insect-containing products as soon as they are available	0.76
Cronbach's α; composite reliability; AVE	**0.83; 0.84; 0.73**
Intention to consume	
As soon as they are commercialized, I intend to eat insects or products containing insects	0.97
As soon as they are commercialized, I will try to eat insects or products containing insects	0.97
As soon as they are commercialized, I will definitely eat insects or products containing insects	0.94
Cronbach's α; composite reliability; AVE	**0.97; 0.97; 0.92**
Variety seeking	
When I eat out, I like to try the most unusual items even if I'm not sure if I would like them	0.78
I think it is fun to try out food items one is not familiar with	0.85
I am eager to know what kind of foods people from other countries eat	0.74
I like to eat exotic foods	0.78
I am curious about food products I am not familiar with	0.89
Cronbach's α; composite reliability; AVE	**0.90; 0.91; 0.66**
EFCMs	
It is important that the food I eat on a typical day:	
Has been produced in a way that animals' rights have been respected	0.74
Has been prepared in an environmentally friendly way	0.94
Has been produced in a way which has not shaken the balance of nature	0.90
Is packaged in an environmentally friendly way	0.76
Cronbach's α; composite reliability; AVE	**0.90; 0.90; 0.71**
GHI	
I am very particular about the healthiness of food I eat	0.75
It is important to me that my diet is low in fat	0.69
It is important to me that my daily diet contains a lot of vitamins and minerals	0.76
Cronbach's α; composite reliability; AVE	**0.76; 0.76; 0.54**

All factor loadings are significant at the 0.001 level (two-tailed).

first (model 1) considered the direct effects of the TPB model only; the second (model 2) incorporated the direct effects of moderating factors; the third (model 3) added the effects of latent interaction terms. The second stage followed the recommendations of Kenny (2008), who suggested testing the significance level of the independent variables, moderating variables, and interaction effects separately when validating independent variables.

The measurement model showed fit indices which were very good by conventional standards: $\chi^2(209) = 491.508$, $p < .001$; Comparative Fit Index (CFI) = .98; Tucker-Lewis Index (TLI) = .98; Root Mean Square Error of Approximation (RMSEA) = .04 (C.I..034 −.043; $p > .05$); Standardized Root Mean Square Residual (SRMR) = .03. CLI/TFI values greater than.95 and both RMSEA and SRMR scores less than.08 are normally considered indicative of a good model fit (Browne and Cudeck, 1992; Little, 2013). The significance of the χ^2 Index does not negatively influence the goodness of the model because several studies have shown that this statistic is sensitive to sample size. On the one hand, χ^2 nearly always rejects the null hypothesis when large samples are used (Bentler and Bonett, 1980); on the other hand, it often tends to accept the null hypothesis when small samples are used, demonstrating a poor ability to effectively discriminate models with a good fit from those with a poor one (Kenny and McCoach, 2003).

First, a model (labelled 'Model 1′) was specified in which each of the exogenous variables of TPB model (attitude, subjective norms, and PBC) was a direct antecedent of intention to consume. As expected, attitude showed a positive and significant relationship with intention to consume ($\beta = .39$; $p < .001$). Also the relationship between subjective norms and intention to consume was positive and significant ($\beta = .12$; $p < .001$). Significant effects were also found between PBC and intention to consume ($\beta = .43$; $p < .001$). These results confirmed hypotheses H1a, H1b and H1c (see Model 1 in Table 5). In Model 2 the significance of the aforementioned paths was maintained. However, the addition of the new moderation variables showed statistical significance for the direct effect exerted on intention to consume by variety-seeking ($\beta = .06$; $p < .05$) but not by EFCMs ($\beta = -0.03$; $p > .05$) and by the GHI ($\beta = .04$; $p > .05$) (see Model 2 in Table 5). The final step was to analyze whether there was an interaction effect from variety-seeking, EFCMs, and GHI, as well as to compare which of the three had the strongest moderating effect. As shown in Table 5 (see Model 3), all main effects in model 2 were confirmed in Model 3, and the addition of interaction terms revealed the statistically significant path for variety-seeking and PBC ($\beta = .24$; $p < .001$) – the standardized coefficient of which had a higher beta value than that observed on the direct effect of variety-seeking on consumption intention ($\beta = .18$; $p < .001$) – and for GHI, which showed a negative moderating influence on PBC ($\beta = -.21$; $p < .05$), whilst there was no significant direct effect of the GHI. Accordingly, H2c and H4c were confirmed. The other interaction terms involving the EFCMs were not supported by the data because they showed no statistical significance. Therefore H3 was rejected.

3.1.3. Cluster analysis

A segmentation procedure was performed on the sample utilized for SEM analysis by means of a cluster analysis method with SPSS software version 26. In accordance with Punj and Stewart (1983), we adopted a two-step approach by combining different cluster procedures such as hierarchical and non-hierarchical cluster analysis. In the first step, the hierarchical cluster analysis involved the selection of Squared Euclidean Distance as similarity measure, whilst the clustering algorithm used was Ward's method. In the second step, we examined the agglomeration table reporting the increase of the coefficients and the dendrogram in order to identify the optimal partitioning or clustering solution (i.e., number of clusters). Finally, we applied a K-means cluster analysis. With regard to partitioning, both the agglomeration table and the dendrogram plot suggested a three-cluster solution as the most appropriate representation of the data. To evaluate the internal consistency of the clustering solution, a cross-validation procedure (Lockshin et al., 1997; Ortoleva Bucher et al., 2016; Punj and Stewart, 1983) was conducted. This procedure requires that the overall sample (S) is randomly split into two mutually exclusive subsamples (S_1 and S_2 made up of 40 % and 60 % of the subjects respectively), S_1 for the clustering development and S_2 for the cross-validation. First performed on S_1 was a Ward's clustering hierarchical method using Squared Euclidean Distance on our clustering solution. Then the centroids of the hierarchical method were used to run the K-means method to obtain more accurate cluster membership. S_2 was in turn subjected to three rounds of analyses. In the first, the final

Table 4
Means, standard deviations, correlations (Pearson's *r*); square root AVE scores are displayed in parentheses.

Factor	Mean	SD	1	2	3	4	5	6	7
1. Attitude	3.04	1.70	**(0.90)**						
2. Subjective norm	2.77	1.49	0.74***	**(0.86)**					
3. PBC	3.40	2.00	0.78***	0.68***	**(0.86)**				
4. Intention to consume	2.43	1.72	0.82***	0.70***	0.82***	**(0.96)**			
5. Variety-seeking	4.87	1.37	0.48***	0.38***	0.49***	0.49***	**(0.81)**		
6. EFCMs	5.10	1.34	0.24***	0.18***	0.15***	0.17***	0.18***	**(0.84)**	
7. General Health Interest	4.53	1.28	0.08*	0.11**	0.01	0.09*	0.24***	0.46***	**(0.73)**

* significant at the 0.05 level (two-tailed).
** significant at the 0.01 level (two-tailed).
*** significant at the 0.001 level (two-tailed).

Table 5
Path coefficients of the research model.

Path Coefficients/Models	Model 1	Model 2	Model 3
Direct effects			
Attitude → Intention to consume	0.39***	0.38***	0.33***
Subjective norm → Intention to consume	0.12***	0.12***	0.15***
PBC → Intention to consume	0.43***	0.42***	0.42***
Variety-seeking → Intention to consume		0.06*	0.18***
EFCMs → Intention to consume		−0.03	−0.03
GHI → Intention to consume		0.04	0.04
Interaction terms			
Variety-seeking X Attitude			0.09
Variety-seeking X Subjective norm			−0.06
Variety-seeking X PBC			0.24***
EFCMs X Attitude			−0.11
EFCMs X Subjective norm			0.00
EFCMs X PBC			0.13
GHI X Attitude			0.16
GHI X Subjective norm			0.08
GHI X PBC			−0.21*

Model 1 = direct effects model with TPB constructs; Model 2 = direct effects model with TPB and moderating constructs; Model 3 = direct effects and interaction effect terms model; standardized coefficients. *** significant at the 0.001 level (two-tailed).* significant at the 0.05 level (two-tailed).

centroids generated by K-means of S_1 were used to classify each observation of S_2 according to the nearest distance technique, resulting in the solution called S_2_a. In the second, a further two-step approach (hierarchical and K-means cluster analysis) was performed on S_2 to obtain S_2_b (as happened for S_1). In the third, the two partitions called S_2_a and S_2_b were compared by means of the Cohen's kappa coefficient of agreement. The coefficient had a value of 0.83, in line with the criterion for retaining a solution defined by Landis and Koch (1977). Finally, we established the external validity by running χ^2 test and ANOVA with Scheffe multiple comparison post-hoc (see Table 6) on socio-demographic and clustering variables respectively.

3.1.4. Cluster analysis: Results

The clusters are described and labelled on the basis of TPB model variables, moderating factors, socio-demographic proprieties, and previous experience of eating insect-based food (see Table 6).

- *Cluster 1*: This cluster comprised 32.3 % of the sample. In terms of psychological variables, these respondents had a rather negative attitude towards insects. They thought that other people would evaluate their decision to consume them quite negatively, and they had an intermediate PBC with regard to their perceived ability to purchase this type of product. Being generally negative about insect-based food, this group of respondents has been labelled '*insect-avoidants*'. Regarding motivational factors, they had a high hedonic tendency (higher than the other two utilitarian motives) and were moderately guided by health and ethical aspects in their dietary decisions. However, they showed a low intention to consume insect-based foods. Considering socio-demographic variables, the χ^2 test and standardized residuals revealed that they were both males and females, were the youngest group of respondents (aged between 18 and 25 years old), were students and had no previous experience of eating insects.
- *Cluster 2*: This cluster was the smallest group with 225 respondents (24.2 per cent of the sample). They showed the best attitude towards insect products, believed that the people they frequented had a fairly positive opinion of their consumption, and thought that as soon as insects were marketed, they would buy them. They have therefore been called '*insect-progressives*'. Regarding motivational drivers, although they distinguished themselves mainly by being the most hedonic compared to the other groups, they were also characterized by a good consideration of ethical and health aspects. For all the aforementioned variables (i.e., hedonic and utilitarian motives, and TPB model constructs), they recorded the highest values for all the factors considered. On the basis of the standardized residuals of the χ^2 test, they were males, adult (both 31–40 and 41–50 years old), had the highest level of education (university degree), were employed, and had already tasted insects as food in the past.
- *Cluster 3*: This cluster comprised the largest number of respondents (43.5 per cent). They expressed the most negative attitude towards insects, believed that others would consider their consumption of insects negatively, and would not be willing to buy insect products. As regards the motivational dimension, even though they had moderate levels for all motives, they were characterized by the lowest variety-seeking and the second highest health motives in comparison with the respondents in other clusters. Moreover, this was the only group in which utilitarian motives had higher values than hedonic ones. Of all segments, they had the lowest level of intention to consume insect products. As for their socio-demographic profile, they were women, the oldest group (51–60 and > 60 years old), with the lowest educational level (primary and middle school), retired and without previous insect tasting experience. On this basis, this cluster is labelled '*insect-rejectors*'.

4. Discussion

This study has pursued the dual purpose of comparing utilitarian with hedonic drivers and, on this basis, identifying the consumer segment most likely to accept insect-based foods. We have advanced four main research hypotheses (H1-H4), each of which was subdivided into three further specific hypotheses to test each of the direct and moderating effects. Consistent with the literature, our research confirms the effectiveness of the TPB model as a predictor of the intention to consume insect food (H1). Within the model, PBC proved to be the predictor with the strongest impact, as in Mancini et al. (2019). This result is consistent with the TPB model, according to which the relative strength of the causal factors of consumption intention (i.e., attitude, subjective norm, and PBC) may change according to the context (Ajzen, 1991), thereby highlighting that, in the case of edible insects, PBC may be the key variable. This finding is supported by the fact that PBC has

Table 6
Cluster demographic descriptions and multiple segment comparisons (ANOVA-analysis).

	insect-avoidants		insect-progressives		insect-rejectors		
	n	%	*n*	%	*n*	%	X^2
Gender							35.52***
Male	131	43.7	135	60.0	143	35.4	
Female	169	56.3	90	40.0	261	64.6	
Age							49.41***
<18	31	10.3	10	4.4	43	10.6	
18–25	135	45.0	69	30.7	126	31.2	
26–30	27	9.0	20	8.9	27	6.7	
31–40	39	13.0	49	21.8	49	12.1	
41–50	24	8.0	36	16.0	54	13.4	
51–60	25	8.3	26	11.6	58	14.4	
>60	19	6.3	15	6.7	47	11.6	
Education							26.11**
Primary-school	0	0.0	0	0.0	4	1.0	
Middle-school	35	11.7	23	10.2	68	16.8	
High-school	148	49.3	88	39.1	194	48.0	
University	111	17.3	111	20.9	130	15.1	
Ph.D.	6	19.7	3	28.4	8	17.1	
Occupation							34.28***
Student	113	37.7	103	45.8	149	36.9	
Employee	23	7.7	28	12.4	30	7.4	
Self-employed	5	1.7	13	5.8	12	3.0	
Entrepreneur	129	43.0	61	27.1	147	36.4	
Retiree	14	4.7	10	4.4	40	9.9	
Unemployed	16	5.3	10	4.4	26	6.4	
Previous experience of eating insects							143.72***
Yes	17	5.7	67	29.8	5	1.2	
No	283	94.3	158	70.2	399	98.8	
Total cases	300	32.3	225	24.2	404	43.5	

Multiple segment comparisons (ANOVA-analysis)

	Clusters (Mean values)			ANOVA Scheffe multiple comparison tests[b]			
	insect-avoidants	insect-progressives	insect-rejectors	*F*-value[a]	insect-avoidants-insect-progressives	insect-avoidants-insect-rejectors	insect-progressives-insect-rejectors
Attitude	3.49	5.05	1.58	978.71	*0.000*	*0.000*	*0.000*
Subjective norm	3.01	4.43	1.66	560.89	*0.000*	*0.000*	*0.000*
PBC	4.09	5.71	1.60	1186.10	*0.000*	*0.000*	*0.000*
Variety-seeking	5.07	5.88	4.17	157.49	*0.000*	*0.000*	*0.000*
EFCMs	4.98	5.60	4.91	22.27	*0.000*	*0.764*	*0.000*
GHI	4.23	4.87	4.56	16.90	*0.000*	*0.002*	*0.016*
Intention to consume	2.18	5.01	1.17	1653.54	*0.000*	*0.000*	*0.000*

*** $\chi^2 = p < 0.001$; ** $\chi^2 = p < 0.01$.
[a] *F*-value ANOVA; [b] *P*-value Scheffe Post-Hoc Comparison Tests.

been shown to weaken the impact of the main barriers to insect acceptance identified in the literature so far, namely disgust and food-neophobia (Mancini et al., 2019). Our explanation takes into account familiarity with the topic of edible insects because at the time of the study insect-based products were not available on the Italian market. Since PBC refers to the perception of having the resources to enact a behaviour (including knowledge resources), and that knowledge increases the perception of control in enacting behaviour, those individuals who are more familiar with insects have a higher PBC. The positive causal effect of knowledge on PBC has already been observed (Galván-Mendoza et al., 2022), and it is also consistent with our cluster analysis results, where the insect-progressives group had the highest PBC score and the largest number of participants with previous experience of insect foods.

The results obtained on motives shed new light on their role, in some cases confirming while in others disconfirming what has been found by previous research.

Hypothesis 2 was confirmed with regard to H2c, i.e. that variety-seeking positively moderates the relationship between PBC and intention to consume. This finding is consistent with the relationship among variety-seeking, PBC, and self-efficacy reported by Ajzen (1987; Ajzen, 2002b; Ajzen and Madden, 1986). In fact, Ajzen evidenced that one of the internal components of PBC consists of self-efficacy beliefs. In this regard, it has been shown that the sense of control or perception of competence has a positive relationship with variety-seeking such that a decrease in the perception of personal mastery leads to a decrease in variety-seeking (Chang et al., 2021). Moreover, variety-seeking has been found to be predictive of willingness to try unfamiliar foods (Lenglet, 2018); and, in the context of edible insects, it reduces the perception of risk (Modlinska et al., 2020) and enhances the tasting experience (Le Goff and Delarue, 2017). In this regard, we argue that since insects constitute a novel food, variety-seeking can be considered an important facilitator to consumers' adoption of such food and that the hedonic, emotional and curiosity properties associated with this construct are levers effective in facilitating the switch to entomophagy. Supporting this contention is the fact that variety-seeking reduces the fear associated with perceived risk (Lähteenmäki and Arvola, 2001), which is one of the barriers to insect consumption (Baker et al., 2016).

The three hypotheses related to EFCMs (H3a-H3c) were not confirmed. Although several studies on food consumption have highlighted the ability of environmental concerns to shape consumer behavior (Junior et al., 2015), different results have emerged within the specific field of insect-based food. Chang et al. (2019) found no significant relationship between environmental concerns and purchase

intention, while Berger et al. (2018) found that environmental motives had a negative effect on purchase intention. More generally, it has also been found that in some cases environmental influences may not be the most suitable driver to promote purchase behavior, as highlighted in the case of organic (Asif et al., 2018) and vegetable products (Turnwald et al., 2017) as well.

The hypotheses related to health motives (H4a-H4c) were confirmed with respect to PBC, but with a negative effect. This evidence is consistent with previous findings on insect-based food (Berger et al., 2018). Empirical results obtained in similar studies seem to suggest that food healthiness is felt especially by consumers who have a high level of engagement with health, and who have high levels of health consciousness (Menozzi et al., 2017; Pozharliev et al., 2023). Likewise, the literature on nutrition has observed that a high level of health concerns is associated with a high level of perceived risk, resulting in a low level of acceptance (Chou et al., 2020; Siegrist et al., 2020) which echoes our findings.

Considering hedonic and utilitarian factors together, we offer two possible explanations for our findings: first, the literature has shown that the rational arguments associated with insect foods (i.e., environmental and nutritional benefits) may not be effective in increasing the intention to try them (Barsics et al., 2017; Gmuer et al., 2016). In this regard, our results provide further confirmation, adding evidence on the effectiveness of emotional (i.e., hedonic) tendencies. Since one of the main barriers to the consumption of edible insects is the disgust reaction, which has more to do with a hedonic dimension, we believe that the levers inherent in the experiential and emotional aspects may be more likely to counteract them than the ethical and health aspects, which may instead relate to concerns about the rational evaluation of the benefits associated with this novel food (e.g., ethical and health consequences). This interpretation would be consistent with the fact that previous experience with insects is one of the most important factors in the acceptance of insects and the willingness to taste them again after the first experience. Thus, although in some food categories, such as organic ones, utilitarian factors are effective (Tandon et al., 2020), insects turn out to be influenced by hedonic variables. Second, the time scale of obtaining food benefits in terms of satisfying needs plays a possible role. Hedonic benefits are in fact considered short-term goals while utilitarian ones are temporally more distant. In the case of insects, it has been observed that benefits related to long-term goals, such as ethical and health ones, are less effective than those linked to hedonic properties, which are short-term and therefore more quickly attainable (Berger et al., 2018). The cluster analysis that we conducted yielded results that are partly consistent with those of previous studies and at the same time specific to our research. Among the three clusters identified, the only one that can be understood as a primary target refers to the group of respondents belonging to the category of 'insect-progressives'. This group of individuals maintained some of the socio-demographic features already found in the literature in reference to gender, education and previous experience with insects; in fact, they were males (Verbeke, 2015), educated (Brunner and Nuttavuthisit, 2020; Szendrő et al., 2020) and had previous taste experiences with insect-based food (Menozzi et al., 2017; Tan et al., 2016). Although some research has found age to be not significantly related to intention to consume (Brunner and Nuttavuthisit, 2020; Woolf et al., 2019), others agree that especially young people are keener to accept and try insect-based food (Szendrő et al., 2020). Furthermore, other research has shown that consumers more than 25 years old are not an appropriate target group (Vartiainen et al., 2020). Our research finding is in line with those of studies that have found a higher acceptance by subjects over the age of 30 up to around 50 (Szendrő et al., 2020). A new finding of our study concerns the role of occupation, indicating that being an employed is a discriminating factor. This information, combined with their higher level of variety-seeking compared to utilitarian motives and groups, suggests that these people are particularly 'active' and 'open-minded', so that they are conceivable as preferred targets for marketing campaigns.

5. Conclusions

From a theoretical perspective, our results extend the current strand of research on the motivational drivers that can prompt consumers to try/buy insect-based food by showing that the acceptance of this novel category of food is driven more by hedonic than by utilitarian motives. Moreover, and partly running counter to what previous studies have found, our research emphasizes the importance of studying – when assessing the penetration impact of an innovation within the market – the specific contribution of utilitarian and hedonic motives as keys to success. Future investigations could attempt to gain deeper understanding of which specific hedonic factors have the greatest impact on insect-based food acceptance. More specifically, the study of hedonic factors such as self-congruence, enhancement, and the communication of social status and self-esteem to others could be considered useful for broadening the view of the role of hedonism in the context of edible insects. With regard to marketing implications, this study suggests that a profound change in the content of the narratives adopted in communication campaigns should be considered, with the focus shifted from aspects of environmental and health concern to hedonic ones. With respect to the cluster analysis, our research provides useful insights into the characteristics of people more willing to try edible insects. It thus partially confirms what has been observed in the literature, suggesting that marketers should take into account the use of hedonic drivers in their segmentation activities. Although our research yielded new results, it had some limitations. First, we used intention as a dependent variable and, despite its predictive value, we cannot assume that intention will turn into behavior, i.e. into actual purchasing. Although we can speculate on the findings, future studies should first assess intention, and then measure the level of conversion through an *ad hoc* taste test. A second limitation concerns the variables used to identify clusters. Although the variables that we included in the model proved able to segment prospect demand and to identify the core target(s), it is possible to use a larger number of independent variables. For example, some behavioral variables like individuals' sportiness measured either through psychographic scales or through the frequency of exercise or the type of sporting activity can possibly be used to identify a market niche, given the possibility of using insects as a substitute or surrogate for other animal-source proteins.

The last limitation concerns the lack of physical and visual stimuli used in the study, although these are obviously involved in the complex cognitive and emotional process that can induce consumers to try and buy insect-based food. Marketing tools like a pleasant in-store visual display or a fancy and catchy packaging can be potent means to turn reluctant consumers into actual buyers. Due to the implicit novelty of insect-based food, we believe that there are limitless research avenues that scholars and practitioners can pursue to obtain a finer-grained understanding of the aspects that are more able to prompt intention to consume and actual buying behavior.

Ethical statement

The study was explained to consumers in the online questionnaire before compilation. They were also informed that all data would be de-identified and reported only in aggregated form to ensure anonymity.

CRediT authorship contribution statement

Riccardo Valesi: Data curation, Formal analysis, Funding acquisition, Writing – original draft. **Daniela Andreini:** Supervision, Writing – original draft, Writing – review & editing. **Giuseppe Pedeliento:** Conceptualization, Supervision, Validation, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Riccardo Valesi reports financial support was provided by Ministry of Education, Universities and Research (IT). Riccardo Valesi reports a relationship with Ministry of Education, Universities and Research (IT) that includes: funding grants.

Data availability

Data will be made available on request.

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