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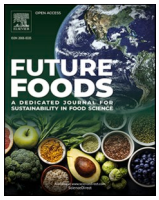

Predicting consumer interest in insect-based foods: The importance of integrating implicit measurements

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ABSTRACT

Entomophagy—the consumption of insects—offers a sustainable and healthy alternative protein source. However, psychological barriers, cultural norms and food neophobia hinder its adoption in Western societies.

This study explores explicit and implicit factors that potentially predict interest in insect-based foods among young adults in Switzerland. Combining sensory engagement through a tasting session with informational interventions and evaluating implicit associations as well as emotions provides a holistic perspective on consumer acceptance of entomophagy. A total of 188 students and employees from a Swiss university were randomly assigned to one of four information groups – nutritional, environmental, taste-focused or control. While tasting an insect-based protein bar, their sensory and emotional responses were measured. Implicit attitudes were assessed using the Single Category Implicit Association Test. Multiple linear regression was performed to identify the key predictors influencing consumer interest in insect-based foods.

Several factors were found to significantly predict interest. Green consumption values (prioritising environmental protection in purchasing decisions) and a positive emotional as well as sensory evaluation of the insect bar were the strongest predictors, followed by lower food neophobia and a less negative implicit association. The provision of information did not prove to be a significant predictor, which emphasises the limitations of short-term information interventions.

These results emphasise the importance of sensory and emotional involvement during tasting experiences, as well as the importance of considering implicit attitudes when investigating a sensitive topic, such as entomophagy.

1. Introduction

The projected growth of the global population to 9.7 billion by 2050—along with rapid economic development—has led to an unprecedented surge in food demand (United Nations, 2022). Addressing this demand requires a 70 % increase in food production, which places considerable pressure on limited resources, such as land, energy and water (FAO et al., 2024). Traditional agricultural practices, particularly meat production, exacerbate this challenge by significantly contributing to environmental degradation, for example, by causing greenhouse gas emissions, deforestation and resource depletion (Gahukar, 2011; Tubiello et al., 2013; Van Huis et al., 2013). These concerns underscore the urgent need for alternative protein sources that can meet future food requirements while minimising environmental impacts. This includes protein-rich sources such as pulses, algae and plant-based meats—which are already on the market—as well as cultured meat, which is expected to become established soon (Onwezen et al., 2021).

Among alternative proteins, entomophagy—the consumption of insects—has emerged as a promising protein source. Entomophagy has been practiced for centuries and continues to be a key source of protein in many cultures (Gahukar, 2011). Practiced by hundreds of millions of people worldwide, entomophagy is deeply rooted in regions such as

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Africa, South America, Asia and Central America (Van Huis et al., 2022). A wide variety of insect species are consumed globally, with some of the most commonly eaten being beetles, caterpillars, ants, grasshoppers, locusts and crickets (Jongema, 2017). During early human development, insects were an important part of the human diet before hunting and farming. In warmer regions, where vertebrates were less abundant, this practice has persisted in modern times (Kouřimská and Adámková, 2016). Given that insects already play an essential role in many traditional diets, entomophagy could present new opportunities for sustainable food development.

The regulatory landscape for edible insects in Europe and Switzerland has advanced significantly, driven by the 2013 FAO report highlighting the need for legal standards to support insect-based foods (Van Huis et al., 2013). In 2017, Switzerland enacted regulations permitting three insect species for human consumption and became the first Western country with formal insect food regulations (BLV, 2024). The EU responded with the Novel Foods Regulation 2015/2283—implemented in 2018—which allowed companies to market insect products under strict safety guidelines, leading to rapid market growth and a projection of over 250,000 tonnes by 2030 (European Union, 2015; IPIFF, 2020). These regulatory developments have facilitated a safe and innovative insect food market, promoting consumer acceptance and sustainability efforts (Van Raamsdonk et al., 2017).

Despite these regulatory advancements and environmental and nutritional benefits, the adoption of entomophagy remains limited in Western societies, including Switzerland. Psychological barriers, such as food neophobia, which is the fear of trying unfamiliar foods (Pliner and Hobden, 1992), play a significant role in preventing individuals from experimenting with insect-based products. This reluctance is particularly strong with unfamiliar foods of animal origin, which are often rejected due to perceived risks and the anticipation of unpleasant tastes or feelings of disgust (Fallon and Rozin, 1983). In Western cultures, where insects are more commonly associated with dirt, pests, diseases and death than food (Hamerman, 2016), many consumers experience a deep sense of disgust at the thought of eating them, a response reinforced by established cultural norms (Lucas et al., 2025; Ribeiro et al., 2022).

Numerous studies have investigated the introduction of insects as food from the consumer's perspective (for recent reviews, see Ardoin and Prinyawiwatkul, 2021; Colamatteo et al., 2025; Kröger et al., 2022; Mina et al., 2023; Siddiqui et al., 2024). However, in all these studies, only individual or a limited number of factors were used to explain consumer behaviour, and hardly any study included implicit measures, such as implicit attitudes or emotions. Therefore, this study explores how consumer interest in insect-based foods is affected by information provision, tasting experiences and implicit attitudes. This holistic approach allows for a deeper understanding of how these factors shape consumer interest in entomophagy.

2. Literature review

In response to growing global challenges in food security and sustainability, insect-based foods have emerged as viable alternatives to conventional protein sources. The adoption of insects for human consumption holds significant promise due to insects' high nutritional value and minimal environmental impact (Van Huis et al., 2013). However, consumer acceptance remains a crucial barrier, particularly in Western cultures where insects are not traditionally part of the diet. This literature review summarises the latest findings on the sustainability, nutritional benefits and sensory perception of entomophagy, as these benefits were presented to participants in this study. In addition, the research findings on the drivers of and barriers to entomophagy are summarised.

2.1. Sustainability

Environmentally, edible insects require far fewer resources than traditional livestock. They have exceptional feed-to-meat conversion efficiency, emit significantly fewer greenhouse gases, and use much less land and water compared to cattle, pigs and poultry (Oonincx et al., 2010; Van Huis et al., 2013). For instance, producing one gram of edible protein from beef requires 8–14 times more land and five times more water than mealworms, and cattle emit 6–13 times more emissions than mealworms per edible protein (Van Huis and Oonincx, 2017). Furthermore, insects can be farmed on organic waste, contributing to a circular economy (Fowles and Nansen, 2020; Sokame et al., 2024; for a critical view, see Biteau et al., 2024). These environmental advantages position insect farming as a promising and sustainable solution to meet the growing global demand for food while reducing the environmental impact of food production.

2.2. Nutrition

Nutritionally, edible insects provide a rich source of protein, healthy fats, fibre and essential vitamins and minerals (Fernandez-Rios et al., 2024; Rumpold and Schlüter, 2013; Van Huis et al., 2013). They offer substantial protein content while being rich in essential amino acids (Kulma et al., 2019; Rumpold and Schlüter, 2013). Insects also supply healthy fats, such as omega-3 and omega-6, along with key minerals such as iron, zinc and magnesium, making them a nutritious alternative to conventional protein sources (Durst et al., 2010; Kouřimská and Adámková, 2016; Montowska et al., 2019).

2.3. Sensory perception

Sensory perceptions—specifically taste, texture and appearance—are central to consumer acceptance of foods in general (Lin et al., 2025). Insects such as mealworms have a slightly nutty flavour with an umami taste and grasshoppers are similar to eating shrimps, making insects a potentially pleasant taste experience (Elhassan et al., 2019). However, due to cultural and psychological conditioning, they often trigger emotional reactions, such as disgust or discomfort (Lucas et al., 2025; Mosca et al., 2025; Niimi et al., 2025; Penedo et al., 2022; Serpico et al., 2021). The visual presentation of insects can deter consumers, especially in Western cultures, where invisible or powdered insect forms are better accepted (Halonen et al., 2022; Petrescu-Mag et al., 2022).

While tasting experiences can help shift explicit attitudes—the conscious beliefs consumers hold about insect foods—more quickly, as consumers may immediately respond to new, positive information, implicit attitudes—unconscious and automatic biases—are slower to change, requiring repeated positive sensory experiences to gradually reduce these ingrained responses (La Barbera et al., 2018). In cultures in which insects are integrated into dietary norms, such as Oaxaca, Mexico, positive sensory adaptation occurs naturally through repeated exposure from a young age (Hurd et al., 2019). In countries without such a tradition, educational campaigns coupled with tasting experiences could help shift perceptions, in addition to addressing hygiene concerns and highlighting nutritional and environmental benefits (Mancini et al., 2019; Woolf et al., 2021).

2.4. Drivers and barriers to entomophagy

Acceptance of insect-based foods is influenced by a wide range of drivers and barriers, including sociodemographic characteristics, psychological factors, sustainability, cultural and social norms, knowledge, prior experience and familiarity and product features. For example, studies indicate that age, gender, education and urban residence significantly affect openness to insect-based foods. Younger people, men, urban residents, and those with higher education levels are generally more accepting (Anagonou et al., 2024; Babarinde et al., 2024;

Berger and Wyss, 2020; Orkusz et al., 2020; Ribeiro et al., 2022; Schlup and Brunner, 2018; Szendrő et al., 2020). Psychological factors, such as food neophobia, disgust, and implicit biases, significantly deter acceptance of insect-based foods, whereas curiosity and repeated exposure can reduce resistance (Cicatiello et al., 2016; Modlinska et al., 2020; Van Thielen et al., 2019). Implicit biases, such as associations of contamination, are especially persistent, requiring long-term exposure and targeted strategies to overcome them (Rozin and Fallon, 1987). Sustainability motivates some consumers to consider insect protein due to its lower environmental impact (Brunner and Nuttavuthisit, 2019; Bukchin-Peles, 2024; Ledesma-Chaves et al., 2024; Khalil et al., 2024). However, taste, quality and appearance are often viewed as more important than environmental benefits, even among eco-conscious consumers (Ardoin and Prinyawiwatkul, 2020). Highlighting sustainability, safety and nutritional benefits, especially for younger consumers, can support acceptance (Petrescu-Mag et al., 2022; Simeone and Scarpato, 2022). Targeted education on environmental and health benefits, combined with sensory exposure, reduces hesitancy and implicit biases towards insect-based foods. Information shapes explicit attitudes, while sensory experiences help overcome deeper biases, such as disgust, supporting long-term acceptance (Ardoin and Prinyawiwatkul, 2020; Goncikowska et al., 2023; La Barbera et al., 2018; Mancini et al., 2019; Michel and Begho, 2023). Prior tasting experiences help shift perceptions and increase the willingness to try and recommend insect-based foods (Barton et al., 2020; Mancini et al., 2019; Woolf et al., 2021). Consumer preferences are influenced by sensory factors, such as taste and appearance, with hidden insect ingredients rated more favourably than visible insects. Familiar flavours, professional preparation and packaging without insect images increase acceptance by reducing disgust (Halonen et al., 2022). Cultural and social norms shape insect food acceptance, highlighting the need for culturally tailored strategies (Brunner and Nuttavuthisit, 2019).

2.5. The current study

Current research on entomophagy reveals significant gaps, particularly regarding implicit, culturally ingrained biases towards insect-based foods, and the limited exploration of how different informational strategies—nutritional, environmental or taste-focused—impact consumer attitudes. Studies that combine sensory and informational interventions remain scarce, raising questions about how these methods might jointly foster openness in regions where insect consumption is not yet culturally normalised. The tasting session offers a unique opportunity for participants to experience the product firsthand, providing valuable insight into how actual tasting experiences, including emotions, alongside information provision and implicit attitudes, affect interest in entomophagy. Implicit attitudes—automatic and unconscious associations—are known to play a crucial role in shaping consumer decisions regarding novel foods, including insect-based products. Research has shown that negative implicit associations linked to feelings of disgust and contamination can significantly reduce consumers' willingness to try such foods (La Barbera et al., 2018; Verneau et al., 2016).

Therefore, the aim of this study is to gain a holistic picture of the factors influencing interest in entomophagy by simultaneously analysing information provision, taste experience, including sensory and emotional responses and implicit attitudes. This unique holistic approach provides a deeper understanding of how these factors influence consumer interest in insect-based foods.

3. Materials and methods

3.1. Participants and procedure

Participants were recruited through various channels, including email invitations, flyers and direct approaches on campus at two locations of the university (will be completed after review) in May 2024. A total of 236 university students and employees, predominantly young adults, volunteered for the experiment. Young adults typically exhibit a lower reluctance towards entomophagy, greater flexibility in food preferences and increased sensitivity to health-related concerns (Rovai et al., 2021). We aimed for a final sample size of nearly 200 participants in order to have sufficient statistical power to detect a moderate effect between the four information intervention groups (see 3.4.). All participants provided informed written consent and received financial compensation from 10 CHF for their participation. Upon providing consent, the participants were seated individually at desks with large pinboards in between to ensure privacy and eliminate any visual influence or observational bias. The study was conducted in accordance with the guidelines for ethical conduct in research at the university (will be completed after review).

Of the 236 individuals initially recruited, 23 were excluded prior to data analysis due to failure in the instructional manipulation check (e.g., 'To ensure data quality, please tick the second box'). Additionally, participants who had more than 20 % erroneous trials across all blocks (including practice blocks) or who had response times shorter than 350 ms or longer than 1500 ms in the SC-IAT analysis were excluded (Karpinski and Steinman, 2006). This resulted in a final sample of 188 participants (M_{age} = 25.45, SD_{age} = 5.11; 53.2 % female).

3.2. Questionnaire

The first part of the questionnaire included questions on diet type and previous knowledge—as well as the consumption of insects—followed by validated scales assessing a range of attitudes and behaviours related to food that potentially could also affect insect consumption (Table 1). Reluctance to try unfamiliar foods was measured using the Food Neophobia scale (Pliner and Hobden, 1992) and for green consumption values, the GREEN scale (Haws et al., 2014) was used (assessing the prioritisation of environmental protection in purchasing decisions). Moreover, interest in eating healthily was measured by the General Health Interest scale (Roininen et al., 1999) and finally, the Sensory Appeal scale (Steptoe et al., 1995) assessed the importance of some sensory attributes of food products (see Table 1).

Following the questionnaire, participants completed the SC-IAT, which was used to measure implicit attitudes towards insect-based foods (see 3.3.). Next, participants were randomly assigned to one of four experimental conditions, each presenting distinct types of information about edible insects – nutritional information, environmental information, taste information, or no information (control group) (see 3.4.). After receiving the assigned information, the participants took part in a tasting session (see 3.5.), where they sampled an insect-based protein bar from Essento (Zurich, Switzerland) containing 14.2 % cricket powder (not visible) and rated preferences and emotional reactions to it using a 6-point Likert scale. Then they completed the last part of the questionnaire, which assessed interest in entomophagy (the dependent variable) using a subscale of the Entomophagy Attitude Questionnaire, developed by La Barbera et al. (2020): a) I'd be curious to taste a dish with insects, if cooked well; b) In special circumstances, I might try to eat a dish of insects; and c) At a dinner with friends, I would try new foods prepared with insect flour (Cronbach's $\alpha = 0.71$). Finally, sociodemographic information (sex, age, place of residence and household size) was collected. The entire experiment lasted approximately 30 min. A flow chart of the procedure can be found in Fig. 1.

All items were rated on a 6-point Likert scale, ranging from 1 = strongly disagree to 6 = strongly agree. The scale was selected to ensure that participants expressed clear opinions and avoided neutral responses (Lucas and Brunner, 2024). To manage the overall length of the survey while maintaining its comprehensiveness, the number of items within certain validated scales was reduced. The questionnaire was available in both English and German, with items in the first part randomised to reduce response bias, and all questions had to be answered mandatorily to ensure complete responses.

Table 1
Items used in the first part of the questionnaire.

Scale	Items	Cronbach's α	Reference
Food Neophobia[1]	I don`t trust new foods. If I don`t know what is in a food, I won`t try it. I am afraid to eat things I have never had before. I am very particular about the foods I will eat.	0.72	Pliner and Hobden, 1992
GREEN Scale[1]	It is important to me that the products I use do not harm the environment. I consider the potential environmental impact of my actions when making many of my decisions. My purchase habits are affected by my concern for our environment. I am concerned about wasting the resources of our planet. I would describe myself as environmentally responsible. I am willing to be inconvenienced in order to take actions that are more environmentally friendly.	0.88	Haws et al., 2014
General Health Interest[1]	The healthiness of food has little impact on my food choices[R]. I am very particular about the healthiness of food I eat. I eat what I like and I do not worry much about the healthiness of food[R].	0.78	Roininen et al., 1999
Sensory Appeal[2]	Smells nice Looks nice Has a pleasant texture Tastes good	0.56	Steptoe et al., 1995

[1] Introductory statement: 'Please indicate how much you agree with the following statements.'.
[2] Introductory statement: 'It is important to me that the food I eat on a typical day….'.
[R] reversed.

3.3. Single category implicit association test (SC-IAT)

The SC-IAT was used to assess implicit attitudes towards edible insects, following the method described by Karpinski and Steinman (2006). Implicit attitudes, which are automatic and unconscious, play a crucial role in shaping consumer decisions (Greenwald et al., 1998) and the inclusion of implicit measures provides deeper insights into how deep-seated biases can influence consumer perceptions of insect-based foods.

The setup and procedure for the test, including the specific words used for the attribute categories, were based on the approach outlined by Karpinski and Steinman (2006) and implemented using the SoSci-Survey platform (Leiner, 2024). This method measures implicit attitudes by recording participants' reaction times as they sort words into predefined categories. The SC-IAT focuses on a single target category, which is paired with two attribute categories across four distinct blocks. In this study, the target category was 'Insect-based food', represented by seven stimulus words (hereafter called target stimuli). The attribute categories, 'good' and 'bad', each consisted of 21 stimulus words (Table 2).

During the test, a randomly selected stimulus word from either the target or attribute category was displayed in the centre of the screen for 1500 ms. Participants were required to assign each word accurately to the appropriate category by pressing either the 'E' or 'I' keys, and their reaction times were recorded. In the first phase, participants categorised 'Insect-based food' with 'good' by pressing the 'E' key, while 'bad' was assigned to the 'I' key. In the second phase, 'Insect-based food' was paired with 'bad' using the 'I' key, while 'good' was assigned to the 'E' key. A detailed overview of the test design is presented in Table 3. Following each word sorting, feedback was provided in the form of a green circle for correct responses or a red cross for incorrect responses and displayed for 150 ms. If a participant failed to respond within the allocated time, a message instructing them to 'Please respond more quickly!' was shown for 1000 ms.

Target stimuli are the seven insect-based foods displayed in Table 1.

The SC-IAT consisted of two stages and four blocks, which all participants completed in a predetermined sequence. Each stage began with a practice block of 24 trials, followed by a test block of 72 trials. Practice blocks (Blocks 1 and 3) were excluded from the final calculation of the SC-IAT scores because they were designed to familiarise the participants

Table 2
SC-IAT category and stimulus words.

Target Categories	Attribute Categories	
Insect-based-food	Good	Bad
Insect snack	beautiful	angry
Insect burger	celebrating	brutal
Insect balls	cheerful	destroy
Insect bar	excellent	dirty
Insect flour	excitement	disaster
Insect pralines	fabulous	disgusting
Insect chips	friendly	dislike
	glad	evil
	glee	gross
	happy	horrible
	laughing	humiliate
	likeable	nasty
	loving	noxious
	marvellous	painful
	pleasure	revolting
	smiling	sickening
	splendid	terrible
	superb	tragic
	paradise	ugly
	triumph	unpleasant
	wonderful	yucky

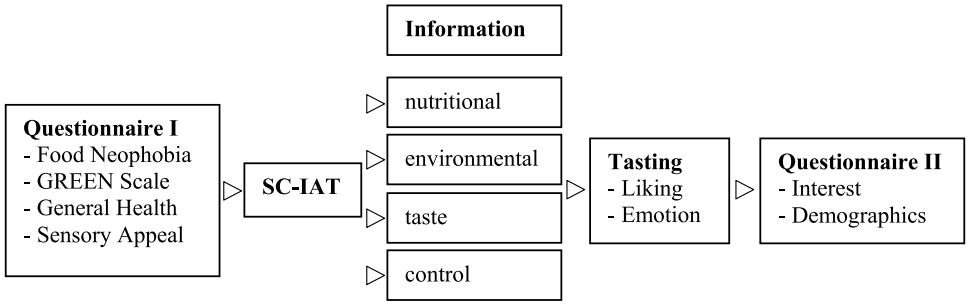

Fig. 1. Flow chart of the study procedure.

Table 3
SC-IAT test design.

Block	No. of trials	Function	Key "E" response	Key "I" response
1	24	Practice	Stimuli Good + Target Stimuli	Stimuli Bad
2	72	Test	Stimuli Good + Target Stimuli	Stimuli Bad
3	24	Practice	Stimuli Good	Stimuli Bad + Target Stimuli
4	72	Test	Stimuli Good	Stimuli Bad + Target Stimuli

with the procedure and key combinations, ensuring that the test outcomes were unaffected by these trials. This exclusion ensured that the results did not influence the calculation of the d-scores (Karpinski and Steinman, 2006). Following data cleaning, the d-score was calculated by subtracting the mean response time of Block 4 from that of Block 2. This difference was then divided by the standard deviation of all valid response times from correctly answered trials. This d-score calculation was performed automatically within the SoSci Survey platform, in line with Karpinski and Steinman's (2006) recommendations. In this study, positive d-scores indicated positive implicit associations with insect-based food, suggesting that participants associated insect-based food more readily with positive attributes. Conversely, negative d-scores indicated negative implicit associations, reflecting a stronger association with negative attributes.

3.4. Information provision

Participants were randomly assigned to one of four intervention groups – a) nutritional information, b) environmental information, c) taste information, or d) no information (control group). No significant differences were found between these four groups in terms of all scales and all sociodemographic variables, which was expected because of randomisation. Visually engaging posters were used to present key facts about edible insects: a) The nutritional information infographic highlighted that insects are a rich source of protein (40–60 %) and contain essential vitamins (B12, B6, A) as well as minerals (zinc, calcium, magnesium). It emphasised that insect farming can occur without antibiotics, offering a natural protein alternative. b) The environmental information infographic demonstrated the sustainability of insect farming. It highlighted the fact that insects require significantly less land, water and feed compared to traditional livestock and produce minimal greenhouse gases. Additionally, it showed that insect farming can leverage low-value food waste streams and efficiently use space through vertical farming systems. c) The taste information infographic explained that insects possess a mildly nutty flavour and can be used in various culinary applications, such as snacks, protein bars, and burgers, making them versatile protein sources.

3.5. Tasting session

The study examined an insect-based protein bar where the insects were not visible, as previous research suggests that participants are likelier to consume insect-based foods when the product is familiar and the insects are not or only minimally visible (Halonen et al., 2022; Petrescu-Mag et al., 2022). Each participant received a tray containing a napkin, a cup of water, and a pre-cut portion of the protein bar, made with chicory root fibre, date paste, 14.2 % cricket powder (*Acheta domesticus*), cocoa butter, 14 % raisins, 11.3 % almonds, 3.4 % cranberries, beetroot powder, psyllium husk fibre and natural flavour (Essento Food AG, Switzerland). Participants were instructed to rinse their mouths with water prior to tasting to neutralise their palates. After the tasting, they filled out a questionnaire in which they rated the protein bar according to their liking. They also rated their emotional responses, assessing security, happiness, worry and disgust, using items from EsSense25, a scale developed to measure consumer emotions in response to food and product experiences (Table 4).

Introductory statement: 'Please indicate how much you agree with the following statements.

3.6. Statistical analysis

Statistical analyses were conducted using IBM SPSS Statistics, version 29 (IBM Corp., 2022). The reliability of the constructs was assessed using Cronbach's α to ensure internal consistency. Following Field (2018), multiple linear regression analyses were conducted to assess the impact of 13 independent variables (predictors) on the dependent variable (interest in entomophagy).

The 13 predictors included food neophobia, green consumption values (measured by the GREEN scale), general health interest, sensory appeal, implicit attitudes (measured with the implicit association test), nutritional information (whether the participant received nutritional information, coded as 0 = no, 1 = yes), environmental information (whether the participant received environmental information, coded as 0 = no, 1 = yes), taste information (whether the participant received taste information, coded as 0 = no, 1 = yes), liking, emotional response, age, sex (0 = male, 1 = female) and place of residence (0 = countryside, 1 = city/agglomeration). The backward elimination method was employed to refine the regression model (Field, 2018). In this method, all predictors are initially included, and then those with p-values greater than 0.05 are sequentially removed from the model, starting with the predictor with the highest p-value until only statistically significant predictors remain. Collinearity was assessed through variance inflation factors (VIFs), with all VIF values below 2, indicating no significant multicollinearity issues (Field, 2018). Since predictors were measured by different scales and/or units, in order to compare the strength of the predictors, standardised coefficients were estimated.

4. Results and discussion

A hierarchical regression analysis was conducted to predict interest in entomophagy using the 13 above-mentioned predictors. The full model, which included all predictors, explained 44.9 % of the variance in interest in entomophagy ($R^2 = 0.449$, adjusted $R^2 = 0.408$, $F(13, 174) = 10.91$, $p < .001$). This indicates that these factors collectively contribute meaningfully to the prediction of interest in entomophagy.

In subsequent models, non-significant predictors were removed one at a time in the following order (backward elimination method) – sensory appeal ($p = .974$), environmental information ($p = .926$), sex ($p = .463$), taste information ($p = .433$), nutritional information ($p = .253$), upbringing environment ($p = .192$), age ($p = .084$) and general health interest ($p = .062$). Despite the removal of these predictors, the changes in R^2 and adjusted R^2 values remained minimal and non-significant, indicating the robustness of the model. The results of the final model with $R^2 = 0.415$ and adjusted $R^2 = 0.399$, including the significant

Table 4
Items used for the tasting.

Scale	Items	Cronbach's α	Reference
Liking	The product tastes good. I would eat the product again. I would consider buying the product. I would recommend this product.	0.93	own scale
Emotional response	Secure Happy Worried[R] Disgusted[R]	0.79	Nestrud et al., 2016

predictors, are displayed in Table 5.

The multiple linear regression analysis revealed five significant predictors of consumer interest in entomophagy. Specifically, in the order of their importance, green consumption values emerged as a strong positive predictor of interest ($\beta = 0.254$), indicating that higher green consumption values are associated with greater interest in entomophagy. Emotional response was also a strong positive predictor of interest ($\beta = 0.232$), suggesting that the more positive emotional responses to the tasting of the insect bar, the higher the interest to consume such foods in the future. Liking was again a positive predictor ($\beta = 0.224$), indicating that favourable taste evaluations of the insect bar are associated with increased interest in entomophagy. Unsurprisingly, food neophobia negatively predicted interest ($\beta = -0.183$), suggesting that higher levels of food neophobia are associated with lower interest in entomophagy. Implicit attitudes, finally, positively predicted interest ($\beta = 0.161$), showing that more positive implicit attitudes are in line with higher interest in entomophagy.

Green consumption values constituted the strongest positive predictor of interest. The more environmentally friendly the values were to the participants, the greater their interest in insect-based foods, reflecting previous findings linking environmental benefits to consumer acceptance (López et al., 2023; Sogari et al., 2019). Furthermore, Dupont et al. (2022) demonstrated that green consumption values significantly influence consumer interest in cultured meat. These findings highlight a broader principle that consumers who prioritise environmental benefits tend to be more receptive to novel and potentially transformative food ingredients and technologies, such as insects and cultured meat, which align with their environmental and ethical values. In Switzerland, sustainability holds a prominent place in public discourse and cultural norms, and pro-environmental behaviours are widely encouraged, which might have influenced this study's results (Berger and Wyss, 2020; Giacomuzzo et al., 2024).

Beyond environmental considerations, emotional response emerged as a powerful predictor of interest in entomophagy. Participants who reported positive emotions after tasting the insect bar were more interested in insect-based foods in the future. This aligns with findings by Ventanas et al. (2022), who demonstrated that direct sensory exposure to insect-based foods can increase feelings of adventurousness and reduce disgust, thereby increasing acceptance. The enhancement of the predictive power of food choice by including the evaluation of food-evoked emotions has been shown elsewhere with breakfast drinks (Dallenberg et al., 2014) and Köster and Mojet (2015) also reported that emotions play a crucial role in eating and drinking behaviour (for a review, see Kaneko et al., 2018).

Liking was another strong positive predictor. The more participants enjoyed the taste of the cricket-based protein bar, the more they were interested in entomophagy, reflecting previous findings (Cicatiello et al., 2020). Therefore, it is important that insect-based foods in the market taste good. Sustainability arguments alone will not sell these products; they must also convince consumers in terms of flavour (Ardoin and Prinyawiwatkul, 2020).

Food neophobia was the only negative predictor, indicating that an aversion to unfamiliar foods remains a critical obstacle to insect consumption. Even when controlling for liking, as a multiple regression analysis does, food neophobia persists, showing that a single taste experience, even when positive, is not enough to overcome the phobia. White et al. (2023) described neophobia as an evolutionary mechanism that prompts instinctive avoidance of potentially harmful foods, explaining why it can be so challenging to overcome. Overcoming these deep-seated reactions may require repeated tastings, diverse product offerings, targeted educational campaigns and broader social acceptance.

Implicit attitudes, as measured by the SC-IAT, also emerged as a significant predictor. Unlike explicit attitudes, which are often shaped by knowledge and conscious reasoning, implicit attitudes tap into more automatic and immediate processes. Verneau et al. (2016) highlighted the importance of implicit measures in understanding consumer acceptance of novel foods, indicating that positive implicit associations can encourage openness, even when explicit responses are ambivalent. Similarly, La Barbera et al. (2018) found that implicit positivity could mitigate feelings of disgust and, therefore, indirectly increase the intention to try insect-based products. In the present study, the results suggest that positive subconscious tendencies function as a psychological 'green light' for experimentation. When consumers exhibit an underlying sense of positivity towards insect-based foods, they may be more inclined to move beyond rational hesitations. Incorporating implicit measures offers a fuller picture of consumer behaviour, and research into this area could help to enhance our knowledge of how subtle, automatic leanings support or hinder the adoption of novel foods.

Although this study provided nutritional, environmental and taste-related information, none of these factors significantly predicted interest in entomophagy. Similarly, a study of a sample of schoolchildren in Denmark found that information about health, taste and sustainability did not influence their willingness to try insect food (Erhard et al., 2023). Mixed outcomes have been documented elsewhere: Gumussoy et al. (2021) noted that abstract environmental messaging frequently fails to overcome emotional barriers, such as disgust, while Michel and Begho (2023) found that providing detailed environmental information can increase perceived value but may not fully address practical hesitations, such as cost or ingrained preferences. Finally, Nikravech et al. (2025) found that information about sustainability increased the acceptance of insect-based meat alternatives in Italy and Germany. The fact that the information measures in this study were not significant could indicate that entrenched attitudes and real-life experiences with food carry more weight than short-term, information-based efforts. Culturally sensitive, more personalised communication strategies that evoke empathy, curiosity or social acceptability may be needed. Repeated long-term exposure—rather than one-time information sessions—might hold greater promise for gradually shifting perceptions.

To improve consumer acceptance of insect-based foods as a sustainable and nutritious protein source, several strategic approaches result from the present findings that are also mentioned elsewhere: As Bucea-Manea-Țoniș et al. (2023) highlighted, education and awareness initiatives reshape consumer perceptions by promoting health benefits such as high protein and beneficial fatty acids, alongside environmental advantages, thereby reducing disgust and neophobia. Public authorities and educational institutions are crucial in sharing scientifically grounded information on these benefits. For instance, classroom lessons can increase children's willingness to try insect-based foods by helping them overcome psychological barriers at a younger, more impressionable age (Collins et al., 2019). Product development efforts should aim to integrate insects into familiar foods in less recognisable forms, such as grounded meat, to reduce visual aversion (Halonen et al., 2022) and to ensure positive taste experiences to encourage repeat consumption (Barton et al., 2020). Thoughtful packaging also helps mitigate negative perceptions by using abstract images instead of realistic insect images that evoke disgust (Pozharliev et al., 2023). Marketing and promotion for insect-based foods could use social influence, celebrity endorsements, and hedonistic messages—focusing on pleasure and health

Table 5
Significant factors from the multiple regression predicting interest in entomophagy.

Predictor	*B*	*SE*	*β*	*t*	*p*
(Constant)	1.527	0.525		2.908	.004
GREEN Scale	0.288	0.066	0.254	4.379	<0.001
Emotional response	0.249	0.078	0.232	3.177	.002
Liking	0.222	0.066	0.224	3.354	<0.001
Food Neophobia	−0.194	0.065	−0.183	−2.958	.004
SC-IAT	0.335	0.127	0.161	2.633	.009

Note. B = Unstandardized coefficients; SE = Standard error; β = Standardised coefficients; t = t-value; p = significance. $N = 188$.

benefits—to normalise consumption (Legendre and Baker, 2021). Finally, distribution and availability in mainstream retail and restaurant channels foster familiarity, making insect-based foods more accessible and socially accepted (van Thielen et al., 2019), which in turn would perhaps lead to a more positive implicit association in the long term.

5. Conclusion

The current study sheds light on the multifaceted factors influencing young adults' interest in insect-based foods. Strong environmental values, positive emotional experiences, liking and positive implicit attitudes collectively emerged as key drivers of interest in entomophagy. Conversely, embedded food neophobia presents a significant barrier to acceptance.

Therefore, tasting experiences are crucial when it comes to entomophagy, as both liking and emotional responses proved to be significant predictors. The pivotal role of implicit attitudes emphasises the need to address subconscious biases alongside explicit motivators, such as environmental benefits. The fact that the information measures were not significant indicates that entrenched attitudes often carry more weight than short-term efforts. These findings not only advance the understanding of consumer behaviour towards sustainable dietary innovations but also provide valuable insights for effectively promoting insect-based foods.

By understanding these dynamics, stakeholders can better address challenges and leverage opportunities, thereby contributing to the development of a more sustainable and resilient food system. The food industry may consider developing products that align with consumers' environmental values, emphasise positive sensory qualities and evoke favourable emotional responses. Designing insect-based foods in familiar formats, such as processed products—protein bars or snacks—and highlighting appealing taste profiles can encourage individuals to overcome initial reluctance. Encouraging repeated exposure may gradually reduce food neophobia and negative implicit associations. Over time, these approaches can help foster lasting openness and facilitate a gradual shift towards the interest and acceptance of entomophagy.

While these findings offer valuable insights, several limitations must be acknowledged. First, the sample primarily comprised educated young adults, which limits the study's generalisability. Younger adults frequently exhibit lower food neophobia and greater openness to novel foods compared to older populations (Rovai et al., 2021). Second, the study's cross-sectional design captured interest at a single time point, immediately following informational and sensory interventions. This approach provides only a snapshot and does not account for potential attitude shifts over time. Deeper shifts, such as reducing food neophobia or shifting implicit attitudes, may require sustained exposure and repeated engagement. Third, conclusions about sensory appeal were drawn from responses to a specific product—a protein bar containing cricket powder. While familiar formats may enhance acceptance, the limited variety of products and insect types may limit the generalisability of sensory-related findings.

Future research should examine how these factors evolve over time and across diverse population segments, exploring various product formats and cultural contexts. Longitudinal studies could illuminate how sustained engagement, regular taste experiences, repeated positive emotional responses, and shifting implicit attitudes interact with green consumption values to reduce the influence of food neophobia. Such work would guide the refinement of strategies aimed at normalising insect-based foods and integrating them into mainstream dietary patterns in Western societies, ultimately contributing to more sustainable and resource-efficient food systems.

Ethical statement

The present study was approved by the ethical board of the Bern University of Applied Sciences (EAB2025_019) and was conducted in accordance with the guidelines for ethical conduct. The participants gave their informed consent and could withdraw from the study at any time without giving any reasons.

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CRediT authorship contribution statement

Thomas A. Brunner: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Hong Nhi Künzi:** Writing – original draft, Formal analysis, Data curation, Conceptualization. **Thanh Mai Ha:** Writing – review & editing, Project administration, Funding acquisition, Conceptualization. **Minh Hai Ngo:** Writing – review & editing, Conceptualization. **Thi Lam Bui:** Writing – review & editing, Conceptualization. **Anh Duc Nguyen:** Writing – review & editing, Conceptualization. **Nhu Thinh Le:** Writing – review & editing, Conceptualization. **Bárbara Franco Lucas:** Writing – review & editing, Supervision, Formal analysis, Data curation, Conceptualization.

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 and supplementary documents are published on OLOS Repository, https://doi.org/10.34914/olos:v7rdwvf6evdnzilwmtleoraq5u

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