

From emotion to intention: how mood, food neophobia, and purchase motives shape willingness to buy new broccoli leaf products

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Abstract

Purpose – This research aims to explore psychological drivers behind consumer acceptance of food innovations, using broccoli leaf products as a case study.

Design/methodology/approach – A quantitative survey of 1,114 German consumers was conducted. Initially, a correlation analysis was carried out to analyze the relationship between mood, food neophobia, and purchase motives. Subsequently, a regression analysis was conducted to evaluate factors influencing the likelihood of buying broccoli leaf products.

Findings – The correlation analysis shows that the relevance of purchase motives shifts when mood is taken into account. A positive mood is associated with a focus on sustainability, certification marks and health, while a negative mood emphasizes price and convenience. Both positive and negative moods are closely linked to brand and design. The regression analysis confirms that positive mood and food neophobia are significantly related to the willingness to buy broccoli leaf products. In addition, factors such as openness to particular dietary styles, a physically active and sustainability-oriented lifestyle, an urban living environment, and a higher education also promote consumer acceptance of such innovative products.

Research limitations/implications – The analysis is based on correlation and regression analyses. For future investigations, the findings suggest that psychological aspects, particularly mood, should be given greater emphasis in consumer research.

Originality/value – The study contributes to a deeper understanding of how mood, food neophobia, and purchase motives are associated with consumers' behavioral responses to innovative foods.

Keywords Consumer psychology, Decision-making factors, Lifestyle factors, Novel food, Plant-based innovation

Paper type Research article

1. Introduction

1.1 Derivation of research questions and justification of the case study

The increasing awareness among consumers, businesses, and governments about healthy diets and sustainable food resource management has simulated research into innovative food

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products (FAO, 2011; Baldermann *et al.*, 2016; Hassoun *et al.*, 2022; Caso *et al.*, 2022; O'Meara *et al.*, 2022). Approximately 40,000 new food products are introduced to the German market each year, but only about 13,000 remain viable after two years (Bundesverband der Deutschen Ernährungsindustrie, 2024). The high failure rate underscores the need for a deeper understanding of consumer decision-making processes (Martínez and Briz, 2000; Menrad, 2003; Osswald *et al.*, 2016; Guiné *et al.*, 2020; Scheed and Scherer, 2021; Bundesverband der Deutschen Ernährungsindustrie, 2024).

In today's globalized and digitalized food market, consumption behavior is shaped by increasing individualization, rapid change, and the complex interplay of rational and emotional factors (Halfmann, 2014; Borgstedt and Stockmann, 2018; Haselhoff, 2020). While rational decisions are based on conscious considerations and facts, emotional decisions are more strongly characterized by personal feelings, moods, and subjective perceptions (Köster, 2009; Leng *et al.*, 2017; Jose and Kuriakose, 2021). Particularly in the domain of fast-moving consumer goods, subconscious emotions often dominate the decision-making process, with conscious reasoning serving mainly to justify decisions retrospectively (McCormick, 2010; Zaltmann and Coulter, 1995; Kahneman, 2011).

To illustrate these challenges, the present study uses broccoli leaves as a case example. In Germany, broccoli is a widely consumed vegetable, with over 70% of the population eating it at least once a month (Welk *et al.*, 2023). However, with the rise of industrialized agri-food systems and corresponding retail structures, broccoli consumption is nowadays predominantly restricted to florets, which account for only 15–30% of the plant (Le *et al.*, 2020; Liu *et al.*, 2018). The remaining parts, particularly the leaves, are typically discarded during harvest and are neither marketed nor perceived as edible by most consumers. However, historical cookbooks and collections of classic Mediterranean recipes reveal that broccoli leaves were once a common and popular food in southern European countries, particularly in Italy (Apicio, 1994; Artusi, 1891). Therefore, broccoli leaves are not classified as a novel food according to Regulation (EU) 2015/2283 (European Parliament and Council of the European Union, 2015), but rather constitute a traditional component that has largely disappeared from modern diets. Nevertheless, for today's consumers, they appear unusual and unfamiliar, both in raw and processed form. Their incorporation into contemporary foods marks a distinct departure from traditional eating habits and challenges deeply rooted expectations regarding which parts of a vegetable are suitable for consumption. Hence, many consumers are likely to perceive broccoli leaves today as a novel food, which may elicit food neophobia. At the same time, this innovation addresses broader issues in food production: the underutilization of edible plant parts reflects a common consequence of modern agricultural and food processing practices, which prioritize yield efficiency and visual appeal over nutritional diversity and full resource use. Reintroducing broccoli leaves into the human diet, therefore, offers both a nutritional and ecological innovation. These parts are rich in micronutrients, contribute to reducing food waste, improve resource efficiency, and help lower nitrogen emissions (Campas-Baypoli *et al.*, 2009; Liu *et al.*, 2018; Berndtsson *et al.*, 2020; Castillejo *et al.*, 2021; Artés-Hernández *et al.*, 2023).

In the United States, companies have already introduced broccoli leaves as fresh vegetables, providing recipes for diverse applications such as salads, smoothies, and gratins (BroccoLeaf, 2024). While no similar initiatives currently exist in Germany, the literature highlights potential uses for broccoli and other brassica by-products in soups, snacks, seasoning pastes, and juices (Artés-Hernández *et al.*, 2023). Given their sustainability potential and versatility in culinary use, broccoli leaf products provide an especially compelling stimulus within the S-O-R (Stimulus-Organism-Response) framework. As an unfamiliar and underutilized food component, broccoli leaves disrupt habitual consumption patterns and challenge consumer expectations – thereby eliciting cognitive and emotional responses that constitute a central component of the S-O-R model. Their deviation from the norm makes them particularly suited for investigating constructs such as food neophobia, emotional reactions, and the role of subconscious associations in food acceptance. At the same time, their integration into the food system aligns with broader sustainability goals. This dual

relevance provide a basis for exploring how ecological motivations interact with psychological and affective drivers of consumer behavior. By integrating insights into mood, purchase motives, and resistance to food innovation, this research not only advances theoretical understanding but also offers practical recommendations for fostering acceptance of healthy and sustainable food innovations.

1.2 Theoretical framework, literature review and research questions

To better understand the high failure rate of food innovations, it is crucial to analyze the psychological mechanisms underlying consumer behavior. While traditional models emphasize rational cost-benefit calculations, current research highlights the significant role of emotional states, habits, and unconscious influences, especially in the context of fast-moving consumer goods. In this domain, decisions are often made spontaneously and then retrospectively rationalized, rather than through deliberate reasoning. However, individual food choices are not shaped by isolated factors. Instead, they emerge from the dynamic interaction of emotional states, personal predispositions, and motivational drivers. To systematically explore these interactions and their influence on behavior, this study applies the Stimulus–Organism–Response (S-O-R) model, a well-established framework in consumer psychology (Liu and Zheng, 2019; Liang and Lim, 2020; Sultan *et al.*, 2021; Ahmad *et al.*, 2025). The S-O-R model conceptualizes behavior as a process triggered by an external stimulus, internally processed by the individual, and resulting in an observable response. In the context of this research the Stimulus (S) refers to the innovative broccoli leaf product, an unfamiliar and sustainable food item that challenges existing consumption patterns. The Organism (O) includes three internal psychological constructs that shape how consumers process the stimulus: mood (emotional state), food neophobia (reluctance to try unfamiliar foods), and food purchase motives (goal- or value-based drivers such as health, convenience, or sustainability).

These dimensions represent affective, cognitive, and motivational aspects of consumer processing. The Response (R) is the purchase intention, which reflects the behavioral outcome of internal evaluations and reactions.

Although other factors – such as social norms, situational context, or product presentation – may also influence consumer behavior, this study deliberately focuses on mood, food neophobia, and purchase motives (Barsalou, 1991; Fishbach *et al.*, 2003; Piqueras-Fiszman and Jaeger, 2014; Halim and Zulkarnain, 2017; Ballco *et al.*, 2022). This emphasis is based on three considerations: (1) their high theoretical relevance within the S-O-R framework, (2) their potential for interaction when encountering novel products, and (3) the availability of validated measurement instruments that provide reliable and practical analysis (Schwarz and Clore, 1983; Siegrist *et al.*, 2013; Char *et al.*, 2016; Siegrist and Hartmann, 2020). Integrating these components into a unified model contributes to a deeper understanding of the psychological drivers behind the adoption of innovative food products.

Accordingly, the study is guided by the following research questions:

- (1) How do mood and food neophobia relate to purchase motives?
- (2) How can regression analysis results – including mood, food neophobia, purchase motives, and socio-demographics – support the successful market launch of innovative broccoli leaf products?

To establish the foundation for this investigation, the following section reviews key theoretical constructs and empirical findings related to consumer mood, food neophobia, and food purchase motives, highlighting their relevance to the acceptance of innovative food products.

Mood is a central psychological variable influencing consumer decision-making. According to *Mood Management Theory* (Zillmann and Bryant, 1985; Isen *et al.*, 1988), individuals tend to choose products that help stabilize or enhance their current affective state. In food consumption contexts, mood not only affects the type of product chosen (e.g. indulgent

vs health-oriented) but also influences the processing of product characteristics such as sustainability or familiarity (Brückner *et al.*, 2023; Wahl *et al.*, 2017). To capture the emotional state of consumers, the *Positive and Negative Affect Schedule* (Watson *et al.*, 1988) is frequently applied. This instrument differentiates between *positive affect* (e.g. enthusiasm, alertness) and *negative affect* (e.g. distress, guilt), thereby allowing the exploration of both facilitating and inhibiting effects on openness to innovation. Existing research suggests that positive affect is associated with increased risk tolerance and novelty seeking, whereas negative affect is linked to more conservative, price-sensitive, and habitual decision-making (Isen *et al.*, 1988; Felser, 2015; Ballco *et al.*, 2022).

Food neophobia refers to the dispositional tendency to avoid unfamiliar food items (Pliner and Hobden, 1992). It is often rooted in evolutionary protective mechanisms and is triggered by novel ingredients, unorthodox preparation methods, or atypical appearance. The *Food Neophobia Scale* is widely used to capture this trait and has been validated in numerous nutrition and consumer studies (Çınar *et al.*, 2021; Roßnach *et al.*, 2016). Individuals with high level of food neophobia tend to prefer conventional, processed, and familiar products, and place greater emphasis on safety cues such as standardization and visual flawlessness (Nicklaus *et al.*, 2016; Barrena and Sánchez, 2013). By contrast, neophilic consumers are more receptive to novel, ethically aligned, and sustainability-driven food innovations (Urala and Lähteenmäki, 2003). Therefore, food neophobia is likely to negatively influence consumers' willingness to adopt innovative food products.

Food purchase motives represent the values, preferences, and goals that guide individual food decisions. The *Food Choice Questionnaire* (Steptoe *et al.*, 1995) includes dimensions such as health, mood, convenience, price, familiarity, and ethical concerns. These purchase motives are dynamic and are influenced by emotional states and personality traits such as food neophobia (Piqueras-Fiszman and Jaeger, 2014; Ballco *et al.*, 2022).

In the context of innovative food products, purchase motives related to sustainability, health, convenience, and price may play a decisive role. However, their influence on purchase intention is not isolated but is likely moderated by both mood and neophobia, determining the extent to which purchase motives translate into actual willingness to try new foods.

In summary, this literature review leads to the development of four key hypotheses guiding the empirical investigation:

- H1. Positive mood encourages consumers to make more far-sighted, and empathetic decisions, thereby increasing their willingness to choose sustainable, health-oriented, and innovative foods.
- H2. Negative mood decreases consumers' willingness to purchase innovative food products.
- H3. Food neophobia is negatively associated with consumers' willingness to purchase innovative food products.
- H4. The influence of food purchase motives on willingness to purchase innovative food products is moderated by mood and food neophobia.

2. Material, methods, and descriptive data

The results of this study are based on a quantitative online survey conducted in May 2024. Participant recruitment and data collection were facilitated by the Bilendi AG panel and implemented via the Tivian XI platform (Cologne). Several measures were implemented to ensure response quality. An attention check was integrated into the questionnaire, and participants who failed this check were excluded from the dataset. In addition, respondents with extremely short completion times or who exhibit uniform response patterns were removed by Bilendi. The final dataset comprised 1,114 participants. The quality of the dataset

was further checked using descriptive statistical analyses (e.g. frequencies, means, and standard deviations) and through visual inspection of the response patterns. These analyses did not reveal any additional anomalies. Therefore, no further exclusions were necessary.

The sample is representative of the German population with respect to age, gender, regional origin, education, and household income. However, additional screening criteria, such as prior broccoli consumption and willingness to purchase at least two of five specified product groups, introduce limitations to the overall representativeness (Table 1). Minor deviations in standard demographic variables were observed, including a 5% higher representation of broccoli consumers compared to the national average. Similarly, deviations in product group consumption were attributable to the screening criterion requiring participants to consume at least two product categories.

2.1 Questionnaire and stimuli material

The recording of the central variables is based on established psychological and behavioral science scales. Respondents' mood was assessed using the Positive and Negative Affect Schedule (PANAS) introduced by Watson *et al.* (1988). This scale comprises two independent subscales, each containing 10 items, to measure positive and negative mood. Positive mood

Table 1. Attributes of the consumer sample ($N = 1,114$) compared to the national average

Characteristics		Sample (%)	Population level Germany (%)
Quotas			
Gender*	Male	51	50
	Female	49	50
	18–24	12	09
Age*	25–34	14	15
	35–44	15	15
	45–54	15	16
	55–64	19	19
	>65	26	26
Region in Germany**	North	21	18
	West	33	35
	South	28	29
	East	19	18
Education*	Still pupil	02	03
	Elementary/secondary school	28	29
	Middle school	30	30
	General university entrance qualification	37	34 ^a
	Without degree	03	04
Household net income**	Under € 1,499	19	20
	€ 1,500–2,499	25	27
	€ 2,500–3,499	21	19
	€ 3,500–4,499	17	18
	Over € 5,000	18	16
Consumption of broccoli	At least infrequent consumption	100	95 ^b
At least rarely consumption	Cabbage/Kale	95	11 ^b
	Pesto	92	52 ^c
	Smoothie	72	40 ^d
	Ready made soup	83	68 ^e
	Tortilla wrap	84	10 ^f

Note(s): ^a Statistisches Bundesamt (2022), ^b Gesellschaft für integrierte Kommunikationsforschung (2023a), ^c General higher education entrance qualification, ^d Welk *et al.* (2024), ^e Nestlé (2016), ^f Smoothie consumer (Gesellschaft für integrierte Kommunikationsforschung, 2023b), ^g Ready made soup consumer (Gesellschaft für integrierte Kommunikationsforschung, 2023c), ^h Wrap consumer (Kantar Media, 2022)

reflects pleasant states characterized by motivation and alertness, whereas negative affect captures unpleasant emotional states commonly associated with stress, anxiety, and irritability. Respondents rated the intensity of these emotional states over a specific time, e.g. during the fast few weeks or at the moment. In this study, participants were asked to evaluate their mood over the past 24 h. This period was chosen to ensure the accuracy of the self-reports and minimize short-term emotional bias (Watson *et al.*, 1988). Notably, positive and negative mood are not mutually exclusive and may co-occur. The PANAS items are detailed in [Appendix A: Questionnaire, Question 11](#).

Food neophobia was measured using the *Food Neophobia Scale* (FNS) developed by [Pliner and Hobden \(1992\)](#). Widely used in nutritional and consumer research, the FNS captures individual differences in openness to novel foods. The scale consists of 10 statements that are rated on a 7-point Likert scale, with each answer reflecting an individual's tendency toward food neophobia. By measuring food neophobia on a continuous scale, the FNS can also capture subtle differences in willingness to try new foods. The FNS items are included in [Appendix A: Questionnaire, Question 13](#).

Purchase motives were measured using the Food Choice Questionnaire (FCQ) ([Stephens *et al.*, 1995](#)). This instrument assesses psychological and behavioral factors influencing food choices. In this study, an extended version of the FCQ was employed, integrating additional purchase motives identified in studies by [Urala and Lähteenmäki \(2003, 2007\)](#), [Hartmann *et al.* \(2013\)](#), and [Testa *et al.* \(2021\)](#). The FCQ consists of statements rated on a Likert scale, enabling the assessment of diverse purchase motives. The extended FCQ offers the advantage of pre-categorized purchase motives, eliminating the need for preliminary factor analysis. Items for the FCQ can be found in [Appendix A: Questionnaire, Questions 12 and 39](#).

The survey also examined participants' general willingness to buy broccoli leaf products ([Appendix A: Questionnaire, questions 22 and 23](#)) as well as specific product examples including a kale alternative, a soup, a green smoothie, pesto and a green wrap (see [Appendix A: Questionnaire, questions 24A–33A](#)). These product examples were selected based on preliminary research and a feasibility analysis to represent broad product categories and capture diverse consumer preferences.

2.2 Data analysis

The data analysis was conducted using correlation and regression analyses, utilizing IBM SPSS Statistics 26 (IBM Corp., Armonk, NY, USA). To explore the relationships between mood, food neophobia, and purchase motives, a *Pearson* correlation analysis was performed. The exploratory approach was deliberately chosen to allow for a broader perspective and to provide opportunities for uncovering unexpected patterns. The focus was on exploratory correlations and hypothesis generation rather than causal modeling. Notably, exploratory analyses can yield practical insights, particularly in fields like market and consumer research, where clear causal mechanisms are often absent ([Cook and Donald, 2007](#)).

Linear regression analyses were used to explain the willingness to buy broccoli leaf products as the dependent variable. Willingness to buy broccoli leaf products was measured on an 11-point Likert scale. This scale was chosen for its ability to capture nuanced differences in purchase intention, enabling a detailed analysis of consumer preferences. Independent variables included socio-demographic factors, mood, food neophobia, and purchase motives. Specific items are detailed in [Appendix A – Questionnaire: Questions 1, 2, 3, 4, 5, 10, 40, 41, 42, and 44](#). The analyses aimed to identify the factors that significantly influence willingness to buy broccoli leaf products. To ensure the validity of the results, the linearity of the variables was checked and variables with multicollinearity were removed. Non-significant variables ($p > 0.05$) were excluded.

Due to the large number of items, two separate regression analyses were carried out. For this reason, the 15 items on mood, food neophobia, and purchase motives were analyzed in one regression and the 10 items on socio-demographics in a second regression.

Given the minimal differences in regression outcomes across individual broccoli leaf products, only the general willingness to buy broccoli leaf products and the associated independent variables were included in the presentation of results.

3. Results and discussion

3.1 The relationship between mood, food neophobia, and purchase motives

The correlation analysis shows the relationships between mood, food neophobia, and purchase motives (Table 2).

3.1.1 Influence of positive mood on purchase motives (H1). The correlation analysis reveals significant associations between positive mood and various purchase motives. The strongest correlation is observed with the health motive ($r = 0.27$; $p < 0.001$). This finding supports Hypothesis H1, which posits that a positive mood increases the willingness to purchase innovative and healthy food products. The health motive, as well as the taste motive ($r = 0.13$; $p < 0.001$) can be explained by Mood Management Theory, according to which individuals deliberately select stimuli that enhance or maintain their emotional state (Zillmann and Bryant, 1985; Isen *et al.*, 1988; Lerner *et al.*, 2015). Previous research also confirms that healthy eating is associated with higher subjective well-being (Wahl, 2017; Chang *et al.*, 2020; Brückner *et al.*, 2023, 2024). However, these findings stand in contrast to studies suggesting that a positive mood is linked to increased caloric intake, particularly through snacking (Gibson, 2006; Kringsbach and Berridge, 2010; Bongers *et al.*, 2013; Singh, 2014; Berridge and Kringsbach, 2015; Evers *et al.*, 2018; Hill *et al.*, 2018; Privitera *et al.*, 2019). Considering both the current results and the existing literature, a bidirectional positive feedback loop between positive mood and healthy eating behavior can be assumed, warrants further investigation in future studies.

In addition to health, brand awareness ($r = 0.26$; $p < 0.001$) and design ($r = 0.20$; $p < 0.001$) are also associated with positive mood. These motives emphasize trust, quality, and aesthetic enjoyment – factors that are more salient in positive emotional states. Likewise, these results can be explained by Mood Management Theory, which suggests that individuals actively seek to maintain or enhance their mood. In the context of design, specific elements such as color and shape can trigger emotional reactions – for instance, yellow is often associated with

Table 2. Correlations between mood, food neophobia as well as motives ($N = 1,114$)

	Positive mood	Negative mood	Food neophobia
Positive mood	–		
Negative mood	–0.02 ^(n.s.)	–	
Food neophobia	–0.16***	0.15***	–
Brand awareness	0.26***	0.13***	0.11***
Convenience	0.07*	0.12***	0.12***
Design	0.20***	0.24***	0.05 ^(n.s.)
Familiar products	0.16***	0.06 ^(n.s.)	0.30***
Flawless products	0.19***	–0.01 ^(n.s.)	0.13***
Freshness	0.15***	–0.24***	–0.18***
Gentle processing	0.21***	–0.05 ^(n.s.)	–0.16***
Health	0.27***	–0.13***	–0.19***
Low priced	–0.04 ^(n.s.)	0.09**	0.08**
Regional	0.20***	–0.09**	–0.11***
Seal	0.22***	–0.06 ^(n.s.)	–0.10**
Taste	0.13***	–0.19***	–0.20***

Note(s): The analysis is based on Pearson correlation coefficients; significance (two-sided): *** $p < 0.001$

** $p < 0.01$ * $p < 0.05$

cheerfulness, while blue is linked to calmness (Singh, 2006; Palmer, 2017; Jonauskaitė *et al.*, 2018; Rejón-Guardia, 2024). Similarly, brands can foster positive moods by evoking nostalgia or reinforcing consumers' self-concept through brand image (McKinsey and Company, 2023). Supporting this view, Lee and Sternthal (1999) demonstrated that individuals in a positive mood pay greater attention to brand names and process them more thoroughly. Furthermore, positively inclined consumers tend to assess product value more optimistically and exhibit lower sensitivity to opportunity costs and prices ($r = -0.04$; $p = \text{n.s.}$) (Rejón-Guardia, 2024). King and Janiszewski (2011), for example, found that participants in a positive mood were more willing to pay for products, while other studies noted increased brand loyalty and impulsive buying in positive emotional states (Šeinauskienė *et al.*, 2015; Bahrainizad and Rajabi, 2018; Srivastava, 2023; Rejón-Guardia, 2024).

The motives regional origin ($r = 0.20$; $p < 0.001$) and product certification ($r = 0.22$; $p < 0.001$) are also correlated with positive mood. These attributes not only communicate safety and quality, similar to brands, but also align with the growing consumer preference for a sustainable lifestyle. In the context of sustainability, it can be hypothesized that individuals experiencing a positive mood and high well-being are more inclined to engage in environmentally friendly and socially responsible behavior (Cianci and Bierstaker, 2009). This hypothesis is supported by evidence suggesting that well-being enhances social interactions and cognitive abilities, thereby improving the capacity to process complex information and make sustainable decisions (Sacharin, 2009; Schneider *et al.*, 2021). Moreover, sustainable consumption may fulfill a "reward function," whereby adherence to social norms promotes psychological satisfaction and elevates mood (Vargas-Merino *et al.*, 2023). This perspective implies that sustainable purchase decisions are not purely rational, but also influenced by emotional and psychological factors.

3.1.2 Influence of negative mood on purchase motives (H2). Similar to positive mood, negative mood also exhibits significant correlations with design ($r = 0.24$; $p < 0.001$), brand awareness ($r = 0.13$; $p < 0.001$), convenience ($r = 0.12$; $p < 0.001$), and low price ($r = 0.09$; $p = 0.003$). These findings support H2: Negative mood can alter consumer behavior by increasing attention to security, simplicity, price, and food neophobia ($r = 0.15$; $p < 0.001$).

Emotional Decision-Making Theory explains this behavior through the need for control and reliability during negative emotional states (Ghorbani and Westermann, 2023). Familiar brands, simple preparation, and low prices function as psychological safety anchors (McKinsey and Company, 2023). The tendency to prefer short-term rewards when the mood is negative was also confirmed, with convenience taking center stage and freshness ($r = -0.24$, $p < 0.001$) taking a back seat (AlAmmar *et al.*, 2020; Bremner *et al.*, 2020). However, these motives may contradict long-term health goals (Ejtahed *et al.*, 2024). Studies also indicate that consumers become more risk-averse and frugal when in a negative mood (Zhao *et al.*, 2022; GfK GmbH, 2024). At the same time, given that humans are inherently in pursuit of happiness and that positive mood can generate feelings of happiness, individuals in a negative mood are likely to select products that promise to improve their emotional state (Crăciun, 2023).

3.1.3 Influence of food neophobia on willingness to innovate and purchase motives (H3). The analysis reveals strong correlations between food neophobia and the motive "familiar products" ($r = 0.30$; $p < 0.001$), thus supporting H3: Food neophobia is associated with a decreased willingness to try novel foods. Individuals with high levels of neophobia prefer familiar, flawless ($r = 0.13$; $p < 0.001$), brand-related ($r = 0.11$; $p < 0.001$), and low-priced ($r = 0.08$; $p = 0.008$) products.

These results suggest a strong preference for safety, standardization, and risk aversion (Nicklaus *et al.*, 2016; Çınar *et al.*, 2021; Ghorbani and Westermann, 2023; McKinsey and Company, 2023). Surprisingly, a positive correlation is also found between food neophobia and preference for convenience products ($r = 0.12$; $p < 0.001$). Although one might assume that ready-made meals would be avoided due to unclear ingredients and preparation methods, the study by Jaeger *et al.* (2022) shows an increase in the consumption of ready-to-eat or reheated foods, potentially due to reduced uncertainty in preparation. At the same time,

convenience products often possess a predictable and standardized flavor profile, which may diminish food exploration and openness to diverse taste experiences (Contini *et al.*, 2018). In addition to safety and simplicity, food neophobia also correlates with a preference for affordable products ($r = 0.08$; $p = 0.008$). Contrary to the assumption that a high need for safety increases willingness to pay for food, the findings suggest the opposite. A possible explanation is that the purchase of high-priced foods is perceived as a greater risk, posing a problem for individuals with pronounced food neophobia. Moreover, skepticism toward novel products may diminish their perceived value. Studies by the Gesellschaft für integrierte Kommunikationsforschung (2023d) show that late adopters are significantly more price-sensitive than innovators.

3.1.4 Interaction between mood and food neophobia with purchase motives (H4). The findings suggest that both mood and food neophobia moderate the effect of purchase motives on willingness to buy, as assumed in H4. Both negative mood and food neophobia are associated with an increased orientation towards safety, simplicity, and familiarity—albeit with subtle distinctions: while food neophobia is more strongly linked to familiarity and perfectionism, negative mood more strongly influences the desire for convenience and low prices.

These overlaps indicate shared psychological mechanisms, particularly regarding risk avoidance and the need for control. Differences emerge in the motives “flawless products” and “product certification,” which appear to be more influenced by food neophobia than by mood.

3.2 Market launch of innovative products – which variables of socio-demographics, mood, food neophobia, and purchase motives influence the willingness to buy broccoli leaf products?

3.2.1 The willingness to buy broccoli leaf products – based on regression analysis. Prior to conducting regression analyses to examine the relationships between willingness to purchase broccoli leaf innovations and the constructs of mood, food neophobia, and food purchase motives, an initial descriptive analysis was carried out to assess the general level of purchase intention in comparison to conventional alternatives. Mean value comparisons indicate a slight preference for broccoli leaf products ($M = 6.63$ on a scale from 0 to 10; 5 = undecided) over traditional options such as classic basil pesto or kale. However, this difference suggests only a moderate tendency and does not permit definitive conclusions regarding overall market potential.

To more accurately evaluate the potential of broccoli leaf innovations, particular attention was directed towards consumers with a high willingness to purchase—defined as scores of 9 or 10 on the scale—following the approach suggested by Reichheld (2003) and FitzGerald and FitzGerald (2019). This high-intention segment comprises between 20.8% and 32.7% of respondents, depending on the product format. Notably, broccoli leaf wraps emerged as the most promising product variant, with over 32% of participants reporting a high willingness to purchase, followed by pesto and smoothies.

Subsequently, linear regression analyses were conducted to explore the predictive relationships between the psychological variables examined and the general willingness to purchase broccoli leaf products. Due to the broad range of collected variables – including (socio)demographic characteristics, lifestyle factors, dietary styles, mood, food neophobia, and purchase motives—the regression was split into two separate models to ensure analytical clarity and statistical robustness. The resulting models are presented in Table 3.

The analysis identified four lifestyle factors influencing the willingness to purchase broccoli leaf products, explaining 8.30% of the variance (adjusted $R^2 = 0.079$). Among (socio-)demographic factors, only a *high level of education* showed a significant positive influence on willingness to buy broccoli leaf products. ($\beta = 0.092$, $p = 0.013$). This aligns with previous research linking education levels with reduced *food neophobia* ($\beta = -0.137$, $p = 0.001$) and greater openness to innovative food products (Hung *et al.*, 2016; Torri *et al.*, 2020). The lack of significant effects for age, gender, and income in this data set is possibly due

Table 3. Results of the regression analysis based on lifestyle characteristics (A) and mood, food neophobia, and purchase motives (B) to predict the willingness to buy innovative broccoli leaf products ($N = 1.114$)

	Constant	B	β	t	p
<i>A. Results of the regression analysis based on lifestyle characteristics</i>					
(Sozio)-demographic data	High education	0.221	0.092	2.478	*
Lifestyle	High sporting activities	0.285	0.150	4.094	***
	Urban residential area	0.190	0.105	2.917	**
Dietary style	Flexitarian	0.732	0.133	3.751	***
R^2	0.083				
R^2 (adj.)	0.079				
<i>B. Results of the regression analysis based on mood, food neophobia and purchase motives</i>					
Mood	Positive mood	0.027	0.084	2.866	**
Food Neophobia	High food neophobia	-0.033	-0.137	-4.559	***
Purchase motives	Familiar product	-0.322	-0.123	-4.011	***
	Certification marks	0.370	0.163	5.162	***
	Low priced	-0.151	-0.060	-2.103	*
	Gentle processing	0.398	0.153	5.020	***
	Regional cultivation	0.243	0.095	2.916	**
R^2	0.171				
R^2 (adj.)	0.165				
Note(s): *** $p < 0.001$ ** $p < 0.01$ * $p < 0.05$					

to the fact that increasing globalization and digitalization are reducing the importance of market segmentation based on traditional criteria (Halfmann, 2014; Borgstedt and Stockmann, 2018; Haselhoff, 2020; rheingold GmbH und Co. KG, 2024). The analysis further highlights the influence of *urban residence* ($\beta = 0.105$, $p = 0.004$) and *active lifestyle* ($\beta = 0.150$, $p = 0.001$) as predictors of willingness to purchase. Urban consumers' greater exposure to novel products and a broader variety of food retail options may explain this pattern (Tuorila et al., 2001; Meiselman et al., 2010; Bialek-Dratwa et al., 2024). Similarly, the significant influence of physical activity could be attributed to health-conscious behaviors, as the marketing materials emphasized the nutritional benefits of broccoli leaf products (e.g. high levels of vitamins C, K, and fiber). Dietary styles also emerged as significant predictors. *Flexitarians* ($\beta = 0.133$, $p < 0.001$) exhibited a strong positive association with willingness to purchase, corroborating prior research suggesting that individuals with flexible dietary habits often display higher levels of food innovation adoption (Gesellschaft für integrierte Kommunikationsforschung, 2023d).

The analysis of mood, food neophobia, and purchase motives identified seven key factors influencing the willingness to buy innovative broccoli leaf products, collectively explaining 17.10% of the variance (adjusted $R^2 = 0.165$). A *positive mood* emerged as a significant predictor ($\beta = 0.084$, $p = 0.004$). This finding is consistent with *Emotional Decision-Making Theory*, which posits that positive affect can increase risk tolerance and openness to novelty (Isen et al., 1988; Felser, 2015). Additionally, research suggests that individuals in a positive mood are more likely to explore and consume novel food products (Evers et al., 2018). These insights highlight the potential effectiveness of emotionally appealing marketing strategies such as storytelling, sensory design, and experience-oriented product presentation. Emotionally enriched consumption contexts can enhance positive associations and increase the willingness to try novel products like broccoli leaves.

Food neophobia showed a significant negative relationship with willingness to purchase broccoli leaf products ($\beta = -0.137$, $p = 0.001$). This aligns with prior research indicating that neophobic individuals prefer traditional food products and exhibit skepticism toward innovations (Çınar et al., 2021). *Familiar products* also showed a negative association with purchase likelihood ($\beta = -0.123$, $p = 0.001$), suggesting that broccoli leaf products appeal

more to innovative-minded consumers. This implies that marketing efforts should target *curious and exploratory consumer segments*. However, recent studies suggest that food neophobia can be mitigated through *positive reinforcement and informative communication*, thereby broadening appeal beyond early adopters to include more conservative consumer groups (Karaağaç and Bellikci-Koyu, 2022). Thus, *trust-building measures, transparent information, and emotional storytelling represent key levers* for overcoming consumer skepticism.

Among motivational factors, *regional cultivation* ($\beta = 0.095, p = 0.004$), certification marks such as organic or fair trade ($\beta = 0.163, p = 0.001$), and *gentle processing methods* ($\beta = 0.153, p = 0.001$) emerged as significant positive predictors. These motives are strongly linked to sustainable lifestyles, highlighting the importance of communicating environmental and ethical benefits in product marketing. *Low price(d)* exhibited a negative association with willingness to purchase ($\beta = -0.151, p = 0.036$). This finding corresponds with prior studies showing that innovators and early adopters are generally less influenced by price considerations (Gesellschaft für integrierte Kommunikationsforschung, 2023e).

3.2.2 Recommendations for the market introduction of innovative broccoli leaf products. The successful market launch of innovative foods made from broccoli leaves with added health and ecological value requires a differentiated understanding of psychological, emotional, and lifestyle-related influencing factors on consumer behavior. The present empirical results confirm that health and environmentally conscious target groups with a positive basic mood and low levels of neophobia in particular show a significantly increased willingness to buy such innovative products. This is in line with current research findings, according to which positive affective states – such as curiosity, joy or pride – are key drivers of acceptance (Rejón-Guardia, 2024). Against this backdrop, it seems necessary to consistently align product design, communication and sales strategies with these emotional consumer states.

Product design offers multiple entry points to combine functional and emotional elements. Packaging should be user/convenience-oriented while also using visual cues to convey naturalness, regional origin, and enjoyment. A balanced relationship between aesthetic appeal and functional user-friendliness is key to avoiding sensory overload and, at the same time, to creating confidence in handling the new product (Rejón-Guardia, 2024). In addition, the development of low-barrier product formats such as soups, sauces or snacks that enable easy integration into existing consumption routines is recommended (Aaker, 2012; Vanhonacker et al., 2013). Furthermore, credible quality signals – such as quality seals or origin information – can further strengthen trust and safety.

Product communication strategies should also focus on emotionally charging the product narrative (Vignolles and Pichon, 2014). Stories about producers, ecological responsibility or regional origin not only increase consumer identification, but also the perceived authenticity of the product (Crespo et al., 2023). Visual and linguistic design elements – e.g. natural color schemes, clear typography and pictorial language – should additionally support this emotional framework. The targeted use of social media marketing, which can convey emotional content visually, interactively and cost-effectively, is particularly suitable for small and medium-sized companies in this context – especially for younger, digitally savvy target groups.

However, the strong mood dependence of the purchase decision must also be taken into account when placing the product at the point of sale (POS). This results in a strategically relevant implication: ideally, the sales environment should already have a positive emotional atmosphere. Instead of costly staging, it is therefore advisable to be present in places where consumers are already open to new experiences – such as weekly markets, organic food stores, street food festivals, sustainable gastronomy concepts or health and environmental events. Such contexts enable an emotionally positive shopping experience, promote sensory engagement with the product and reduce cognitive barriers.

The use of sensory stimuli at the POS – such as natural music, haptically pleasant packaging materials or aromatic product displays – is also recommended to promote positive affective

states (Erenkol and Merve, 2015). In addition, accompanying entry facilitating measures, such as trial offers, time-limited price advantages or flexible return options, can further promote acceptance (Frech, 2003; Suwelack *et al.*, 2011). Last but not least, cooperation with trustworthy brands and sales partners can significantly increase visibility and credibility among relevant target groups.

3.2.3 Interpretation of the results in light of the S-O-R framework. The S-O-R model served as the theoretical framework for this study to analyze the interaction between innovative foods and psychological factors influencing consumer behavior. In this model, the novel broccoli leaf product acts as the stimulus (S), while mood, food neophobia, and purchase motives represent the organism component (O). The response (R) manifests itself in the willingness to purchase.

The empirical results confirm the relevance of this model. The broccoli leaf product served as a novel stimulus by breaking with traditional consumption patterns and thus appealing to both food neophobia and curiosity. The significant correlations between the perception of innovation and willingness to purchase show that broccoli leaves are indeed effective as an innovative stimulus. At the organism level, both mood and food neophobia were confirmed as mediating psychological states. Positive mood correlated significantly with health- and sustainability-related purchase motives and a higher willingness to innovate, indicating an expanded decision-making field when positive affect is present. This supports Hypothesis H1 and is consistent with Mood Management Theory, according to which positive emotions promote exploratory behavior. At the same time, it was found that negative mood and pronounced food neophobia were associated with safety-related motives (e.g. price, simplicity, familiarity) – which empirically supports the assumptions of Hypotheses H2 and H3. The regression results also illustrate that the response – i.e. the willingness to buy – is not determined exclusively by rational product characteristics, but rather is significantly influenced by affective states and personal dispositions. The interaction between organismic components such as mood and neophobia and motivational factors (e.g. certification marks, regional origin, and gentle processing) confirms the assumption of a mediated effect of these variables, as postulated in hypothesis H4. These internal states thus influence both the evaluation of the stimulus and the probability of a positive consumption decision.

3.3 Limitations of the study and future research potentials

The choice of correlation analysis was guided by the intention to adopt an open approach that avoids predefined hypotheses, allowing for the consideration of unexpected results. Correlation analysis facilitates the identification of underlying relationships between variables but does not allow for causal inference. A PLS model is required to establish causal relationships.

In the study, a linear regression analysis was used to investigate the factors that influence the willingness to buy innovative broccoli leaf products. This method is particularly useful in early research and product development phases as it provides clear insights into the relationships between variables and their contributions to the dependent variable (in this case, willingness to buy). It therefore helps to identify trends that can form the basis for strategy development. In contrast to a cluster analysis, however, this method does not offer the possibility of drawing conclusions about specific target group clusters.

The PANAS scale was utilized to assess mood, a key variable in the factor and regression model. It measures the two dimensions of mood and thus enables a differentiated analysis of emotional states. The advantage of the scale is its good standardization and validation, as well as its simplicity and good transferability to non-psychological contexts. However, its simplicity and adaptability may also be limitations, as it risks oversimplifying complex emotional states. In addition, its results can be distorted by short-term events and situational

influences. An uncritical interpretation can therefore lead to mood being seen as more stable than it actually is.

The FNS is a well-established instrument for measuring food-related neophobia, with high reliability demonstrated across numerous studies. However, the strict categorization into neophobic and neophilic attitudes carries the risk that nuances or differentiated attitudes are overlooked. In addition, the scale does not take into account cultural differences or individual preferences, which can also have a significant influence. These aspects should be taken into account when interpreting and applying the results in order to obtain a more comprehensive picture.

The extended FCQ has the advantage of being a validated and clear way of assessing the diversity of purchase motives. However, when analyzing the results, the influence of social desirability, which can affect the results, must always be taken into account.

Using a Likert scale to measure willingness to buy provides an efficient method for quantifying purchase intentions and comparing consumer groups. However, it should be noted that the scale only measures hypothetical purchase intentions, which can lead to a discrepancy between intention and actual behavior. Actual purchase probabilities should be assessed in simulated purchase situations or field experiments as the project progresses.

Our findings highlight the need to prioritize psychological and emotional factors in future consumer research and the strategic positioning of products. For instance, it could be explored how specific branding strategies can actively foster positive emotions and stimulate curiosity. Furthermore, additional analyses should include a detailed investigation of the conflicting results concerning dietary habits and consumption patterns to gain a more comprehensive understanding of different consumer segments. Further studies should also critically examine whether the PANAS scale truly captures consumers' current mood or whether consumer typologies can be derived from it. Although the PANAS scale was originally developed for the short-term measurement (up to 2 months) of affective states, their studies already indicated that mood is closely linked to personality (Watson *et al.*, 1988). Richins' (1997) study further supported this, demonstrating that emotions are not merely snapshots but also reflect long-term habits and preferences that can be used for consumer group segmentation. This suggests that mood measurements may capture more than just current states and could also be utilized to derive long-term consumer typologies.

In addition to these conceptual considerations, the correlation patterns found in our study suggest further hypotheses that require further empirical research. One result is the negative correlation between negative mood and taste. One possible explanation lies in the motivational orientation of emotional states: While individuals in a positive mood try to maintain their emotional state and therefore place a greater value on pleasurable sensory experiences such as taste, individuals in a negative mood may either deprioritize sensory rewards or focus more on instrumental or risk-averse criteria. This leads to the hypothesis that negative affect reduces the importance of hedonic consumption motives (e.g. taste) in favor of functional or protective considerations. Future studies should test this hypothesis using the PLS model. Furthermore, the negative correlations between food neophobia and the importance of health and taste suggest a complex interaction between emotional aversion and evaluative judgment. These results could indicate that individuals with high neophobia do not perceive health claims or unfamiliar flavor profiles as added value, but as a source of uncertainty or risk. This could support the hypothesis that high levels of food neophobia are associated with a general skepticism toward positively connoted product attributes when they are associated with novelty or the unknown. Alternatively, it can be hypothesized that consumers with food neophobia prefer familiarity so much that even health or taste benefits are disregarded when associated with new or unconventional products. These hypotheses should be further investigated experimentally, for example through product framing studies or moderated mediation models. Such studies can contribute to a more nuanced understanding of how affective and cognitive dispositions influence food evaluation and ultimately consumer behavior.

4. Conclusion

The increasing complexity of consumers' lifestyles requires a differentiated approach to product development and market entry strategies. This study explored the complex relationships between consumer mood, food neophobia, and purchase motives. The results suggest that consumers in a positive mood respond more favorably to messages that emphasize health benefits and general well-being. Conversely, consumers in a negative mood may be more receptive to communication that highlights comfort and ease. The study also emphasizes the enduring importance of brand identity and design in building emotional resonance, recognition, and consumer trust.

Based on the findings, it can be concluded that the successful introduction of innovative broccoli leaf products depends on targeted marketing strategies addressing health-conscious, innovation-oriented, environmentally aware, and emotionally attuned consumer groups. Achieving this requires moving beyond functional attributes and incorporating emotional, social, and psychological factors into product development and marketing strategies. Accordingly, future research approaches should combine advanced psychological models with empirical methods such as behavioral experiments or field simulations. This would help bridge the gap between stated intentions and actual purchase decisions and thus make predictions about the success of innovative products more accurate.

Informed consent statement

Informed consent was obtained from all subjects involved in the study.

Ethical approval

The Ethics Committee of the University of Göttingen confirms that there are no objections concerning the implementation of the project as requested.

Data availability statement

The data presented in this study are available on request from the corresponding author. The data will be made publicly to a later stage.

Supplementary material

The supplementary material for this article can be found online.

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