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GREEN FOOD PURCHASE: EXPLORING THE GAP BETWEEN INTENTION AND BEHAVIOR

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Abstract

Addressing the green attitude-behavior gap is crucial for tackling environmental challenges, particularly in the context of green food consumption. Despite growing environmental awareness, consumers often struggle to convert their intentions into actual purchasing behaviors. Bridging this gap can foster sustainable consumption patterns, improve public health, drive economic and cultural changes, and strengthen environmental protection. This doctoral dissertation thoroughly investigated the factors that facilitate or hinder the integration of environmentally sustainable dietary practices. The research has led to the development of an advertising strategy designed to help companies effectively and engagingly promote their sustainable products, thereby encouraging informed consumer choices. This dissertation comprises four studies.

Study 1 examined cognitive predictors of green food purchase intention, such as perceived environmental knowledge, trust in green claims, and low skepticism towards green advertising. The study found that trust in green claims mediated the relationship between environmental knowledge and purchase intentions. Informed consumers exhibited higher trust in credible green advertising, which positively influenced their purchasing intentions.

Study 2 explored implicit and explicit attitudes towards green food using the Implicit Association Test (IAT) and focus groups, respectively. Although the IAT did not yield significant results, regression analysis of post-IAT survey data highlighted the positive impact of perceived benefits of green food on purchasing behavior. Focus group discussions revealed various facilitators and barriers to green food consumption, emphasizing the importance of transparent eco-labeling to build consumer trust, the ambivalence between defense of the tradition and culinary innovation, and preferences regarding the vegetarian label versus descriptive language for dishes names.

Study 3 profiled green food consumers into three categories: "Coherent-Buyers," "Non-Buyers with Favorable Intentions," and "Coherent Non-Buyers." The study identified sociodemographic characteristics and emotional factors, such as pride in purchasing environmentally sustainable food, that differentiated these categories. This underscored the need for tailored marketing strategies to address the diverse motivations and barriers among consumer segments.

Study 4 tested a green food nudge strategy based on the findings of the previous three studies in a local canteen, using a similar one as a control group. Although repeated-measures ANOVAs did not show significant differences in overall sales, effect size analysis and percentage change in sales

of specific dishes suggested that the strategy was more effective for specific dish categories, indicating the potential of targeted interventions to promote sustainable eating habits.

This thesis advances the understanding of green food purchase behavior by integrating cognitive, emotional, and attitudinal factors and offering practical insights for developing effective marketing strategies. By addressing perceived benefits and barriers and ensuring transparent communication, stakeholders can better align their efforts to close the green attitude-behavior gap. This research contributes to the broader discourse on green consumerism and provides actionable recommendations for policymakers and marketers committed to fostering environmentally sustainable food consumption.

Introduction

The consequences of the global environmental crisis are becoming more and more evident and concerning nowadays. Key problems include climate change and subsequent extreme weather events, global warming, pollution, deforestation and loss of biodiversity, all exacerbated by overpopulation and unsustainable resource use. These crises stem from industrialization, urbanization, irresponsible capitalism and a historical alienation of humanity from nature, leading to ecological degradation and health risks globally (Kovalenko & Kovalenko, 2018; de Majo, 2016; Singh et al., 2020). The advent of the Industrial Revolution, coupled with the proliferation of mechanization across numerous domains and disparities in lifestyle, has led to an intensification of the exploitation of environmental resources. This has resulted in the emergence of consumption patterns that are characterized by a lack of conscious awareness, spontaneity, and regulation (Engin & Sevim, 2022). The primary causes of this critical situation include greenhouse gas emissions from fossil fuel combustion, which lead to global temperature rise and extreme weather events (Singh et al., 2020). Additionally, air and water pollution from industrial waste and urban runoff, as well as deforestation for agriculture and urban development, contribute to habitat destruction and biodiversity loss, undermining ecosystem stability (Singh et al., 2020; Kovalenko. & Kovalenko, 2018; de Majo, 2016).

The environmental crisis presents numerous emerging challenges that are often overlooked and can significantly impact social well-being and human health. Recent research underscores several concerning issues, including food insecurity, flooding, and desertification, which frequently result in climate-induced migrations. Marginalized communities are disproportionately affected, as they often lack the resources needed to adapt. This exacerbates social inequalities, leading to political instability, social unrest, health risks, and even violent conflicts (Madhanagopal & Nikku, 2023; Smith & Chiu, 2022). Recent studies suggest indeed that food insecurity due to climate change has been a driving force in political tumults in regions such as Sub-Saharan Africa (Atwoli et al., 2022). Moreover, global warming is leading to increased health risks from heat stress, mostly for outdoor workers, old and fragile people, especially in developing countries and lower-income population groups, which can result in illness or even death (Mora et al., 2017). In addition, emerging research highlights the link between air pollution and mental health issues, particularly in lower-income communities living near industrial areas. Polluted environments contribute to higher rates of depression and anxiety, further aggravating social disparities in mental

health care access (Guedes et al., 2024; Thangwiwjinda et al., 2024). As said, all this disproportionately affects disadvantaged populations, leading to an intensification of existing socioeconomic inequalities around the globe (Madhanagopal & Nikku, 2023; Smith & Chiu, 2022).

For these and other reasons, that cannot be fully addressed in the present dissertation, in the last few years sustainable transition has become a priority worldwide. The United Nations announced in 2015 the 17 "Sustainable Development Goals (SDGs)'' under the Agenda 2030 (UN, 2015) calling for more sustainable life patterns. The European Commission as well agreed on the "European Green Deal" (European Commission, 2021), a roadmap for the EU's climate agenda, based on the mounting evidence of the climate crisis, and in 2021 formally adopted the European Climate Law setting the legal objective for the Union to reach climate neutrality by 2050 (European Parliament and of the Council, 2021). An aspect that clearly emerges from these documents is that, as climate change influences all levels of society, adaptation will necessarily have to be systemic; thus, governments will have to engage in evaluating specific climate risk assessments and accelerating adaptation actions. This means that interventions on climate change should involve all parts of society and all levels of governance, from families going grocery shopping to the decisions of multinational corporations.

A solid first step would be raising people's awareness of their climate impact and of the possible related solutions they could adopt, to increase general awareness of the issue and thus public understanding. The decisions that individuals make daily have thus profound consequences, as highlighted also by the study of the European Commission's Joint Research Center (2023), according to which the main drivers of impacts of European consumption[1] are represented by food consumption, housing and mobility. In addition, the European Union is a net-importer of environmental impacts, that is the environmental impact of the production of products and services that the EU imports and are consumed in EU is higher than those caused by the products generated and consumed domestically (European Commission's Joint Research Center, 2023). Households are responsible for approximately three-quarters of global greenhouse gas emissions, with the average per capita carbon footprint generation being 6 tons of CO2 equivalent (Hertwich & Peters, 2009; Ivanova et al., 2020), which is considerably high considering that, to stay within the goals

[1] The European environmental impact of consumption accounts not only for the impacts taking place within the EU territory but also for those embedded in imports and exports.

of the Paris Agreement (which seeks to limit global warming to 1.5°C above pre-industrial levels), the average per capita emission globally should ideally be around 2-3 tons per year by 2030 (Ritchie, 2023). This suggests that systematically purchasing and using products and services which have lower environmental impacts compared to their alternatives is a driver towards impact reduction and towards sustainable economic growth.

The term “green consumption” was then introduced to indicate the attitude of customers in taking into account environmental impact considerations when buying, utilizing, and discarding items or services (H.V. Nguyen et al., 2019). Green consumers play a critical role to maintain a sustainable development over time, as green purchasing behavior is not just a personal choice but also an integral part of a wider picture of ecological and social well-being (Felicetti et al., 2024). Nevertheless, despite the growth of global interest in environmental issues and the resulting increase in sales of environmentally sustainable products (Mollah et al., 2023; Ratnoday & Rana, 2021), research has consistently demonstrated a discrepancy between individuals' stated intentions and their actual purchasing behavior (Durif et al., 2010; ElHaffar et al., 2020; Gleim & J. Lawson, 2014; Margariti et al., 2024). In fact, despite customers' professed increased environmental concern and positive attitudes towards green products, the market share of such items remains limited to a mere 7–8% of global commerce (ShabbirHusain & Varshney, 2019), which is still an improvement considering that in the 1990s and 2000s, these products accounted for a minimal market share, which often fell below 1% (Adrita & Mohiuddin, 2020). However, this is a relatively low figure when one considers that approximately 30–50% of consumers have declared to have green purchasing intentions (Yulandari, 2023), and that studies estimate that the potential market share of these products could reach between 20% and 30% of the overall market within the next two decades (Shelton, 2024). The phenomenon which highlights the discrepancy between consumers' positive environmental attitudes and their actual eco-sustainable purchasing behaviors (Fontes et al., 2021), well-documented within the scientific community, is known as the “green attitude-behavior gap” (Park & Lin, 2020), the “green intention-behavior gap” (Frank & Brock, 2018), the “motivation-behavior Gap” (Groening et al., 2018), or the "value-action gap" (Memar & Ahmed, 2012). This gap poses significant challenges for marketers and policymakers aiming to promote green consumption (Hong & Thanh, 2024; Malhotra et al., 2024). Moreover, despite many years of extensive literature on this topic, many researchers contend that this gap remains

unresolved due to inconclusive findings and a paucity of systematic research (Carrington et al., 2014; Zhuo et al., 2022).

The literature on green purchase behavior (GPB) has expanded significantly over the past two decades, reflecting a growing awareness about environmental issues. Key research themes include the determinants of GPB, the role of consumer attitudes and the influence of social and business factors, such as greenwashing (Al-Swidi & Saleh, 2021; Öztek & Çengel, 2013; S. Xu et al., 2007). The term *"*greenwashing" is used to describe the practice of companies falsely portraying their products, services, or policies as environmentally friendly in order to capitalize on the growing consumer demand for sustainable options (Guo et al., 2017; Kangun et al., 1991). Although there is a growing trend among businesses to promote themselves as environmentally conscious, the prevalence of greenwashing has undermined genuine efforts towards sustainability (Taglialatela et al., 2024). In recent years, there has been an increasing awareness of environmental issues on a global scale. This has led many companies to enhance their engagement and disclosure of their environmental initiatives to the public (Wijekoon & Sabri, 2021) to enhance their competitiveness and brand reputation and increase their revenue by meeting this increasing demand for green products (Sharma, 2024). A notable example is the scandal referred to as "dieselgate" wherein the involved company marketed its diesel cars as low-emission and environmentally friendly, despite the fact that the vehicles were emitting up to 40 times the legal limit of nitrogen oxides. The practice of greenwashing not only erodes consumer trust but has also significant environmental and social consequences, as it allows continued harmful practices to persist under the false pretense of sustainability. Such deceit can foster consumer cynicism, leading individuals to become more skeptical of environmental claims and, in turn, discouraging engagement even with genuinely sustainable products and behaviors (De Freitas Netto et al., 2020).

A key turning point in research on the topic of green purchasing is that, while earlier studies predominantly focused on green products in general (Liobikienė & Bernatonienė, 2017), there is now a growing call among scholars for investigations more targeted to specific product categories. A focus on distinct product categories may indeed facilitate a more nuanced understanding of the frequently discordant findings on this topic (Luthra & Deshwal, 2022). Motivations and factors driving purchase behavior may indeed vary across different products categories (Luthra & Deshwal, 2022). For instance, the use of energy-efficient appliances may be motivated by cost

savings (Liobikienė & Juknys, 2016), while organic food and cosmetics purchases might be driven instead by health concerns (Chen & Chang, 2012; Magnusson et al, 2001). In consideration of the recommendations put forth by the recent review on this subject by Luthra and Deshwal, (2022), we focused our research on a specific category of green products, namely eco-sustainable food (or "green food").

We selected green food item category for several reasons. First and foremost, green food products are significant due to their dual relevance to both environmental protection and human health points of view. Regarding the first point, it has been observed that food production currently accounts for about 25% of anthropogenic greenhouse gas (GHG) emissions, 70% of freshwater withdrawals, and occupies about half of the habitable land on Earth (Poore & Nemecek, 2018). The promotion of sustainable diets represents indeed a crucial strategy in mitigating the accelerating effects of climate change. Although the term "eco-sustainable diets" carries some ambiguity, there is widespread consensus that reducing the environmental impact of food production necessitates a significant decrease in the consumption of animal-based foods, particularly meat (Steinfeld & FAO, 2006). In fact, considering the EU consumption, animal-based products contribute for more than 50% to the environmental impact, while they represent only about 25% of the total amount of food consumed (European Commission's Joint Research Center, 2023). Sustainable diets have been linked not only to a reduction in greenhouse gas emissions but also to broader environmental benefits, including reductions in nitrogen and phosphorus use, cropland exploitation, and freshwater consumption (Springmann et al., 2018b). The livestock industry, for instance, occupies a staggering 33% of the world's arable land to grow feed for cattle (FAO, 2012). By reallocating this land to the cultivation of plant-based food for human consumption, global calorie availability could increase by up to 70% (Pribis et al., 2010), potentially feeding an additional four billion people (Cassidy et al., 2013). This relocation of arable land use could play a critical role in addressing the predicted shortfall in the global food supply over the next three decades (Rahut et al., 2022). These data underscore the inefficiency in current resource utilization, whereby vast quantities of food that are fit for direct human consumption are instead converted into less efficient (concerning the used resources/food energy ratio), more environmentally detrimental animal-based products (Shepon et al., 2016).

From a public health perspective, adopting sustainable dietary practices offers considerable benefits beyond environmental impact. Several studies have highlighted the positive effects of

plant-based and low-meat diets on human health. A landmark study examining mortality rates related to diet and environmental impact across 150 countries found that predominantly plant-based diets are associated with increased longevity and a reduced risk of age-related diseases (Springmann et al., 2018b). Specifically, "flexitarian" diets, which incorporate small amounts of animal products, were shown to lower chronic disease-related mortality by 19%, while vegan diets, which instead exclude all animal-derived foods, resulted in a 22% reduction (Springmann et al., 2018b). These and other findings suggest that diets rich in plant-based foods not only support environmental sustainability but also contribute to improved health outcomes, including reduced risks of cardiovascular disease, diabetes, obesity and certain cancers (King et al., 2023; Li et al., 2023; Viroli et al., 2023).

In addition to the environmental and physical health benefits, sustainable diets have also been linked to enhanced psychological well-being (Springmann et al., 2018b; Wang et al., 2020). Recent research has highlighted the psychological advantages of green food consumption, particularly in its role as a mediator between perceived consumer effectiveness (i.e. the belief that individual consumer choices can positively impact the environment) and overall psychological well-being (H.V. et al., 2019; Wang et al., 2020). When individuals feel that their consumption choices can contribute meaningfully to environmental protection, they experience positive emotions, which can foster greater engagement in pro-environmental behaviors in a virtuous circle that, in turn, leads to an increase in overall life satisfaction and well-being (Xiao & Li, 2011). This emerging connection between sustainable dietary practices and mental health further underscores the holistic value of promoting eco-sustainable diets, as they not only benefit planetary health but also enhance individual physical and emotional wellness (Marak & Parashar, 2024).

The primary objective of this doctoral research was to examine the green attitude-behavior gap within the specific context of environmentally sustainable food consumption. This research aimed to identify the main drivers and barriers that influence the purchase and consumption of green food and to draw suggestions for developing interventions that can bridge the above-mentioned gap in daily purchasing decisions. Additionally, this research contributes to the field of pro-environmental marketing by designing and field-testing an advertising strategy, based on the findings of the initial research phase, to promote green food consumption in a shared canteen.

This thesis offers several contributions to the literature on green purchase behavior. Firstly, it expands on existing findings regarding the variables that influence green purchase intention and

behavior, specifically in the context of environmentally friendly food. By focusing on such specific category, the research helps avoiding potential confounding effects that may arise from treating green products as a homogenous category (Knobloch-Westerwick & Kleinman, 2012; Luthra & Deshwal, 2022).

Secondly, one of the studies in this research investigated both explicit and implicit attitudes towards green purchase behavior. Automatic evaluations, also referred to as "implicit attitudes", can significantly influence consumer judgement and decision-making (Petty et al., 2009). This thesis represents the first attempt to apply the Implicit Association Test (IAT) to the study of attitudes towards green food. The extant literature scarcely addresses the role of implicit attitudes in green product purchase behavior (Wijekoon & Sabri, 2021). Yet, these attitudes are relevant because, unlike conscious variables, they better predict behaviors that require minimal cognitive elaboration and are more spontaneous, such as daily purchasing (Cerri et al., 2018). Moreover, integrating information on implicit attitudes with qualitative data from focus groups enriched the understanding of consumer motivations and barriers, revealing nuanced insights into green product purchase behavior that quantitative methods may overlook. This approach may provide valuable tools for improving marketing strategies and theoretical frameworks (Megha, 2024).

Thirdly, this thesis focused on profiling consumer categories, particularly non-buyers who express favorable intentions, addressing a persistent research gap identified in the literature (Haba et al., 2023). Scholars suggest that it is essential to study not only consumer characteristics but also their relationship to green purchasing behavior (Haba et al., 2023; H.V. Nguyen et al., 2019). Building upon this insight, this research aimed to segment green customers based on their purchasing intentions and behaviors, using demographic, psychographic, and behavioral characteristics.

Finally, following recommendations from other authors as well as findings of the earlier studies of this research, the last study collected actual purchase data in a field-study. This approach addressed the limitation of previous research that relied solely on self-reported measures, which often overlook actual consumer behavior (Wijekoon & Sabri, 2021).

To summarize, the present research project is organized into four studies. The first one investigated the predictors of green food purchase intention by administering an online survey to a large sample of consumers. The questionnaire focused on variables that influence people's trust in green claims, with the aim of understanding the impact of green advertising skepticism and trust

in green claims on green food purchase intention. The second study used focus groups and IAT to explore explicit and implicit attitudes towards green purchase among Italian adult consumers. The third study profiled different categories of green food consumers and analyzed the impact of key variables indicated as important in the literature, such as emotional factors, on the likelihood of belonging to each of these categories. The identified categories were: "Coherent-Buyers" who are willing to buy green food and actually buying it; "Non-Buyers with Favorable Intentions" who are willing to buy green food but not buying it, and "Coherent Non-Buyers" who are not willing to buy green food and not buying it. The fourth and last study, based on the findings of the previous ones, was made in collaboration with Ecoinnovazione Srl, a consulting firm based in Bologna and a large catering and facility services company (CAMST Group). This last research was divided into two parts. The first part developed a communication strategy based on the main drivers of green food purchase identified through the previous three studies. The second part involved field-testing the developed nudging strategy with a sample of Italian consumers.

Methods Overview

This paragraph comprises an overview of the various research methods adopted in this thesis, consisting of four studies. Two of them were already published in scientific journals (Study 1, doi:10.3390/ijerph192416757; Study 3, doi:10.3390/su16177297), while one of them consisted in two parts using a mixed method (Study 2).

Study 1 and study 3 employed a cross-sectional design, consisting of self-report questionnaires administered online. Both surveys were made of scales drawn from extant literature on the topic, adapted to the specific category of green food (e.g., by substituting "conserving energy housing appliances" with "green food"). All the scales were independently translated from English into Italian, with subsequent back-translation by two academic bilingual speakers. In both studies, participants were recruited using an exponential, non-discriminative sampling strategy. This approach leveraged the researchers' personal contacts to reach as many people as possible in a cost-effective manner.

With regard to statistical analyses, Study 1 employed a mediation model with the maximum likelihood estimation method to investigate the mediating role of trust in green claims in the relationship between green advertising skepticism and intention to buy green food and in the relationship between perceived environmental knowledge and intention to buy green food. Study 3 used a cluster analysis and subsequent logistic regression to split consumers into categories

according to their intention to buy green food and their actual buying behavior and then understand which variables influenced the probability of belonging to each of such categories.

Study 2 was composed of two parts. The first one comprises an IAT experiment (Greenwald et al., 1998) and an online post-experiment questionnaire. The IAT aimed to assess whether implicit attitudes towards green good versus traditional food existed, while the online survey aimed to collect participants' sociodemographic information and investigate their perceptions of the physical and environmental effects of green food consumption and of the principal barriers to green food purchasing. Subsequently, the IAT D score and the IAT effect score were calculated (Greenwald et al., 2002) and a linear regression analysis was performed on the online survey's variables. The second part of Study 2 employed the focus group method to investigate consumers' opinions and attitudes regarding green food purchasing and the green attitude-behavior gap. The focus groups were videotaped and transcribed and a thematic analysis (Braun & Clarke, 2006) was performed on the data to grasp and categorize the main themes emerged during the discussion groups.

Finally, Study 4 used a longitudinal field study design to test the effectiveness of a marketing strategy aimed at promoting green food options in an Italian canteen. The nudge strategy consisted of several billboards, an information video, and signs indicating the daily dishes suggested as more environmentally sustainable than others on the same menu. The content of the two-weeks advertising campaign, expressed through images and written texts, was based on the variables identified by the previous three studies as most influential on green food consumption. We monitored two canteens for a total period of a month. One represented the experimental group ("Tavolamica 1" canteen) while the other was the control group ("Tavolamica 2" canteen). After two weeks, we introduced the advertising strategy in "Tavolamica 1" canteen only, and we collected sales data in both cafeterias in order to compare the two weeks before the introduction of the intervention (t0) and two weeks after the implementation of the green food promotion campaign (t1). For reasons of the catering company's privacy, we conducted the statistical analyses based on the relative percentage data for sales of each dish. First, the nudge strategy efficacy was tested conducting some repeated-measures ANOVAs, one for each dish category (first courses, second courses, side dishes and pizzas) and menu (rotation 1 and rotation 2 menu). Then, we calculated the effect size with Cohen's d for sales variation of every specific plate category sold

in both canteens. Lastly, we calculated the sales percentage change from pre- to post- test for every dish in both canteens.

Chapter 1. The Role of Human Diet

Food production places a severe burden on the environment, significantly contributing to greenhouse gas emissions, soil erosion biodiversity loss and other pollution and resources-depletion issues (Feskens, 2023). Consequently, shifting towards more eco-sustainable diets could represent an effective climate mitigation strategy that would reduce ecological footprints, carbon emissions and preserve biodiversity and resources (Peker & Günal, 2023; Zainal et al., 2024), supporting local and sustainable production practices and preserving human health at the same time (Marak & Parashar, 2024). Sadly, there is no longer any need of imagination to realize that climate change presents a significant risk to ecosystems and human health, triggering extreme weather events, zoonotic diseases and antimicrobial resistance, with notable implications for our lifestyles (Feskens, 2023). It is estimated that over 60% of global greenhouse gas emissions and 50-80% of total resource use are linked to household food consumption (Vermeir et al., 2020). As a result, there is an increasing imperative to encourage environmentally sustainable eating habits. Over the past 50 years, the global nature and nutrient transition scale of food consumption has changed with the westernization of food consumption in population growth regions worldwide, resulting in an increased demand for meat and dairy products, empty calories and total calories (Kearney, 2010; Tilman & Clark, 2014).

Furthermore, it is widely acknowledged that unhealthy diets contribute to 11 million deaths annually, with an additional 420.000 deaths resulting from unsafe food consumption (Mallick & Choudhary, 2024). After all, we live in one, shared, ecosystem: alterations in the natural environment inevitably have repercussions for humans, and vice versa. For example, the increase in greenhouse gases and warming of the earth leads to a reduction in harvests, an increase in plant diseases, and post-harvest losses due to spoilage in already marginalized areas, with a possible reduction the intrinsic nutrient density of crops (Feskens, 2023). In light of these considerations, the 2021 United Nations Food Systems Summit (UNFSS) underscored the urgency of adopting diets that are both healthy and derived from sustainable food systems, a message that was conveyed across a range of discourses, social movements, and national pathways (United Nations, 2021). As defined by the United Nations' Food and Agriculture Organization, a “sustainable diet” is one that has a minimal environmental impact and contributes to food and nutrition security, as well as to the health of both current and future generations (Lindgren et al., 2018).

Sustainable diets are characterized by a number of key attributes, including protection and respect for biodiversity and ecosystems, cultural acceptability, accessibility, economic fairness and affordability, nutritional adequacy, safety and health, and optimization of natural and human resources (Szabo & Webster, 2021). In order to maintain sustainable nutrition, it is of the utmost importance to exercise careful utilization of all resources worldwide and strive to minimize harm to the environment (FAO, 2019). Globally, approximately one-third of the edible portions of food produced for human consumption are lost or wasted, amounting to 1.3 billion tons annually (Cederberg & Sonesson, 2011). Food is wasted at each stage of the food supply chain, from the initial agricultural production to the final stage of domestic consumption (Mallick & Choudhary, 2024). The issue of food loss and waste (FLW) represents a significant challenge to the sustainability of our food systems, as it results in the inefficient utilization of valuable resources, including water, land, energy, labor, and capital (Cederberg & Sonesson, 2011). The disposal of this waste in landfills results in the emission of additional greenhouse gases, thereby exacerbating climate change. It is estimated that FLW contribute between 8 and 10% of global greenhouse gas emissions, which in turn leads to climate instability and extreme weather events (United Nations, 2020). Such disruptions have an adverse impact on crop yields, nutritional quality and the efficiency of supply chains (Mallick & Choudhary, 2024).

As already mentioned, the environmental impact of animal-based food sources is greater than that of plant-based food sources, it is therefore recommended to limit one's consumption of such foods in favor of plant-based alternatives in order to establish a sustainable diet pattern (Willett et al., 2019). Meat production alone accounts for approximately 14.5% of total global greenhouse gas emissions (Food and Agriculture Organization of the United Nations, 2013), making it one of the largest contributors to environmental degradation. In general, even the lowest-impact meat and dairy foods have a higher environmental impacts than the highest-impact plant-based foods (Poore & Nemecek, 2018). Beyond meat, reducing the intake of other animal products, such as fish, eggs and dairy, can significantly decrease an individual's carbon footprint by as much as 22%, which surpasses the environmental benefits of most other household actions (Lacroix, 2018).

As with other dietary approaches, sustainable nutrition is characterized by a variety of models. Examples of such models are plentiful and include, in addition to those already mentioned (i.e. the flexitarian diet), vegan and vegetarian diet, the Mediterranean diet with the Double

Pyramid model, the New Nordic diet and the Planetary Health diet (Ricci & Banterle, 2020). The well-known Mediterranean Diet emphasizes the consumption of agricultural products, including fresh or dried vegetables and fruits, legumes, olive oil, moderate consumption of fish, dairy products, tea, whole grains, and an assortment of herbs and spices (Benedetti et al., 2016). Its mainly plant-based composition guarantees a low water footprint and contributes to a reduction in carbon emissions and ecological impacts certifying it as a sustainable nutrition model (Aboussaleh et al., 2017). In 2009, the Italy Barilla Food and Nutrition Foundation introduced the Double Pyramid model, an innovative approach to the Mediterranean diet. This model incorporates an inverted pyramid, which assesses the ecological consequences of food choices (Olgun et al., 2022). While the original pyramid offers dietary recommendations in line with Mediterranean traditions, the supplementary pyramid classifies foods according to their detrimental environmental impact, taking into account their ecological footprint (Kadioğlu & Sökülmez Kaya, 2022). As depicted in Figure 1, the upper quadrant of the pyramid represents foods that should be consumed with caution due to their considerable environmental impact, including red meat, cheese, fish, and sugary products. In contrast, the lower level of the pyramid encompasses foods that are recommended for more frequent consumption, as they have a relatively lower environmental impact (Olgun et al., 2022). Interestingly, the foods that have the greatest impact on the environment are also the most deleterious to human health (Springmann et al., 2018b).

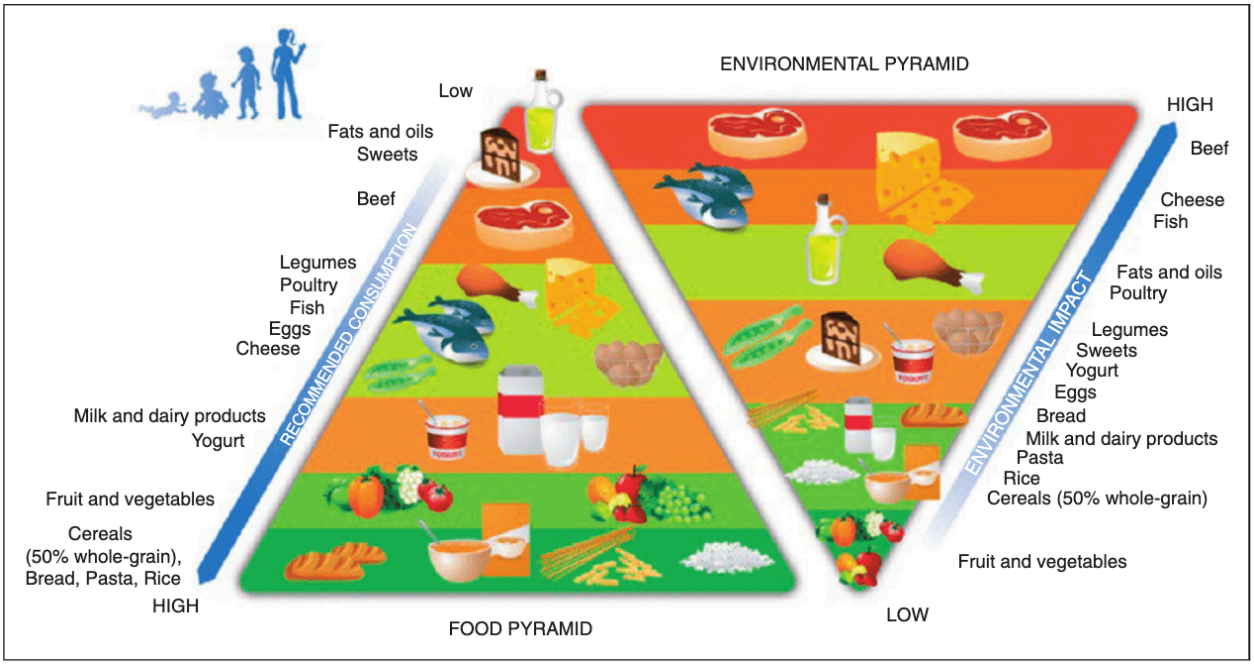


Figure 1. The Double Pyramid (Barilla Center for Food and Nutrition, 2013)

The New Nordic diet model is a response to the need to recognize that societies extend beyond the Mediterranean region. It acknowledges the necessity for a distinct dietary model in Scandinavian countries, where unsustainable and unhealthy eating habits have become prevalent (Mithril et al., 2013). The New Nordic diet incorporates elements of Scandinavian culinary culture while considering the environmental and health impacts of food choices. It encourages the consumption of locally produced foods at regional levels, including legumes, rye, oats, vegetables, fruits, a wide variety of local herbs, mushrooms, fish, and oily seeds. Furthermore, it emphasizes the avoidance of processed foods, packaged meals, and sugar-sweetened products (Saxe, 2014).

Vegetarian and vegan dietary models are based on the exclusive or predominant consumption of plant-based foods. These diets are classified according to the inclusion or exclusion of animal-derived foods. In a vegetarian diet meat and fish are excluded, while in a vegan diet, all animal-derived products are eliminated from the eating plan (Olgun et al., 2022). Compared to other sustainable dietary models, the vegan diet exhibits the most significant reductions in land use and greenhouse gas emissions (Kadioğlu & Sökülmez Kaya, 2022; Springmann et al., 2018b).

The Planetary Health diet, which was first proposed by the EAT-Lancet Commission in 2019, was developed following a meeting on nutrition-related issues that was attended by

representatives from 16 countries and 37 experts (Willett et al., 2019). The principal aims of this initiative are to ensure the global population has access to adequate nourishment, to prevent the extinction of species and to safeguard natural resources. The diet places equal emphasis on the consumption of fruits and vegetables, unsaturated plant oils, whole grains, plant-based protein sources, limited dairy and meat products, and starchy vegetables (Willett et al., 2019).

Despite their disparate nomenclature and etiologies, these dietary models exhibit a commonality that underscores their environmental benefits. The foundation of these models is a concentration on plant-based foods, encompassing vegetables, fruits, whole grains, legumes, and nuts (Peker & Günal, 2023). By limiting or excluding the consumption of resource-intensive animal products, particularly red meat, these diet models collectively contribute to a reduction in greenhouse gas emissions, land use, and water consumption (Willett et al., 2019). However, it remains challenging to precisely quantify the environmental impacts of each diet due to various contextual factors. For example, a Vegan diet comprising high amounts of avocados, and other tropical fruits that travel across the world and highly processed foods may have a larger environmental impact than expected (Dixon et al., 2023). The promotion of healthy food from sustainable agriculture, in fact, inevitably involves a certain degree of trade-off, given the complex interplay between health, environmental sustainability, and socio-economic factors (Balié, 2020). To take one example, the reduction of food loss would inevitably result in an increase in the cost of food. This would have a number of consequences for consumers and for those engaged in the production and distribution of food, who may become uncompetitive (Balié, 2020). A significant challenge associated with the pursuit of healthy diets from sustainable food systems is indeed the resulting increase in costs, as a result of the increased demand for nutrient-rich foods. Even the cheapest healthy diet is, on average, 60% more expensive than diets that merely satisfy the nutritional requirements for essential nutrients (Herrero et al., 2023). For instance, the EAT-Lancet diet would be unaffordable for an estimated 1.5 billion people (Hirvonen et al., 2020), costing approximately twice as much as a diet that only meets the nutrient requirements and five times more than diets that meet just the dietary energy needs through carbohydrates like potatoes, bread, rice and other cereals (FAO, 2020).

In conclusion, a transition towards sustainable consumption patterns is essential to align global societal and environmental goals and ensure the sustainable and equitable prosperity of humanity in the coming years (Herrero et al., 2023). However, a significant range of constraints

currently impede this transition. It is therefore evident that the role of science and innovation will be pivotal in the deployment of these interventions at scale and at low cost, as well as in the minimization of potential trade-offs. The present thesis will contribute to this field of enquiry by expanding the elaboration on behavior change interventions regarding eco-sustainable food.

1.1. What is green food?

The term "green food" is defined as food that is protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically and nutritionally valuable, and produced in a manner that optimizes natural and human resources (Szabo & Webster, 2021). Additionally, green food is defined as a product with characteristics or production methods that result in less environmental impact throughout its entire life cycle, from production to disposal, in comparison to other products within the same category (Gil, 2000). This latter definition was identified as the most appropriate based on the findings by Durif and colleagues (2010), who conducted a comprehensive analysis and comparison of 35 definitions drawn from academic, industrial, and consumer literature. Nevertheless, the precise definition of green food is a complex matter, given the numerous factors that must be taken into account considering foodstuff lifecycle, including greenhouse gas emissions, the use of cropland, the consumption of freshwater, the pollution associated with fertilizers and many more (Springmann et al., 2018a). The topic also is not without terminological and ontological confusion. The majority of existing studies on green attitudes and behaviors focus on pro-environmentalism and organic food consumption, rather than green food per se (Qi et al., 2020).

The term "organic food" is used to describe foodstuff produced through the practice of organic farming. This production system makes use of natural manure and seeks to minimize the use of synthetic fertilizers, pesticides and chemicals (Gil, 2000). Although it has been proposed that the results of organic food can be employed for comparison and reference with respect to green food (Yu et al., 2014), it is important to note that the adjectives "organic" and "green" describe two distinct concepts and should not be used interchangeably. Similarly, the terms "green" and "sustainable" are frequently used interchangeably, despite a lack of consensus on this matter in the literature (Goswami, 2024). For this reason, in this thesis, we will only adopt the term “eco-sustainable”, as a synonym to “green”. It is acknowledged that the misuse of terminology may also impede the progression of research (Fischer et al., 2021). In order to avoid this, clear definitions of the terms "organic food" and "green food" have been provided above. The present research

project focuses on green food, defined in a manner that distinguishes it from organic food. To this end, Study 1 and 2 questionnaires' items were adapted from extant literature, with the term "organic food" substituted for "green food" after providing a clear definition of the latter, based on Durif and colleagues' definition (2010), at the beginning of every questionnaire. Specifically, this modification was implemented to ensure clarity and consistency throughout the research. Specifically, in Study 1, which focuses on trust in green claims and skepticism towards green advertisements, it was important to ensure that respondents comprehended that the subject of the questionnaire pertained to the ecological attributes of food. Thus, the term "organic" might have been confusing, as it is more commonly associated with health benefits than ecological benefits (Rizzo et al., 2020). Moreover, organic foods are not always eco-sustainable as well (Galgano et al., 2016), and we wanted to circumscribe our research to the ecological facet of the topic. The same procedure of substituting the original term "organic food" with "green food" was made with Study 2 items, as the aim was to profile the consumers who demonstrate a higher level of attentiveness to this particular aspect.

As aforementioned, in this thesis we chose to focus on one particular green item category, in order to follow the literature suggestions that encouraged specificity in such a research field. The reasons why we selected green food over other products are several. First of all, unlike other products, such as energy-saving household appliances, sustainable diets can promote individuals' health in addition to minimizing environmental impact (Hayashi, 2023). Moreover, since we are operating in the field of psychology, it is notable that food valence is much more impactful at a psychological level compared to other items, as it involves the survival, emotional and reward system (Chang et al., 2022). In fact, food directly engages the brain's reward system, particularly areas like the nucleus accumbens and the orbitofrontal cortex, which are sensitive to signals of caloric content and pleasure. This can trigger powerful responses linked to survival and gratification, often involving the release of dopamine, a key neurotransmitter in the reward system (Tellez et al., 2013). The consumption of food also interacts with stress and emotional states. This is evidenced for example by studies which have demonstrated that individuals who are prone to emotional eating exhibit different patterns of brain activation when anticipating food rewards compared to individuals who are not prone to emotional eating. These patterns suggest that the intake of food, especially in response to emotions, activates specific brain pathways that are less involved with non-food items (Kringelbach, 2015). Eating is not merely a physiological necessity

but is imbued with emotional and cultural significance. The act of eating is often associated with social and emotional experiences, such as traditional celebrations and family gatherings, which contribute to its psychological impact (Forgács & Németh, 2007). Although the psychological salience of food makes it an interesting and intriguing topic, it is evident that these same features make it challenging to alter established eating habits. Such behaviors are in fact rooted in established habits formed through repeated experiences (Catellani & Carfora, 2023). Moreover, people often eat similarly to those around them, particularly in social settings. Social norms around food can subtly encourage individuals to consume a certain amount of food, or specific types of food, depending on what is accepted within a group (Higgs, 2015). This tendency to align with others' choices can create resistance to dietary changes, especially if healthier choices are seen as deviating from the norm in a particular social circle (Stok et al., 2014). These are the reasons that led us to choose this particular item category, as we believe that psychological science can contribute effectively to the matter.

As mentioned before, sustainable food products are designed to minimize environmental impact throughout their lifecycle, from production to disposal (Gil, 2000). This can occur in several different ways. Key characteristics often include eco-friendly production methods, such as organic farming and regenerative agriculture, which reduce the reliance on synthetic inputs and enhance biodiversity (Saikia & Laishram, 2023). Additionally, the distinguishing feature of sustainable foods may be prioritizing resource efficiency, focusing on reducing water usage, energy consumption, and greenhouse gas emissions (Godfray & Garnett, 2014). For example, Clune and colleagues (2017), in a systematic literature review, collected greenhouse gas emissions data for various food categories derived from life cycle assessment studies. Their findings indicate that grains, fruits, and vegetables have the lowest environmental impact per serving, while meat from ruminants has the highest effects per serving. Other studies (Davis et al., 2016) have evaluated the environmental impact of water usage. In general, the findings of the studies reviewed here indicate again that plant-based foods have a lower environmental impact per unit of weight, per serving, per unit of energy, or per protein weight than animal source foods across a range of environmental indicators. Seafood is a separate case because its environmental effects are highly variable, with notable differences between wild-caught and farmed fish and shellfish, as well as within specific categories (e.g., farmed salmon versus farmed freshwater fish such as carp, and farmed shrimp versus farmed mussels). In particular, the fishing phase is the most energy-costly

aspect of industry, while aquaculture's primary environmental concern is feed production, which frequently relies on fish meals and oil derived from capture fisheries. Additionally, the use of airfreight as a transportation method can exacerbate climate impacts (Ziegler, 2010).

The environmental effects of foods can be quantified using a variety of units, including per kcal, per g protein, or per serving, depending on the nutritional contribution of each food (Willett et al., 2019). However, the use of a unique indicator to measure environmental impact can be misleading for certain foods. For instance, vegetables contain few calories per serving, making it inaccurate to measure their environmental impact using kcal. From a per serving perspective, their environmental effects are relatively low, yet from a kcal perspective, some vegetables appear to have a high environmental footprint (Willett et al., 2019). From a logistic perspective, sustainable foods typically emphasize local and seasonal sourcing to decrease transportation emissions and support local economies (Köse, 2024). The consumption of local and seasonal foods has the potential to reduce the necessity for long-distance transportation, which in turn could lead to a reduction in the carbon emissions associated with food miles (Herrera, 2020). Moreover, the cultivation of seasonal foods does not necessitate the use of artificial heating or lighting, thereby conserving energy and reducing the environmental impact of food production (Vargas et al., 2021).

Finally, these products are often packaged in biodegradable or recyclable materials to minimize waste. The pervasive use of non-biodegradable materials in packaging has intensified concerns about environmental pollution. Globally, the packaging industry, particularly within the food sector, makes extensive use of paper, glass and plastics, collectively accounting for over two-thirds of material consumption (Ncube et al., 2020). The exponential growth in the use of plastic by the packaging industry has become a significant contributor to the alarming rate of plastic waste entering the environment. It is therefore imperative to adopt environmentally friendly packaging solutions, which can be broadly categorized into three main types: reusable packaging, such as glass, which can be cleaned and used multiple times; paper, which can be reprocessed and reused; and biodegradable packaging, such as cotton sacks, which break down harmlessly in the environment (Ncube et al., 2020).

In light of the aforementioned considerations regarding terminology and the distinctive characteristics that differentiate eco-friendly food, it is now pertinent to examine the ways in which consumers can effectively identify such products during their purchasing activities. Indeed, in the absence of awareness regarding the previously mentioned facts about the environmental impact of

various foods, consumers are compelled to rely on eco-labels to ascertain whether a food product is eco-sustainable. Recently, there have been a number of calls from high-income countries to introduce environmental footprint labels on food products (Lemken et al., 2021). Such labels would provide information about the environmental impact of products, for example, greenhouse gas emissions presented in a quantitative format (e.g. high, medium, low) or a categorical format (e.g. traffic light colors, green-better, red-worse). That information may be displayed separately or combined into an overall score, and may include the carbon footprint, land use, water use, and eutrophication caused by food production. Environmental footprint labels are therefore a subset of eco labels, which include certification schemes that are already commonly used by retailers in many different countries (Garnett, 2023). Although examples of such schemes are already being adopted (e.g. organic/Bio, Rainforest Alliance, and the Marine Stewardship Council) (Ecolabel Index, 2022), significant data gaps remain, and many technical challenges persists. Previous attempts by some British retailers to introduce carbon footprint labels were abandoned in 2012 due to the expense, level of work and lack of engagement by other retailers (Vaughan, 2012), but in recent years, the technical feasibility of introducing environmental footprint labels to food has increased, particularly following the publication of the agricultural impact database from Poore and Nemecek (2018) and the development of algorithms to estimate the impacts of multi-ingredient foods (Clark et al., 2022).

Despite the considerable interest in the introduction of environmental footprint labels and the technical aspects of their implementation, there has been a lack of critical academic evaluation of the potential impact of such labelling on the environmental performance of the food system (Garnett, 2023). This might be due to the myriad of eco-friendly labels currently in existence (the Ecolabel Index alone currently contains 456 of them), coupled with the absence of a unified international consensus on the most appropriate one to adopt (Hay et al., 2024). Recently, preliminary efforts have been made towards the development of "meta sustainability" labels, which are designed to integrate diverse sustainability dimensions into a unified label. The objective of this initiative is to reduce the number of labels on a product and to assist consumers in making more sustainable consumption choices (Dendler, 2014; Torma & Thøgersen, 2021). However, they are still in the early stages of development and lack a robust evidence base (Torma & Thøgersen, 2021). Indeed, eco-sustainable labels can address a multitude of dimensions, including social (e.g., fair-trade labels), ethical (e.g., animal welfare labels), health (e.g., nutritional labels) and

environmental friendliness (e.g., organic or carbon footprint labels) (Asioli et al., 2020; Bangsa & Schlegelmilch, 2020). As stated in "The Green Marketing Manifesto" (Grant, 2009), in fact, the term "green" encompasses not only ecological or eco-friendly concerns, but also ethical considerations. In essence, the Manifesto argues that contemporary market relations ought not be exclusively driven by the pursuit of profit but rather should prioritize the creation of value for society at large. The growing number of labels that are simultaneously present forces consumers to make decisions between different sustainability dimensions, which often involve intra-sustainable trade-offs (for example, an organic label placed alongside a product with poor nutritional value or a high climate impact) (Sonntag et al., 2023). The presence of multiple labels on a single product may result in consumers being overwhelmed by the amount of information they are presented with, which could potentially lead to confusion or a loss of trust in the quality of the product (Kaczorowska et al., 2019; Lemken et al., 2021; Macready et al., 2020).

The concept of greenwashing

As already mentioned, another important problem regarding green food purchase is greenwashing. Greenwashing refers to the practice where companies make misleading claims about the environmental benefits of their products to appear more eco-friendly than they actually are (Guo et al., 2017; Kangun et al., 1991). This deceptive marketing strategy can undermine consumer trust leading to skepticism and a violation of psychological contracts, which in turn negatively affects their intention to purchase green products (Kim & Lee, 2024). This skepticism arises when consumers perceive a gap between a company's claims and its actual environmental practices. The phenomenon is prevalent in the food industry, where companies exploit consumers' growing interest in sustainability and health to enhance their brand image without making any substantial environmental improvements (Zanasi et al., 2017). This not only creates disadvantages for consumers, who are required to pay for a non-existent service, but also introduces distortions into the competitive arena. There is a tendency for unscrupulous companies to exploit the advantages they gain in terms of higher prices or volumes sold without bearing the costs that would otherwise be associated with pursuing sustainable and responsible strategies effectively. This can impede the dissemination of sustainable and responsible production practices, both by eroding the reputation of the concept of a green economy and by creating obstacles for companies actually seeking to implement genuine sustainable or "green" policies (Samriddha & Manickam, 2024). Tools and indicators have been developed to help consumers and other stakeholders in the food system

identify greenwashing in the agrifood sector. These tools assess the accuracy and relevance of sustainability claims made by companies, ensuring that their marketing strategies are transparent and truthful (Zanasi et al., 2017). For instance, a case study on Barilla demonstrated the effectiveness of such tools in evaluating the company's sustainability reports and identifying potential greenwashing practices (Zanasi et al., 2017). Moreover, Greenpeace (2016) has established four criteria for the detection of greenwashing.

1. “Dirty Business”: The promotion of eco-friendly initiatives while the core operations remain polluting or unsustainable. This may take the form of investing heavily in unsustainable practices despite the implementation of minor green projects.
2. “Ad Bluster”: This refers to the practice of using advertising to overstate an organization’s environmental achievements. This is often accompanied by a disproportionate expenditure on promotion compared to the actual environmental initiative.
3. “Political Spin”: This is the public commitment to environmental goals, which is not reflected in the organization's actions behind the scenes, particularly in relation to environmental legislation.
4. “It's the Law, Stupid!”: This refers to the practice of claiming environmental achievements that are simply compliance with existing laws. This is achieved by framing required actions as voluntary.

The first study of this thesis aimed to investigate the relation between green advertising skepticism, trust in green claims, environmental knowledge and green food purchase intentions, analyzing some protective and risk factors related to greenwashing regarding green food purchasing.

Chapter 2. Theoretical Framework

The objective of this chapter is to present the theoretical frameworks that form the basis of this doctoral project. The theoretical models that will be discussed in this thesis are drawn from two distinct academic fields: marketing science and behavioral psychology. This is due to the highly applicative nature of the subject matter. According to a recent meta-analysis on the determinants that influence green product purchase intention and behavior (Sharma et al., 2023), the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 2002; Fishbein & Ajzen, 1977) and the Theory of Planned Behavior (TPB) (Ajzen, 1985) are the theories most frequently used by researchers to explain green purchase intention and green purchase behavior. The theory of reasoned action (TRA) was developed in the field of social psychology and considers attitude as a predictor of behavior (Ajzen & Fishbein, 2002). TRA sees individuals as rational subjects who make systematic use of the information available to them to decide whether to adopt a particular behavior. According to this theory, numerous variables play a role in the thought-action relationship. These are *intentions*, which are the cognitive representation of adopting a behavior; *attitudes* towards the behavior, which refer to beliefs about the consequences that the behavior may lead to; and *subjective norms*, that refer to both normative beliefs (i.e., what is considered socially acceptable) and to the person's motivation to adhere to them. Hence salient beliefs, formed by attitudes and subjective norms about a specific action, influence intention and subsequent behavior (Madden et al., 1992). Fishbein and Ajzen (Fishbein & Ajzen, 1977) identify three boundary conditions that can influence the strength of the relationship between intentions and behavior. These are: (a) the extent to which the intention and the behavior align in terms of specificity, (b) the stability of intentions between the time of measurement and the performance of the behavior, and (c) the degree to which the individual is able to exercise voluntary control over the implementation of the behavior. The Theory of Reasoned Action is depicted in Figure 2.

In social psychology, TRA has been extendedly studied (Malhotra & McCort, 2001). Various authors have tested and validated Fishbein and Ajzen's model in different settings, including health behaviors, voting, organic food consumption, alcohol use etc. (Netemeyer & Bearden, 1992; Sharma et al., 2023). The TRA model has been demonstrated to offer excellent predictive utility, particularly in the context of marketing and consumer behavior (Choo et al., 2004; Wijekoon & Sabri, 2021). More specifically, TRA has been utilized to predict intentions in green marketing contexts, such as studying energy conservation, recycling behaviors and green

purchase behaviors (Sharma et al., 2023). For instance, Park and Ha (2014), used TRA to explain individuals' intentions to engage in eco-friendly products purchasing. The study found that, in addition to intentions, both attitudes toward eco-friendly products and subjective norms significantly influenced consumers' intentions to buy these products, thereby supporting the validity of TRA. The theory has also been successfully applied in the field of green food purchase behavior. For example, a recent study confirmed the applicability of reasoned action theory in analyzing consumer behavior regarding green food in Algeria, demonstrating that attitudes towards green products significantly influenced purchase intentions. Moreover, the authors found that both green marketing and personal factors significantly influenced purchasing behavior through the mediating variables attitude and intention suggesting that, even if TRA is a fair starting point, more recent and more comprehensive psychological theory should be applied in the future studies (Troudi & Bouyoucef, 2020).

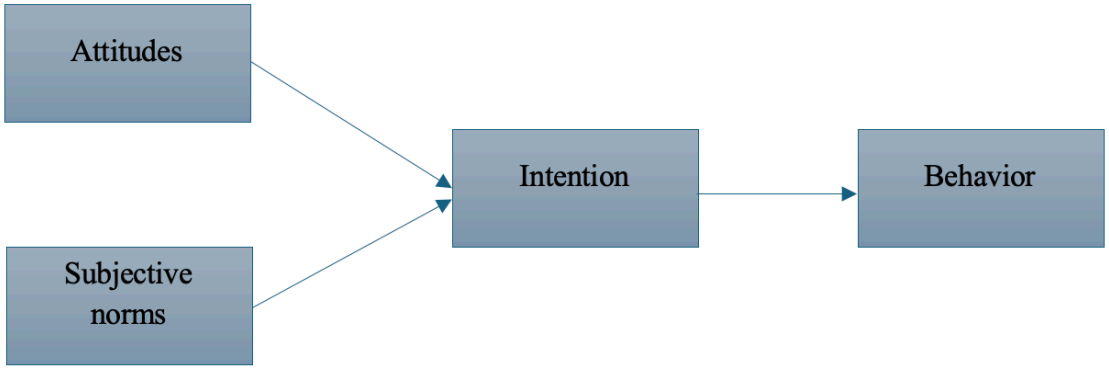


Figure 2. Path model for the Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975).

In fact, one of the principal constraints of TRA is that, on the assumption that behaviors are preceded by conscious thought, it excludes all irrational, automatic and contextual behaviors of which individuals are not aware, such as routine grocery shopping or repetitive brand choices (Verplanken & Orbell, 2003). To illustrate, some consumers may hold a favorable view of green products, yet lack the knowledge or product accessibility to purchase them (Paul et al., 2016). In situations where consumers' actions are limited by variables other than their intentions, the control factor provides valuable insight into the obstacles perceived by consumers, thereby enhancing the theory's predictive capacity (Armitage & Conner, 1999). Hence, to address the limitations of TRA,

Ajzen expanded this framework proposing the Theory of Planned Behavior (TPB), that incorporates perceived behavioral control (PBC) in the model, that is an individual's perception of one's ability to perform a behavior. It encompasses both internal factors, such as skills and self-efficacy, and external factors, like resources and obstacles that may hinder action (Kiriakidis, 2017). This extension permits the examination of the influence of personal determinants and social surroundings as well as non-volitional determinants on behavioral intention (Han et al., 2010). This theoretic extension acknowledge thus the fundamental fact that not all behaviors are under complete volitional control (Rizzo & Columna, 2020).

The following sections of this chapter depict the application of TPB in the green purchase behavior and green attitude-behavior gap literature, a possible extension of the TPB framework, and an integrated model that goes beyond the TPB in order to better address the multiplicity of possible scenarios that may arise during the purchasing process when also considering the role of automatic and unconscious mechanisms.

2.1 The theory of planned behavior and the extended TPB

The Theory of Planned Behavior (TPB, Figure 3) has been widely applied in the study of green purchase behavior to explain the gap between consumers' positive attitudes towards sustainability and their actual purchasing decisions (Sharma et al., 2023). According to TPB, an individual's behavior is driven by four key factors: attitude towards the behavior, subjective norms, intention to perform the action and perceived behavioral control (Ajzen, 1991). As aforementioned, perceived behavioral control was incorporated into TPB to extend the boundaries of TRA (Ajzen & Fishbein, 2002). Let's now have a closer look at these variables. The term "Attitude" is defined as the degree to which an individual holds a favorable or unfavorable evaluation of a given behavior (Ajzen, 1991). Additionally, attitude incorporates an assessment of whether the behavior in question is perceived as positive or negative, whether the actor desires to engage in the action, and an understanding of the potential consequences associated with it (Leonard et al., 2004; Ramayah et al., 2010).

The term "subjective norm" is defined as the perceived social pressure to perform or not to perform a certain behavior (Ajzen, 1991). In defining such, the influence of others who are close or important to the person, such as close friends, relatives, and colleagues is of great importance (Park, 2000). In other words, when people perceive that their significant others endorse a particular behavior, they are more likely to adopt that same behavior themselves.

The “intention” variable is defined as an individual's motivation or conscious plan to engage in a specific behavior (Ajzen, 1991). It is predicted by attitudes, subjective norms and perceived behavioral control and it’s considered the most immediate antecedent of behavior, reflecting the level of effort that individuals are willing to exert or intend to apply in order to perform the behavior in question (Fishbein & Ajzen, 2011). An individual will develop a positive intention towards a given behavior only if they hold a positive attitude towards it (Mostafa, 2006; Taylor & Todd, 1997). A number of studies have demonstrated that intention is the fundamental construct of the TPB model and is also the most effective means of interpreting human behavior (Daskalakis & Yue, 2017). The first study of this thesis is indeed dedicated to investigating green food purchase intention predictors in the context of greenwashing related variables.

Finally, “perceived behavioral control”, as postulated by Ajzen (1991), refers to the perceived ease or difficulty of performing a given behavior. It is influenced by past experiences and anticipated obstacles. Contrary to Bandura’s (Bandura, 1977) concept of “self-efficacy”, that is the individual judgement of his capability of performing a certain action considering internal control factors, perceived behavioral control emphasizes external and general factors (Armitage & Conner, 1999). The influence of Perceived Behavioral Control (PBC) on the intention-behavior link is expected to be neutral if the behavior in question is fully volitional. Conversely, if the behavior is not fully under volitional control, PBC is expected to moderate the relationship between intention and behavior (Armitage & Conner, 2001). TPB thus enhances the capacity to predict consumer purchasing behavior for green products in a more complex range of situations (Jebarajakirthy & Lobo, 2014).

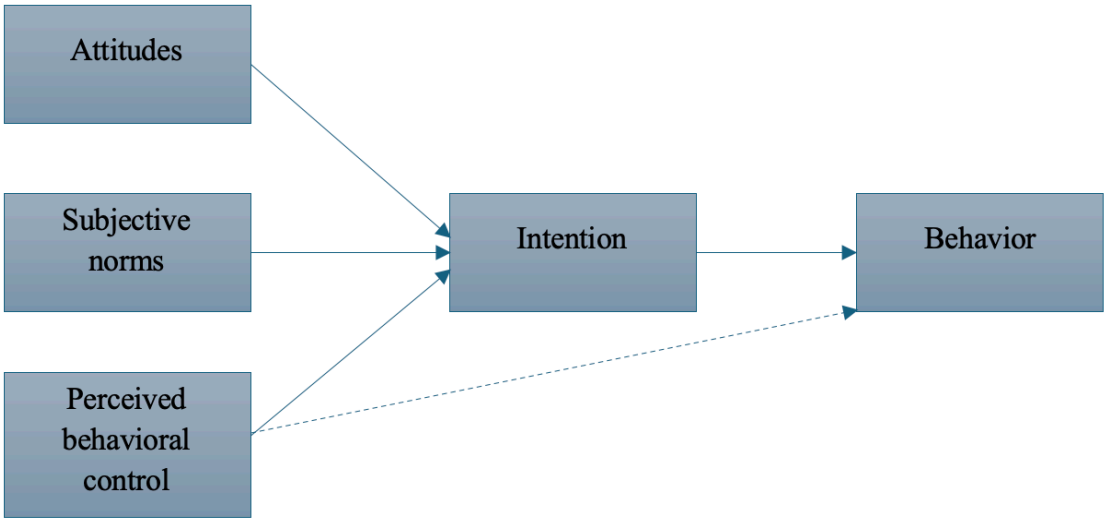


Figure 3. Path model for the Theory of Planned Behavior (Ajzen, 1991)

As a conceptual framework (represented in Figure 3), TPB has been successfully applied to investigate several topics related to environmental-friendly behaviors, such as organic food choice (Dean et al., 2012; Paul & Rana, 2012), recycling behaviors (Davis et al., 2009; Martinho et al., 2015), green purchase intentions (Chen & Tung, 2014; de Sio et al., 2022) and pro-environmental behavior (Taglialatela et al., 2024). In the context of food, the TPB has been employed extensively to elucidate the role of motivational factors in determining food choices, including those related to organic and sustainable foods. In the specific field of green food purchase behavior, a recent meta-analytic research based on 42 previous empirical studies of the TPB model applied to sustainable food consumption concluded that the Theory of Planned Behavior is a robust framework for understanding the factors influencing this behavior (Shen et al., 2022). The study highlighted the significant positive correlations between attitude (ATT), subjective norms (SN), and perceived behavioral control (PBC) with the purchase intention (PI) of sustainable food. The study also demonstrates that the correlation between purchase intention and behavior is more pronounced than the one between ATT, SN, PBC, and PB. This suggests that PI is the most influential predictor of PB. However, it also underlines the issue of the intention-behavior gap, which posits that even the most powerful intention may not necessarily translate into corresponding behavior (Sniehotta et al., 2005).

Although the model proposed by Ajzen (1991) has been extensively validated, numerous researchers (Kumar & Mohan, 2021; Paul et al., 2016; Shukla, 2019) have identified the need to incorporate additional variables to more comprehensively understand consumer intentions to purchase green products. Nevertheless, in many cases the TPB framework doesn't seem to be sufficient to explain green purchase behavior. In fact, as aforementioned, studies show that while many consumers express favorable attitudes and intention to buy eco-friendly products, actual purchasing often falls short to reflect this will (Paul et al., 2016). This can happen for many reasons, for instance, the perceived behavioral control factor plays a crucial role in predicting whether people will translate intentions into actions basing on many purchase facilitators and barriers that consumers may perceive (Paul et al., 2016). The attitude-behavior gap remains a significant challenge, highlighting the influence of other complex factors beyond the TPB framework that play a role in the purchase process interacting with each other. To address this, as said, researchers have suggested integrating additional constructs into an extended TPB to better capture the complexity of green purchasing decisions (Liobikienė & Poškus, 2019). These additional constructs often refer to facilitators, such as trust in green claims, environmental knowledge and environmental concern (Kamalanon et al., 2022) and barriers, such as higher costs, green advertising skepticism, limited product availability or perceived inefficacy of individual actions (Yadav & Pathak, 2017).

2.2 The "Two Pathways" models

As aforementioned, extant literature provides only limited insight into the role of unconscious processes in the development of green purchase intention (Wijekoon & Sabri, 2021). Nevertheless, these attitudes are significant because, in contrast to conscious variables, they enhance the prediction of behaviors that necessitate minimal cognitive processing and are more spontaneous, such as routine purchasing (Verplanken & Orbell, 2003). Several studies on ethical purchasing have found indeed that only 30% of the variance in behavior can be attributed to intention and perceived behavioral control (Rivis et al., 2009; Webb & Sheeran, 2006). While purchase intention represents a crucial preliminary step in the process of sustainable purchasing, in many cases it is not a guarantee of actual purchasing behavior (de Sio et al., 2024; Dul, 2016). This discrepancy may be attributed to an error in measurement of purchasing behavior. Liu et al. (2017) conducted a review of the literature related to sustainable consumption, concluding that in these studies, the

intention and the behavior may have been assumed to be the same or, if not, that the correlation between the two was very high. This assumption may therefore have significant implications. If intention and behavior are closely related, it is challenging to account for the discrepancy between consumers' positive attitudes towards environmental conservation and green consumption and their actual buying behavior, which does not align with their stated intentions (Peattie, 2010; Young et al., 2010). One potential explanation for this phenomenon is that the majority of empirical studies on eco-friendly purchasing have relied on customers' self-reported attitudes and practices, rather than actual customer behaviors (Wijekoon & Sabri, 2021). The process of self-reporting has been shown to give rise to several potential issues, including the exaggeration of perceived benefits, the selection of answers that align with socially desirable norms, and the tendency to present oneself in a particular way that does not match reality (Schwarz, 1999). As measuring actual customer behavior can be challenging, it has been suggested that items investigating past consumer behavior should be included in questionnaires (Shen et al., 2022). To overcome this limitation, taking a leaf out of previous literature's suggestions, in the third study of this PhD project we asked participants how many green food items they bought last week, while in the last study we measured actual customer behavior in a field study design to acquire a true picture of how customers behave in reality. Moreover, in Study 2, we went beyond extant literature limitations of using exclusively self-report questionnaires utilizing also reactions time measures (in the IAT) and qualitative data from focus groups.

Hence, the discrepancy between purchase intention and behavior in relation to sustainability represents a significant challenge for researchers, necessitating a shift in focus beyond the conventional theory of planned behavior (Ajzen, 1991), which remains the dominant paradigm in consumer purchase behavior literature. In this regard, Danner and Thøgersen (Danner & Thøgersen, 2022) have proposed two potential pathways through which green purchase decision-making occurs (Figure 4). In the first one, as postulated by the TPB, the consumer makes a conscious decision about the purchase of a product when enough motivation, ability, and opportunity are present. In the second pathway, when the three aforementioned factors are lacking, the purchase action will be guided by an automatically activated attitude, as postulated by Fazio in the MODE model (1990) and by Kahneman's dual-system theory of thought (Kahneman, 2013). It is assumed that an automatic response is always activated first (Kahneman, 2013). By "automatically activated attitude" we refer to the fact that attitudes are stored in the long-term

memory as object-evaluation associations, influenced by past beliefs, experiences, and behaviors (Fazio, 2007). These attitudes, if sufficiently accessible, can be automatically triggered upon encountering an external or internal cue that can prime this knowledge, making it more accessible (Janiszewski & Wyer, 2014). Repeated priming of an attitude makes it more accessible and likely to influence behavior (Berger & Mitchell, 1989), so it's not surprising how habits play a fundamental role in shaping purchase behavior. It is therefore reasonable to posit that all consumers encounter both pathways put forth by Danner and Thøgersen (2022) when making green food purchases, based on their external and internal circumstances. A path that il characterized by fast, automatic, and intuitive thinking (Kahneman's System 1), and one that involves slow, deliberate, and analytical reasoning (Kahneman's System 2) (Kahneman, 2013). The present thesis concentrated on both factors that can facilitate green food purchase behavior along the more consciously controlled pathway, studying intention's antecedents (Study 1) and consumer's qualitative responses (Study 2) and along the unconscious pathway, studying implicit attitudes (Study 2).

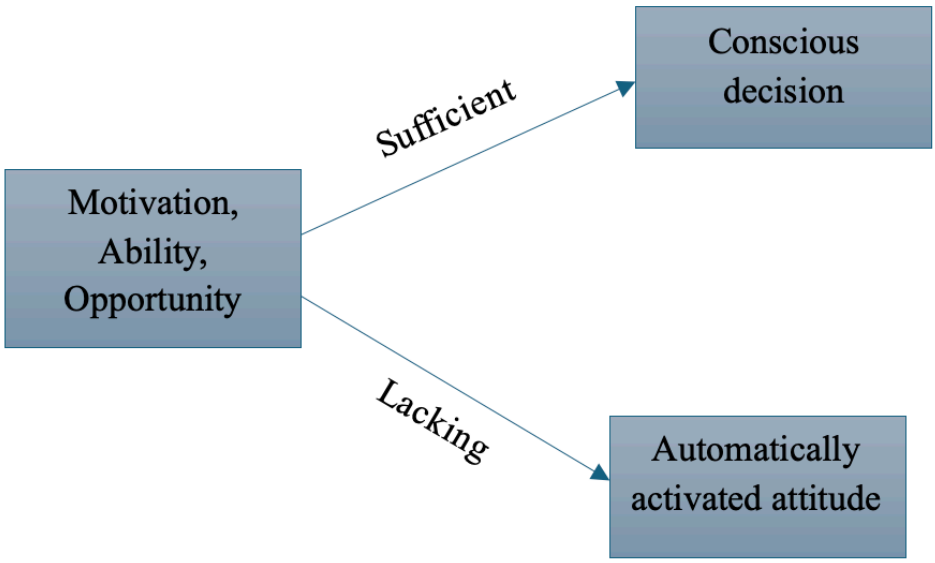


Figure 4. Integrated Behavioral Model (Danner & Thøgersen, 2022)

Chapter 3. Encouraging Green Food Purchasing Behavior

While the benefits of a more sustainable diet for society have been highlighted, the question of how governments, firms, marketing agencies, and policy makers can effectively encourage sustainable consumer behavior remains unanswered (Carrington et al., 2010) due to the absence of conclusive findings and the scarcity of systematic research (Van Doorn & Verhoef, 2015) including, as we noted previously, the lack of evaluation of reported behavior instead of an objective assessment of actual purchases (Bishop & Barber, 2015).

3.1 Consumers Profiling

Profiling green consumers, recognizing that different subgroups within the population respond differently to various inputs, has been identified as a good starting point to design more effective strategies that aim to close the green attitude-behavior gap (Haba et al., 2023). This involves studying the diverse consumer segments that may vary on many variables, such as personality traits, altruistic attitudes, environmental commitment, and social influences, that might influence their level of commitment to environmentally friendly products (Oliva et al., 2024). This profiling is crucial for businesses and policymakers to tailor their strategies effectively (Pathange et al., 2024).

In recent decades, bibliometric analyses have explored the topic of green consumerism. One persistent research gap identified by these studies is the lack of profiling of non-buyers who express favorable intentions (Haba et al., 2023). Extant research focuses almost exclusively on two distinct groups: regular green products buyers and convinced non-buyers (Hughner et al., 2007). However, this approach ignores the fact that neither group is responsible for the observed green attitude-behavior gap. In fact, those who already regularly purchase organic products demonstrate a consistent pattern of purchasing behavior, while convinced nonbuyers are unlikely to change their mind in the future, in absence of any green purchase intention. The customer segment responsible for the green attitude-behavior gap is then that of the “Non-Buyers with Favorable Intentions” (NBFI) (Frank & Brock, 2018), or “occasional buyers” (Aschemann-Witzel & Niebuhr Aagaard, 2014), or “switchers” (Henryks et al., 2014), who indicate a serious interest in purchasing organic groceries but do not act in accordance with their intentions. To date, few specific quantitative research on barriers to organic buying with the focus on NBFI has been conducted, apart from a handful of studies (Aschemann-Witzel & Niebuhr Aagaard, 2014; Frank & Brock,

2018; Henryks et al., 2014). A study in the Indian context identified three distinct consumer groups based on their environmental concern, perceived environmental knowledge, and green purchasing behavior (Jaiswal et al., 2020): “Keen Greens,” “Moderate Greens”, and “Reluctant Greens”. The study highlights that attitudes towards eco-friendly practices vary among these groups, emphasizing the need for tailored marketing strategies to effectively promote green consumerism.

Nevertheless, it seems probable that NBFI may not perceive the traditional barriers to green purchase behavior that have been frequently identified in the literature (Szmigin et al., 2009). These barriers such as price (e.g., value for money) (Padel & Foster, 2005), availability (Tarkiainen & Sundqvist, 2009), quality (e.g., taste and appearance) (Loebnitz et al., 2015), situational factors (e.g., promotion and role conflicts) (Van Doorn & Verhoef, 2015), as well as information-related factors such as lack of knowledge, lack of trust, and certificate variety (Gruber et al., 2014; Padel & Foster, 2005), have frequently been the subject of research interest. It seems indeed that the most effective way to encourage more environmentally friendly purchasing behaviors is to bridge the essential purchase barriers while accounting for consumer segments with different needs and preferences. To address this gap, some authors proposed that future research should focus on identifying distinct green consumer segments based on demographic, psychographic, and behavioral characteristics (Haba et al., 2023). To this end, it is essential to acknowledge the necessity of examining not only consumer characteristics but also their relationship to green purchasing behavior. However, the majority of studies on this topic have primarily focused on examining the characteristics associated with purchase intention. Such an approach would be inadequate for the purpose of understanding and intervening in the green attitude-behavior gap (H. V. Nguyen et al., 2019).

Building upon insight from the existing literature, the objective of the third study of this research project was to segment green food customers based on their purchasing intentions and behaviors, focusing especially on the NBFI group and on the specific product category of green food. This involved investigating factors such as purchase-related emotions, motives to buy green food and sociodemographic characteristics, addressing the necessity to study consumers in a wider way, emphasizing the role that these products play in relation to various psychological and personal dimensions of consumers (Castellini et al., 2020). By understanding the unique characteristics, motivations, and barriers for different profiles, researchers can better interpret the

diverse factors that influence sustainable purchasing. Profiling allows for the development of targeted strategies and interventions that are tailored specifically to each group's needs, enhancing the effectiveness of marketing and policy efforts aimed at promoting green behaviors (Joshi & Rahman, 2015). Additionally, profiling contributes to a more nuanced understanding of the gap between intention and behavior in green purchasing, revealing insights into how attitudes, social norms, and situational factors play distinct roles across different consumer segments (Frank & Brock, 2018).

3.2 Nudging green choices

It is of paramount importance to engage consumers in environmentally friendly practices, as the small, everyday choices and decisions that consumers make provide a crucial opportunity to address climate change (Calculli et al., 2021). As food choice is largely a personal matter, the utilization of techniques that facilitate rational and value-congruent decision-making at the individual level is of considerable importance in guiding collective behavior in a more sustainable direction (IPCC, 2022). Given that consumers' decisions may deviate from their original values or be influenced by other factors, there is a potential for the application of behavioral techniques to encourage more sustainable consumption patterns (Wensing et al., 2020).

Nudging strategies, which are based on the principles of behavioral economics, seek to exert subtle influence on decision-making processes without imposing restrictions on the range of choices available. The objective is to guide individuals towards behaviors that are perceived as beneficial or desirable, such as green consumerism (Thaler & Sunstein, 2008). The term "nudge", first popularized by Thaler and Sunstein (2008), is used to describe a variety of techniques that are designed to influence human behavior in a particular and predictable way. These techniques can be observed in several different contexts, from default settings on printers to reduce paper consumption, to text messages sent to remind individuals of scheduled medical appointments. The purpose of these techniques is to make the lives of individuals simpler, safer or easier (Sunstein, 2014). These strategies function by structuring the decision environment, utilizing prompts, reminders and framing techniques to enhance the appeal or visibility of specific options, thereby aligning individual behaviors with socially desirable outcomes.

In the context of consumerism, the use of nudging has been widely documented as a means of promoting healthier, more sustainable, and prosocial choices without the use of overt coercion or significant financial incentives (Benartzi et al., 2017). In the context of green consumerism,

nudges are employed with the specific objective of promoting sustainable purchasing decisions and environmentally friendly habits (Berger et al., 2022). For example, the use of visual cues on the shelves of supermarkets that label or position eco-friendly products in a more prominent position encourages consumers to select sustainable options over conventional ones (Van Der Linden, 2015). These nudges exploit behavioral biases, such as the inclination to conform to social norms or respond to convenience, which can contribute to bridge the gap between pro-environmental intentions and behavior (White et al., 2019). By promoting sustainable purchasing behaviors in a non-intrusive manner, nudging offers an effective tool to engage consumers in green consumerism, subtly aligning individual choices with ecological sustainability (Sunstein, 2013).

The existing body of scholarly evidence on the impact of nudges in the green food environment remains limited (Kwasny et al., 2022). In a systematic review, Blackford (2021) identified 14 studies examining the impact of nudges on sustainable food choices in real-life settings. The nudges under examination encompassed alterations to the configuration of the options presented, modifications to the portion sizes, the introduction of distinct sustainability labels or information regarding alternative sustainability options, in addition to changes to the default product. The studies resulted in a disparate set of findings. For instance, Kwasny et al. (2022) concentrated on interventions designed to reduce meat consumption, encompassing both actual and intended choices. The authors present the findings of three studies that investigated the impact of social norm nudges, which provide information on the behavior of other individuals. These nudges were found to be effective in reducing meat consumption, both in intended and real choices. In contrast, the results by Gottselig et al. (2023) showed that consumers in one of the treatment groups, after being exposed to green nudges (consisting in displaying nature pictures or providing information on other people's behavior before the consumer made a choice) were willing to pay more for meat rather than the alternative, indicating that nudges can also have an opposite effect from that intended. Nevertheless, the authors of the systematic review above-mentioned (Blackford, 2021) states that nudging interventions have the potential to influence sustainable food consumption (SFC) behaviors in a meaningful and positive way, offering a cost-effective and non-obtrusive method to alter consumer food-related habits through modifying the choice architecture that consumers interact with on a day-to-day basis, thus guiding their behaviors in desired directions (Torma et al., 2018).

The World Bank and the EU have provided support for research aimed at further examining the potential of nudging (Mai, 2022). Policymakers can employ nudges to facilitate the design, implementation and evaluation of appropriate policy instruments, with the aim of devising effective policies that enhance sustainable behavior and counteract the negative impact of other actors who encourage environmentally harmful behaviors (Lehner et al., 2016; Marteau, 2017). However, the efficacy of nudging has been controversial, with critics citing a lack of empirical evidence, the difficulty in translating theory into practice, and ethical concerns, including paternalism and reduced human autonomy (Kasperbauer, 2017; Mai, 2022).

The last research of the present thesis consists in a field study in a non-corporate canteen in the Emilia-Romagna area that tested a nudging strategy based upon the results from the previous three studies within this research project, with the objective of promoting the selection of eco-friendly food products.

Chapter 4. Study 1: Green Trust as a Mediator in the Relationship between Green Advertising Skepticism, Environmental Knowledge, and Intention to Buy Green Food

Abstract

Changing individual habits towards greener choices is an essential ingredient in tackling the environmental crisis. Engaging in green behavior may improve psychological wellbeing. Although the intention to buy green products is widespread, the eco-friendly market is struggling to leave the ground. Greenwashing can increase skepticism towards green advertising, which in turn can hinder the intention to buy green products. Conversely, a better knowledge of environmental issues can promote a positive attitude towards the environment and thus the intention to purchase green products. This study aimed to investigate if trust in green claims can mediate the relationships of green advertising skepticism and environmental knowledge with the intention to buy green food. An online survey was administered to 410 Italian consumers (63% female; 18–78 years). Our mediation model explained 23% of the variability in intention. Trust fully mediated the relationship between green advertising skepticism and intention to buy green food, while it partially mediated the relationship between perceived environmental knowledge and intention. Specifically, GAS was associated with lower INT through lower TR, whereas PEK was linked to higher INT though higher TR. The findings of this study can provide green market operators and policy makers with valuable information to encourage green food purchases.

4.1 Introduction

Decades of industrial human activity, characterized by an unsustainable consumption pattern, the use of non-renewable energy, and short-sighted capitalism, has led to an unprecedented situation of environmental degradation. Climate change, air pollution, mass migrations, deforestation, and biodiversity loss are only a few of the problems that this process has caused. The ecologic transition has recently become a priority worldwide, although occidental countries have been well aware of the problem since the 1970s (Matthes, 2019). This situation poses a serious threat to the environment, human health, and society at large. Therefore, environmental interventions should involve every segment of the population, from government decisions to firms' policies and individual consumer choices. Kates (2000) pointed out that overpopulation and extreme

consumerism are the two major drivers of the present environmental and ecological situation. A recent study reported that consumer household purchases were responsible alone for 40% of environmental damage (Joshi & Rahman, 2015). Thus, the unplanned purchasing of goods can cause serious damage to the environment. Increasing the use of eco-friendly products could then be a possible solution to hinder this impact and stimulate more sustainable economic growth. Moreover, at the individual level, engaging in green behavior and perceiving consumer effectiveness, as the belief in one's contribution to the environment preservation, may improve psychological wellbeing (Wang et al., 2020b). In a recent study, respondents to a self-administered survey declared that the consumption of organic food positively affected their subjective wellbeing and led to a better physical state, more positive emotions, and better social life (Ismael & Ploeger, 2020). Hence, adopting behaviors that have a lower environmental impact could benefit individuals' health as well as the planet's.

Green utilization implies that customers consider the ecological impact of buying, utilizing, and discarding items or services (Moisander, 2007). Such attitudes are in line with the objectives of the Green Deal (European Commission, Directorate General for Communication, 2021), which focus on developing an ecological awareness to guide consumers' choices. The theoretical framework most largely used to investigate factors that may influence consumers' intention and behavior is based on the theory of planned behavior and the theory of reasoned action (Ajzen, 1991). Such theories consider individuals as rational subjects who make systematic use of the available information to decide whether to adopt a certain behavior. In these theoretical models, intentions, which are cognitive representations of behavior adoption, are critical to the thought-action relationship. Therefore, assessing the antecedents of the intention to buy green products can be crucial to spread specific eco-friendly behavior.

In the last decades, consumers have started to show more and more concern and responsibility for the environment (Huang & Rust, 2011; Sharma et al., 2023), and there is an ever-growing market for green and environmentally friendly products, ranging from conserving household appliances and green electric vehicles to green cosmetics (Segev et al., 2016). Nevertheless, despite customers declaring to have environmental concern and positive attitudes towards green products, the market share of these items remains limited to just 7–8% of global commerce (Transparency Market Research, 2021). This phenomenon, whereby a highly positive attitude towards green purchase behavior is not followed by actual actions, is called "the green

attitude-behavior gap" (Park & Lin, 2020; Qi et al., 2020). Although there is a vast literature on the subject, many researchers argue that this gap is still unexplained due to inconclusive results and a lack of systematic research (Carrington et al., 2014).

Furthermore, a recent review on green purchase behavior (Luthra & Deshwal, 2022) underpinned that in existing literature the focus is pointed mainly on green products in general, and not on specific product categories. Yet, the factors influencing purchasing intentions differ by product category, which is why the authors suggested keeping this in mind for future research (Luthra & Deshwal, 2022). Focusing on specific product categories could shed light on the often-disagreeing results on the topic, for example Nguyen et al.'s (Nguyen et al., 2017) and Sharma and Foropon's (2019) discord on the effect of perceived behavioral control on green purchase intention. Hence, following the suggestion of the above-mentioned review by Luthra and Deshwal (2022), we focused our study on a specific category of green products, green food. Green food is defined as food that is protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically and nutritionally valuable, and made by optimizing natural and human resources (Szabo & Webster, 2021). Green food is also defined as a product with characteristics or production methods that cause less damage to the environment throughout its entire life cycle (from production to discarding) compared to other products of the same category (Durif et al., 2010). The majority of the existing studies on green attitude and behavior consider the fields of pro-environmental manner and organic food consumption, more than green food (Qi et al., 2020). Organic food refers to food produced through organic farming, a production system that uses natural manure and avoids synthetic fertilizers, pesticides, and chemicals as much as possible (Gil, 2000). Although it has been suggested that the results of organic food can be used for comparison and reference with regards to green food (Yu et al., 2014), the adjectives "organic" and "food" describe two different concepts and shall not be used as interchangeably. We acknowledge that a misuse of the terminology is another factor that might hamper the research progression, and for this reason we have provided clear definitions of "organic food" and "green food". An obstacle to research progression could be indeed the lack of a common terminology regarding sustainable food. The words "green" and "sustainable" as well are often used interchangeably (Huang & Rust, 2011) even though there is no agreement on that in the literature. In this paper we focused specifically on green food based on a definition that distinguishes it from organic food.

Green Advertising and Greenwashing

Environmental advertising or green advertising can be defined as a message that tries to influence consumers' cognitions, attitudes, and behaviors by promoting green features in the product's whole lifespan, from production to distribution and disposal or recycling [1]. Such features can include actual characteristics of the product or stages of the production process itself that may reduce environmental damage. In recent years, the rise of environmental concerns around the world has pushed many companies to improve their engagement and present their environmental efforts to the public (Peng & Berry, 2019; Wijekoon & Sabri, 2021). Unfortunately, in some cases, green marketing claims do not reflect companies' actual environmental conduct, exaggerate their efforts, omit their real environmental footprint, or make vague or false statements (Garfield, 1991; Guo et al., 2017). This phenomenon is called greenwashing (Kangun et al., 1991). Estimates on the diffusion of the greenwashing phenomenon seem to be discordant and unstable over time. An analysis of magazines at the beginning of the 1990s found that 58% of all green advertisements contained at least one misleading claim (Szabo & Webster, 2021). Subsequent studies found, on the contrary, that most green claims in magazines were truthful (Segev et al., 2016) and that misleading forms of green advertising were declining over time (Leonidou et al., 2011). However, a more recent study highlights that reports of greenwashing have increased worldwide since "dieselgate" (Yang et al., 2020) in September 2015, when the Volkswagen group was revealed to have falsified the emissions data of its cars, suggesting that the greenwashing phenomenon is still very subtle and diffused (Pizzetti et al., 2021; Siano et al., 2017).

Green Advertising Skepticism and Trust in Green Claims

Since advertising is the main source of information on product characteristics, skepticism towards it can hinder the frequency of buying green products even among people concerned about the environment (Chang, 2011). Previous research confirmed that consumers' skepticism about green adverts was negatively related to their attitude towards green products (Chang, 2011; Fowler & Close, 2012). The theory of reasoned action considers attitudes (i.e., the set of beliefs about the consequences of an action), together with subjective norms and perceived behavioral control, as predictors of intention, which in turn predicts behavior (Ajzen & Fishbein, 2002). Hence, if consumers become suspicious of green claims, their attitude towards green products will get worse, and subsequent purchasing intention and behavior will become more unlikely. Green advertising skepticism is theorized as the negative cognitive component of consumers' attitude toward green

products consisting of the tendency not to believe the environmental information given by advertising (Manuel et al., 2014; Mohr et al., 1998). Previous studies found that skepticism negatively influences purchase intentions by questioning the reliability, functionality, and truthfulness of green product claims (Mostafa, 2006; Moutinho et al., 2011). On the contrary, trust in green claims is defined as consumers' willingness to rely on an object grounded on its credibility, benevolence, and environmental performance (Chen, 2010). Trust is related to a more positive attitude toward green products (Lee et al., 2011), so if consumers trust environmental claims about products, this will positively influence their purchase intention towards them (Chen & Chang, 2012). Green trust has been theorized as a mediator between other constructs within the study of customers' green purchase intention and behavior (e.g., between green brand image and green brand equity) (Amin & Tarun, 2021). However, it has not been studied yet as a mediator between green advertising skepticism and intention to buy green food. Therefore, for the current study, the following hypothesis was proposed.

Hypothesis 1 (H1). *Trust in green claims mediates the relationship between green advertising skepticism and intention to buy green food*.

Environmental Knowledge

When customers are conscious of the environmental impact of items and build up a more informed attitude toward ecological protection, their awareness will affect their buying choices and may direct them to purchase green items (Barr & Gilg, 2006). Perceived environmental knowledge refers to an individual's perceived knowledge about definitions, causes, and effects of environmental problems and about actions that would be necessary to address them (Tanner & Wölfing Kast, 2003). It involves collecting information about specific or general aspects of environmental phenomena (Patel et al., 2017) and being aware of the collective responsibilities necessary for green development (Mostafa, 2007). It has been suggested that more knowledge about environmental issues may promote positive attitudes toward the topic (Chan, 2001; Mostafa, 2007; Tanner & Wölfing Kast, 2003) and consequently green consumption intention and behavior (Johnstone & Tan, 2015; Patwary et al., 2022; Peattie, 2010). A recent study (Sultana et al., 2022) reported a significant positive relationship between both perceived green knowledge and green trust and customers' intention to visit green hotels. Furthermore, green trust mediated the relationship of customers' green knowledge with green visit intentions. Identifying the mediating role of green trust on the influential factors of customers' green hotel visit intention has the merit

of assisting the hotel business administrators to identify some of the underlying factors for choosing green hotels and to adopt business operations accordingly. We expected to replicate this finding shifting the focus from the intention to visit green hotels to the intention to buy green food. Therefore, the following hypothesis was proposed.

Hypothesis 2 (H2). *Trust in green claims mediates the relationship between perceived environmental knowledge and intention to buy green food*.

The Present Study

This study proposed a mediation model, as shown in Figure 1. To summarize, trust in green claims is argued to have mediating effects on the relationship between green advertising skepticism and intention to buy green food as well as in the relationship between perceived environmental knowledge and intention to buy green food. Furthermore, we assumed that gender could be a confounding variable related to two or more variables in the mediation model, partially explaining the relations between them, and thus it should be adjusted for in the mediation analysis. Previous studies have indeed found gender differences regarding environmental issues. For example, among fast food consumers, females were found to express a wish for green menus in terms of environmental impact more than males (Lassen et al., 2016). Among university students, women were found to be more concerned than men about green consumption (Gorni et al., 2012).

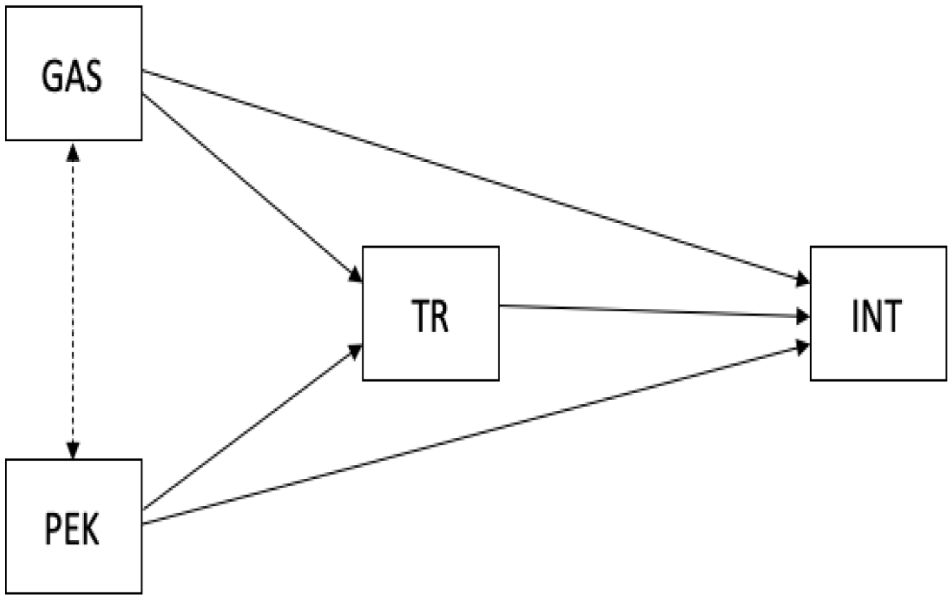


Figure 1. Conceptual framework of the study. GAS = green advertising skepticism; PEK = perceived environmental knowledge; TR = trust in green claims; INT = intention to by green products.

4.2 Materials and Methods

Participants and Procedure

This study adopted a cross-sectional design. We recruited participants using an exponential, non-discriminative snowball sampling strategy through the researchers' personal contacts in order to reach as many people as possible in a cost-effective way, following other authors' example and suggestions (Sexton et al., 2011; Thomson, 2014; Young, 2015). The people contacted through emails and private messages were sent a link to an anonymous online survey, asked to fill in the questionnaire and to invite their friends or acquaintances to do the same. Inclusion criteria to participate in the study were being 18 years or older and having, at least occasionally, the opportunity to purchase food. The survey was conducted from April to July 2022. A minimum sample size of 400 participants was defined a priori to reach enough power (0.80) to detect a mediated effect assuming small-to-medium-sized paths (Fritz & MacKinnon, 2007).

Measures

The survey included a demographic section (i.e., gender, age, education level, occupation, and household monthly income), an explanation of what "green food" stands for (Appendix A) and measures of the study variables. Regarding the constructs of the variables chosen, green advertising skepticism (GAS) was defined as the consumers' tendency not to believe the claims made in green advertising and package labels (Mohr et al., 1998). Perceived environmental knowledge (PEK) was intended as how well-informed people thought they were about environmental issues and related necessary actions (e.g., production, packaging, symbols, recycling) (Patel et al., 2017). Trust in green claims (TR) was intended as belief in eco-friendly companies and sellers' honesty about the declaration of eco-friendliness of their products (Luhmann, 2017). Intention to buy green food (INT) was defined as a prior, conscious decision to perform a certain behavior, in this case, purchasing green food (Sinnott-Armstrong & Nadel, 2010).

To measure the constructs of interest, scales were taken from previous studies and mostly used as originally created, following Haws and colleagues' advice (Haws et al., 2023) for

deployment of scales in consumer research. Criteria for selecting the scales included connection to focal constructs, psychometric soundness (e.g., acceptable/good reliability), and a short length, to produce higher response and completion rates (Kost & Correa Da Rosa, 2018). We adopted the four-item scale (total score 4–20; $\alpha = 0.79$) developed by Mohr, Eroglu, and Ellen (Mohr et al., 1998) to measure GAS. The six-item perceived knowledge scale (Mostafa, 2007) (total score 5–25; $\alpha = 0.86$) was used to measure PEK. The four-item scale (total score 4–20; $\alpha = 0.94$) developed by Voon, Ngui, and Agrawak (Voon et al., 2011) was used to measure TR. Finally, the three-item intention scale (total score 5–15) developed by Soyez (Soyez, 2012) was used to measure INT. Table 1 shows construct, reference, and items content for each scale. The questionnaire in its original version (Italian) and in its English translation is reported as well in the thesis' Appendix.

Table 1. Measurement instruments.

Study variable	Items
Green Advertising Skepticism (GAS) (Mohr et al., 1998)	1. Most environmental claims made on package labels or in advertising are true. (R) 2. Because green claims are exaggerated, consumers would be better off if such claims in advertising were eliminated. 3. Most environmental claims on package labels or in advertising are intended to mislead rather than to inform consumers. 4. I do not believe most environmental claims made on package labels or in advertising.
Perceived Environmental Knowledge (PEK) (Mostafa, 2007)	1. I prefer to buy products and packages that are environmentally safe. 2. I know less about recycling than the average person. (R) 3. I know how to select products and packages that reduce the amount of waste ending up in landfills. 4. I understand the environmental phrases on product packages. 5. I understand the environmental symbols on product packages. 6. I am very knowledgeable about environmental issues.

Trust in Green Claims (TR) (Voon et al., 2011)	1. I trust that those selling or producing bio-based adhesives are honest about the bio-based nature of their products. 2. I trust that eco-friendly companies comply with environmental standards. 3. I trust eco-certification and eco-labels. 4. I trust the information on eco-labels. 5. I trust that those selling or producing bio-based adhesives are honest about the bio-based nature of their products.
Intention to Buy Green Food (INT) (Soyez, 2012)	1. If I buy groceries next time, I will also buy organic food. 2. In the future I am going to buy organic food. 3. I intend to buy organic food next time. 4. I intend to recycle my recyclables in the next four weeks. 5. I will recycle my recyclables regularly.

Note. (R*) denotes reverse scored item.

In the scales to measure TR and INT items were slightly modified by replacing "organic food" with "green food". All items were rated using a 5-point scale (from 1 = "I completely disagree" to 5 = "I completely agree"). Scales were independently translated from English into Italian and then backtranslated by two academic bilingual speakers. Validity and reliability were assessed in this study sample as well as potential common method bias (Podsakoff et al., 2003).

Ethical Considerations

This study conducted a survey that involves human beings with the approval of the Ethical Research Committee of the University of Bologna (protocol number 0090636, 29 April 2022) according to ethical standards. Consumers voluntarily participated in the study and provided their consent by clicking on a button placed at the beginning of the online survey, right after an informed consent statement that described the study objective. This study ensured the anonymity, privacy, and security of the respondents.

Data Analysis

We conducted preliminary analyses including descriptive statistics, bivariate correlations between the study variables, and validity and reliability of the measures. Validity was tested using

confirmatory factor analysis (CFA), the average variance extracted (AVE), and comparison of square root of the AVE for each construct with the correlation involving the constructs. Thresholds for the CFA goodness of fit indices were $\chi 2/df < 3$; root mean square error of approximation (RMSEA) <0.06; standardized root mean square residuals (SRMR) < 0.08, and comparative fit index (CFI) ≥0.95 (Tanner & Wölfing Kast, 2003). AVE values should be >0.50 and its square root should be greater than the correlation between constructs (Patel et al., 2017). Reliability was tested using McDonald's ω and the composite reliability (CR) with acceptable values ≥ 0.70. Harman's single-factor test was conducted to detect the problem of common method bias, which is considered to be present if the total variance extracted by one factor is >50% (Hair et al., 2014). In addition, we examined the goodness of fit of a one-factor model of CFA.

A mediation analysis with the maximum likelihood (ML) estimation method was conducted to test the two hypotheses in a single model (Figure 1). A bootstrap resampling procedure with bias-corrected percentile and 1000 replications was used to confirm the significance of the indirect effects (Hayes & Little, 2022). The analysis estimated total, indirect, and direct effects of the independent variables (GAS and PEK) on the outcome variable (INT) through the proposed mediator (TR).

For the interpretation of the results, we used both statistical significance ($p < 0.05$) and measures of effect size, with Pearson's r of 0.10 considered small, 0.30 medium, and 0.50 large (Cohen, 2013). In bootstrap analysis, the effect was considered significant when the 95% confidence interval (CI) did not include zero. All statistical analyses were performed with JASP 0.16.3 software (JASP Team, 2024).

4.3. Results

Sample Characteristics and Descriptive Statistics

A total of 410 Italian adult consumers meeting the inclusion criteria agreed to participate; thus, the sample size was considered adequate. All of them stated that they personally bought food at least occasionally. The mean age of participants was 34.96 years (sd = 15.17; range 18–78), among them, 63% were females. According to the Italian educational system, 6% of the participants had a low level of education (5–8 years), 33% had a high school degree (12–13 years) and 61% had a university degree or masters/Ph.D. More than half of the participants (60%) were active community workers, 24% were undergraduate university students, 11% were student workers, and

the remaining 5% were housewives, unemployed, or retired. With regards to household monthly income, 8% declared earning less than EUR 1000, 58% between EUR 1000 and 3000, 24% between EUR 3000 and 5000, and 10% more than EUR 5000 per month. The characteristics of the respondents are depicted in Table 2.

Table 2. Characteristics of participants.

Characteristic		Frequency	Percent
Education	Low Level	24	5.85%
	High School Degree	135	32.93%
	University Degree	251	61.22%
Occupation	Student	98	23.90%
	Student Worker	46	11.22%
	Active Worker	247	60.24%
	Unemployed	19	4.63%
Income	< EUR 1000	31	7.56%
	EUR 1000–3000	239	58.29%
	EUR 3000–5000	97	23.66%
	> EUR 5000	43	10.49%

Descriptive statistics and bivariate correlations between variables are shown in Table 3. The correlation between GAS and PEK was nonsignificant. GAS correlated negatively with TR and INT, with moderate and small effect sizes, respectively. PEK correlated positively and weakly with TR and positively and moderately with INT. TR was positively and weakly correlated with INT. Moreover, a small effect was found in the association of gender (female coded 1 and male coded 0) with GAS ($r = -0.12$, $p = 0.01$) and INT ($r = 0.11$, $p = 0.03$). In particular, males tended to be more skeptical than females about green adverts, while females reported greater intention than males to purchase green food. Thus, we used gender in the mediation model as a confounding variable related to GAS and INT.

Table 3. Means, standard deviation, and Pearson's correlations (N = 410).

Variable	Mean (SD)	Range	1	2	3

1. GAS	10.48 (3.06)	4–19	-		
2. PEK	21.54 (5.04)	6–30	0.00	-	
3. TR	14.14 (3.28)	4–20	−0.40 **	0.21 **	-
4. INT	11.98 (2.95)	3–15	−0.09 *	0.44 **	0.26 **

Note. GAS = green advertising skepticism; PEK = perceived environmental knowledge; TR = trust in green claims; INT = intention to buy green food. * $p < 0.05$. ** $p < 0.001$.

Characteristics of Measures

The results of the measurement model based on the four scales used indicated a good model fit with all indices meeting the required thresholds: $\chi 2/df = 2.31$; RMSEA = 0.06; SRMR = 0.07; and CFI = 0.97. All factor loadings were statistically significant, and AVE values were greater than the threshold value, except for GAS (Table 4). Furthermore, the square roots of AVE were greater than all Pearson correlations, thereby providing evidence for discriminant validity of the measures. Reliability was acceptable to very good for all the variables according to CR and ω values (Table 4). Thus, the measures in this study had acceptable validity and reliability.

Table 4. Psychometric characteristics of measures (N = 410).

Variable	Item	Loading	AVE	CR	McDonald's ω	95% CI
GAS	G1	0.40*	0.45 (0.67)	0.74	0.75	0.71-0.79
	G2	0.45*				
	G3	0.77*				
	G4	0.91*				
PEK	P1	0.71*	0.51 (0.71)	0.85	0.84	0.81-0.87
	P2	0.35*				
	P3	0.78*				
	P4	0.75*				
	P5	0.76*				
	P6	0.78*				
TR	T1	0.72*	0.70 (0.84)	0.90	0.90	0.89-0.92
	T2	0.82*				
	T3	0.91*				
	T4	0.88*				
INT	I1	0.92*	0.85 (0.92)	0.95	0.94	0.93-0.95
	I2	0.91*				

	I3	0.94*	

Note. GAS = Green advertising skepticism; PEK = Perceived environmental knowledge; TR = Trust in green claims; INT = Intention to buy green food; AVE = Average variance extracted; CR = Composite reliability. Square roots of AVE are reported in parentheses. * $p < 0.001$.

Regarding Harman's single-factor test, results of the unrotated solution of principal component analysis showed that four factors emerged explaining 70% of the variance and the first factor accounted for 30% of it that is less than the 50% threshold. Further- more, results of one-factor model of CFA indicated a poor model fit with $\chi 2/df = 12.99$, RMSEA = 0.17, SRMR = 0.18, and CFI = 0.66. Therefore, we concluded that common method bias did not seriously compromise this study results, since the variance that was attributable to the measured method rather than to the constructs measured seemed to be acceptably low.

The Mediation Model

The hypothesized mediation model tested (Figure 2) yielded a good fit, with $\chi 2/df = 2.5$; RMSEA = 0.06, SRMR = 0.03, and CFI = 0.99. It explained 23% of the variance in the values of INT and 20% of the variance of TR.

As shown in Table 5, the indirect effect of GAS on INT through the mediator TR was statistically significant as confirmed by the bootstrap analysis. As represented in Figure 2, GAS was significantly and negatively associated with TR, which in turn was significantly and positively associated with INT. Therefore, higher GAS was indirectly related to lower INT via a lower TR. The direct effect of GAS on INT without the mediator TR was nonsignificant, indicating full mediation. Thus, Hypothesis 1 was supported.

The indirect effect of the second independent variable PEK on the dependent variable INT through the mediator TR was statistically significant, as confirmed by the bootstrap analysis. As shown in Figure 2, PEK was positively and significantly associated with TR, which in turn was positively and significantly associated with INT. This means that higher levels of PEK were indirectly related to higher levels of INT through a higher TR. However, the direct effect (Table 5) was also significant, indicating that TR partially mediated the relationship between PEK and INT. Thus, Hypothesis 2 was supported.

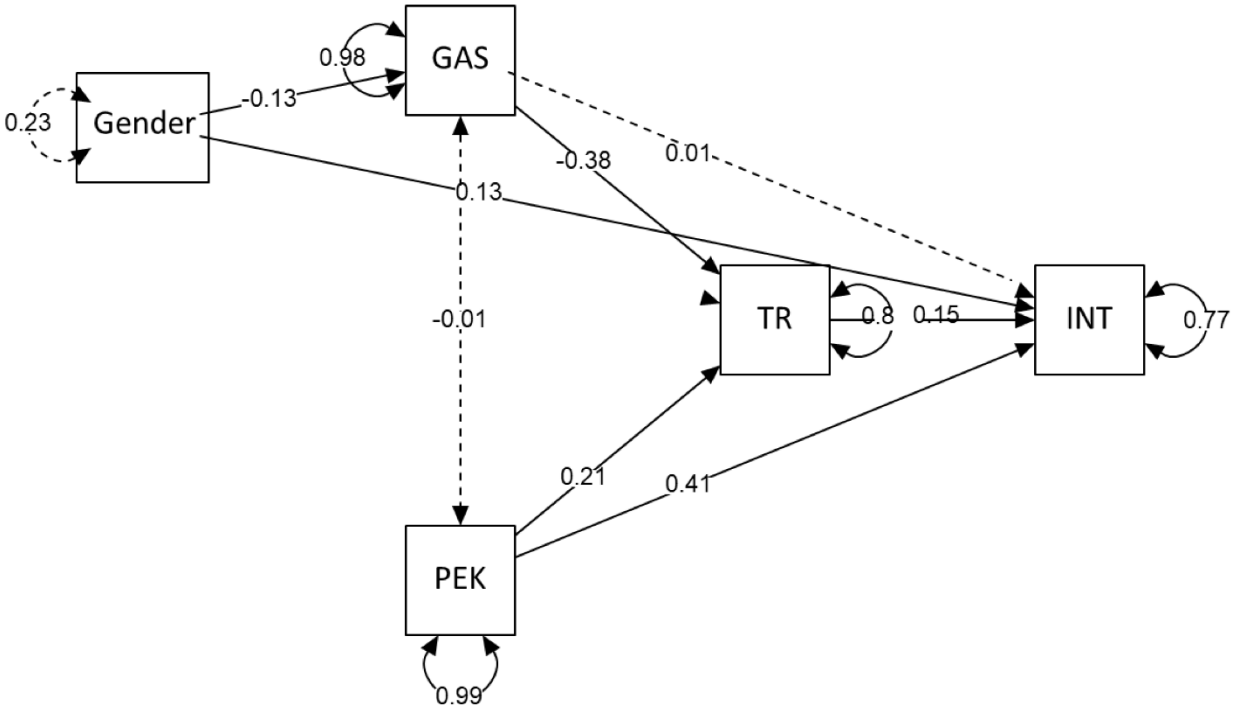


Figure 2. Results of hypothesis testing (N = 410). GAS = green advertising skepticism; PEK = perceived environmental knowledge; TR = trust in green claims; INT = intention to buy green food. Standardized parameter estimates are reported. Dotted lines indicate nonsignificant parameters.

Table 5. Results of the mediation model.

Effects lb	β	SE	z	*p*	95% CI	95% CI ub
Total						
GAS → INT	-0.05	0.04	-1.15	0.25	-0.14	0.04
PEK → INT	0.44	0.04	9.97	<0.001	0.35	0.52
Indirect						
GAS → TR → INT	-0.06	0.02	-2.89	0.004	-0.10	-0.02
PEK → TR → INT	0.03	0.01	2.58	0.010	0.01	0.06
Direct						
GAS → INT	0.006	0.05	0.13	0.90	-0.08	0.10
PEK → INT	0.41	0.05	9.12	< 0.001	0.32	0.49

Note. GAS = Green advertising skepticism; INT = Intention to buy green food; PEK = Perceived environmental knowledge; SE = standard error; CI = confidence interval; lb = lower bound; ub = upper bound. Delta method standard errors, bias-corrected bootstrap confidence intervals.

4.4 Discussion

Green customers play a critical role in maintaining environmentally sustainable development over time, which can help preserve the health of the planet and entire societies. The present study aimed to investigate whether green advertising skepticism and perceived environmental knowledge were associated with the intention to buy green food through the mediation of trust in green claims. Although green skepticism and environmental knowledge were previously associated with green purchase intention (Indriani et al., 2019; Do Paço & Reis, 2012) and green trust was used as a mediator between other variables and consumers' purchase intention and behavior (Chen & Chang, 2012), no study has simultaneously considered all four dimensions together and with a specific focus on green food.

The results of correlation analyses showed that higher levels of skepticism about green claims were associated with lower intentions to purchase green foods, consistent with previous findings (Indriani et al., 2019; Leonidou & Skarmeas, 2017). However, the results of the mediation analysis showed that when trust in green claims was entered into the model as a mediator, green advertising skepticism was not directly related to the intention to buy green food. Rather, it indirectly affected consumer green food purchase intention via the trust in green claims variable, which fully mediated this association, showing that consumers with high levels of green advertising skepticism tend to perceive green claims as more untrustworthy, and this in turn reduces their willingness to purchase green food. This result expands the body of knowledge about the underlying mechanisms of the negative association between green advert skepticism and green consumerism. According to previous literature (Matthes & Wonneberger, 2014), this can be the case in which advertising arguments are perceived as misleading and deceptive and, subsequently, people judge the information utility taken from them as low, developing advertising distrust. Information utility is how much information can help an individual make future decisions (Knobloch-Westerwick & Kleinman, 2012).

Results also showed that the positive association between perceived environmental knowledge and green purchase intention that was shown to be valid for green hotel visits (Sultana et al., 2022) was confirmed for green food too. Thus, the more people know about environmental

issues, their causes, and possible solutions, the more they will be willing to buy green food. The mediation analysis showed that trust in green claims partially mediates the relationship between perceived environmental knowledge and intention to buy green food. This means that environmental knowledge triggered trust in green food claims, positively affecting, as a result, green food-purchasing intentions. A possible explanation has been suggested in previous research, where green consumers i.e., people who are aware of environmental problems and buy green products (Erdoğdu et al., 2016) were found to trust green adverts more because they could distinguish between green and non-green foods or real green and greenwashed claims (Leire & Thidell, 2005). Despite the consistency of our finding with previous studies, we must also consider that they are discordant with other authors' assumption that the more people are aware of green issues, the more skeptical they become towards green advertising because they are suspicious of greenwashing (T. T. H. Nguyen, et al., 2019). Noteworthy, GAS and PEK were unrelated in the present study, suggesting that skepticism in green advertising does not reflect or is not influenced by perceived knowledge of environmental issues (Yu, 2020). On the other hand, a recent study (Schmuck et al., 2018) argued that even consumers with deep knowledge may not recognize vague greenwashing claims. Indeed, although they were more able than less informed individuals to detect false textual claims in a controlled experiment, this ability was inhibited when a nature-evoking image was added to a false claim. The authors concluded that environmental knowledge alone cannot be seen as a shelter from greenwashing, and future research must also consider other predictors and implicit mechanisms.

The overall findings of the present study were in line with the theory of reasoned action and the theory of planned behavior (Ajzen, 1991), which consider individuals as rational in deciding whether to adopt a certain behavior. Although the theory of planned behavior (TPB) (Ajzen, 1991) is still the most-used theoretical framework in the research field of green purchase intention and behavior (Sharma et al., 2023), Danner and Thøgersen (2022) described two possible pathways in which green purchase decision-making occurs. In the first one, as posited by the TPB, the consumer chooses consciously what to buy when enough motivation, ability, and opportunity are present. In the second one, when these three factors are lacking, the purchase action will be guided by an automatically activated attitude, as theorized by Fazio (Fazio, 1990). Hence, it is reasonable to think that every consumer faces both the pathways theorized by Danner and Thøgersen (2022), when purchasing green food. This study focused on factors that can promote

green purchase behavior in the first, more consciously controlled pathway. However, future research should consider integrating the TPB with other models able to take into consideration behavioral automatisms.

Finally, a promising avenue for future research would be to further explore the recommendations made by Luthra and Deshwal (2022) concerning specificity. This involves assessing the model's applicability to specific products, rather than to a general propensity towards "green food". Additionally, incorporating brand trust as a precursor to trust in green claims could provide a more robust and ecologically valid framework.

The contribution of the present study to the theory, though, remains relevant as addressing factors that can promote green purchase intention in a consciously controlled pathway could still help us understand more about the mechanisms that drive green purchase behavior. Moreover, the novel finding of the independence between knowledge and skepticism could help disprove the idea of the cultured skeptical consumer.

Limitations

A number of possible sources of bias must be acknowledged in this study. First, the snowball sampling strategy used, although cost-efficient, may have introduced bias by missing out isolated members of the community or skewing towards subgroups of people who share the same characteristics or interests. Is it possible, in fact, that only people already interested in environmental issues were motivated to fill in the online survey, leading to a selection bias (Kowald & Axhausen, 2012). For this reason, caution should be used to generalize our findings, and future research should consider using a random sample representative of the general population. Second, the exclusive use of self-reported instruments could have inflated the associations between variables because of the common method of assessment. Although data did not indicate evidence of severe common method bias, future studies should integrate information from multiple sources. Third, the scale used to measure green advertising skepticism had quite good psychometric characteristics, but its AVE value was under threshold, indicating a less-than-optimal convergent validity. Thus, a revision of this scale is needed. Fourth, in this study we used only a measure of self-perceived environmental knowledge, which refers to a different construct than factual knowledge. Although it has been suggested that measures of perceived knowledge may better assess an individual’s actual understanding of an issue (Su et al., 2014), it would be relevant using both types of assessment in future research. Furthermore, it was suggested by an

anonymous reviewer that we include aspects related to knowledge about green food eco-labeling in the PEK scale.

Although it has been recognized that ecolabels can positively affect purchase intentions and selection of green products (Mohr et al., 1998), this may represent a possible obstacle to our aim to assess this aspect regarding green food in particular, because self-declarations by producers are available, in many cases, covering only the carbon footprint of products, while current European ecolabels do not cover food products. However, it is worth mentioning that, as part of the Farm to Fork Strategy (Purnhagen et al., 2021) the European Commission is working towards the setting-up of a sustainable food labelling framework, to assess and improve the eco-sustainability of food products and provide useful information to help consumers make informed choices. Future research on the topic should explore and integrate this aspect.

Fifth, the outcome of this study was the intention to purchase green food. Although theories of reasoned action and planned behavior consider intention a predictor of action, in the field of green purchase behavior a gap has been detected between intention and purchasing behavior (Park & Lin, 2020); therefore, actual green purchase behavior should be objectively measured in future research. Finally, although the proposed mediation model provided some information about the directionality of the relationships among the study variables, the cross-sectional design of the study did not allow us to draw causal conclusions. Future studies should therefore consider the use of longitudinal data to more accurately examine the nature of the relationships among the variables.

4.5. Conclusions

To the best of the researchers' knowledge, this study is the first attempt to examine a mediating role of trust in green claims in the relationship between skepticism towards green adverts or perceived ecological knowledge and intention to purchase green food. In spite of its limitations, this study identifies mechanisms that would benefit from further assessment. Based on previous research suggestions (Knobloch-Westerwick & Kleinman, 2012; Luthra & Deshwal, 2022), we focused on intentions to buy a specific green product, green food. This helped to avoid possible confounding effects given by considering green products as indistinct elements of a unique category.

Within the theoretical framework adopted in this study, intentions are critical to the thought–action relationship; therefore, assessing the antecedents of the intention to buy green food can be crucial to spread specific behavior such as adopting a green diet. Industrial livestock

production is responsible for a considerable amount of the ecological footprint of humans in terms of resource utilization and pollution (De Boer et al., 2019). Moreover, Western meat overconsumption is increasingly associated with food-related diseases like obesity, diabetes, or cardiovascular diseases (Battaglia Richi et al., 2015), and it is proven that adopting an energy-balanced, low-meat diet can led to large reductions in premature mortality (Springmann et al., 2018b). Hence, alternative food consumption patterns are needed, both from an environmental and a health perspective and would lead to profound improvements in our individual, national, and environmental health.

Based on empirical findings, this study provides suggestions for marketers and businesses that want to offer more efficient and targeted advertising on green foods. Marketers could consider green advertising skepticism and environmental knowledge as separate and unrelated but useful dimensions in designing more reliable and convincing adverts. They should consider the positive relationship as well observed between perceived environmental knowledge and positive intentions toward green purchase. It could be possible, for instance, to educate consumers about the convenience of buying ecologically safe products by placing reliable environmental facts and their related sources in advertisements and/or on the products packages. Moreover, government agencies and policy makers could consider these elements when developing interventions to raise public awareness of the individual and collective benefits of buying green foods and adopting a green diet. The findings of this study also provide implications for individual consumers. Individuals could improve their environmental awareness, their ability to distinguish between true and greenwashed adverts, and their belief that each consumer can help safeguard the environment. Engaging in green food consumption can indeed promote individual wellbeing and create value for the entire society.

Appendix A

Definition of "Green food": *Since this research concerns green products, we will try to offer you a definition of this concept. A green product has characteristics or production methods that cause less damage to the environment throughout its life cycle (from production to end of life) compared to other products of the same category. For example, it uses renewable energy sources, non-toxic and/or biodegradable substances, is grown with organic methods (if it is a food product), produced locally, is packaged with recyclable materials, etc. In this research we will use the concepts of "green" and "eco-sustainable" as synonyms.*

Chapter 5. Study 2: Exploring Green Food Attitudes Through IAT and Focus Group Studies

Abstract

This study examines implicit and explicit attitudes toward green food and their impact on green food purchase behavior (GFPB) through two complementary parts. Part 1 employed an Implicit Association Test (IAT), and a post-experiment self-report questionnaire (n = 338; 50.6% females, 19-85 years). Part 2 employed a focus group (n = 21; 52.4% females, 21-67 years). While the IAT score analysis did not yield significant results, the linear regression analysis conducted on the post-IAT questionnaire revealed that the Effect of Green Food on Subjective Well-Being (EGFSWB; $\beta = .52$, $p < 0.001$) and Consequences of Green Food Consumption (CGFC; $\beta = .12$, $p < 0.025$) positively predicted GFPB, while Barriers to Green Food Purchase (BAR; $\beta = -0.18$, $p < 0.05$) negatively influenced GFPB. Part 2, based on three focus groups and content analysis, uncovered practical and attitudinal barriers shaping explicit consumer perceptions. Moreover, some notable novel insights emerged regarding the ambivalence between the defense of the tradition and culinary innovation opinions and the vegetarian label versus descriptive language preference regarding dishes names. The findings underscored the interplay between perceived benefits and barriers in influencing green food consumption and offer actionable insights for interventions to bridge the attitude-behavior gap regarding this kind of eco-sustainable items.

5.1 Introduction

The current environmental crisis, characterized by climate change, biodiversity loss, and pollution, poses significant risks to ecosystems and human health. Agriculture and food production contribute substantially to global greenhouse gas emissions, accounting for approximately one-quarter of all human-induced emissions (Poore & Nemecek, 2018). Conventional agricultural practices drive biodiversity loss through habitat destruction and soil degradation, resulting in decreased species diversity and compromised ecosystem stability (IPBES, 2019). Additionally, agriculture is the largest consumer of freshwater resources, responsible for about 70% of global freshwater withdrawals, which intensifies water scarcity, especially in vulnerable regions (Mekonnen & Hoekstra, 2016). Since a significant portion of the world's arable land is dedicated to livestock farming, as it requires vast resources for animal feed production, meat and other

animal-derived foods represents the most environmentally taxing foods due to its high greenhouse gas emissions (Springmann et al., 2018b). Given these impacts, promoting green food purchasing behaviors emerges as an essential strategy for reducing the ecological footprint of food consumption and supporting environmental sustainability (Vermeir & Verbeke, 2008).

The term "green food" is defined as food that has been produced or processed in a way that has a reduced environmental impact throughout its entire life cycle, from production to waste disposal, compared to other products within the same category (Gil, 2000). The definition entails a comparative perspective, in line with the approach and definitions adopted by the Green Claims Directive (European Commission, 2022). According to it, an environmental claim is defined as "any message or representation […] which states or implies that a product or trader has a positive or no impact on the environment or is less damaging to the environment than other products or traders, respectively, or has improved their impact over time" (European Commission, 2022). This logic is also substantiated and embedded in the methodologies for quantifying the environmental footprint of products along their life cycle, namely Life Cycle Assessment (International Organization for Standardization, 2006a, 2006b), which is part of the Better Regulation Toolbox of the European Commission (European Commission, 2023). Nevertheless, despite a growing interest in pro-environmental products and environmental concern among consumers worldwide, research consistently reveals a discrepancy between declared intention and actual purchasing behavior (ElHaffar et al., 2020). This phenomenon is known as the "Green Attitude-Behavior Gap" (GABG; Park & Lin, 2020).

The GABG is closely associated with the Theory of Planned Behavior (TPB) (Ajzen, 1991). This theory posits that an individual's attitude, along with their subjective norms and perceived behavioral control, exerts a significant influence on their behavior. Furthermore, it postulates that the relationship between attitude and behavior is mediated by intentions. In a number of different research areas, the TPB has demonstrated considerable potential as a means of predicting human behavior (Montano et al., 2015). However, in the context of green consumption, the theory has not met expectations. As said, despite consumers declaring positive attitudes and intentions to act in a pro-environmental manner, these thoughts are not transformed into actual behavior (Echegaray & Hansstein, 2017). To overcome this limitation, Danner and Thøgersen (2022) delineated two potential pathways through which green purchase decisions are made. In the first pathway, as postulated by the Theory of Planned Behavior, the consumer makes

a conscious decision, based on his attitudes and intentions, regarding the purchase of a product when there is sufficient motivation, ability, and opportunity present. In the second pathway, when the aforementioned three factors are lacking, the purchase action will be guided by an automatically activated attitude, as postulated by Fazio (Fazio, 1990). These two pathways are also in line with Kahneman's Dual Process Theory (Kahneman, 2013), that theorizes the existence of a fast, automatic, and intuitive path (System 1), and a slow, deliberate, and analytical path (System 2). It is therefore reasonable to posit that consumers encounter both of the pathways when purchasing green food.

In order to comprehend the factors contributing to the discrepancy between attitudes and behaviors pertaining to environmental sustainability, and to develop effective strategies to reduce this gap, it is essential to expand our understanding of the processes underlying green purchase intention (GPI) and green purchase behavior (GPB) (Tarkiainen & Sundqvist, 2009). A recent review of the academic literature (Wijekoon & Sabri, 2021) reveals a great multitude of variables that influence consumers' decision-making processes with regard to environmentally friendly products. The authors identified 212 variables that affect GPI and 135 determinants influencing GPB. The enormous amount of research on the topic, however, has not been sufficient to find effective methods to intervene on the green attitude-behavior gap due to inconclusive findings and a lack of continuity in systematic research (Carrington et al., 2014; Zhuo et al., 2022).

One reason for this outcome is certainly represented by the fact that modifying food consumption represents a significant challenge due to the multitude of factors influencing dietary patterns (Vermeulen et al., 2020). These include structural constraints, which encompass socioeconomic, environmental, political (Kenny et al., 2023; Stok et al., 2017), and corporate forces influencing food-related behaviors (Béné, 2022). The decisions we make regarding our dietary habits are contingent upon a multitude of personal characteristics, including attitudes, knowledge, skills, emotions, and the sociocultural context within which each individual is immersed. Additionally, structural and environmental factors play a pivotal role in shaping our food choice architecture (Leng et al., 2017). Some of the factors influencing food choice may even be unknown to the consumer itself. In fact, as said, food decision can travel through two possible pathways: one is slow deliberate, energy-expensive, based on personal attitudes, knowledge and values, the other is fast, less voluntary and happens through an automatically activated attitude (Fazio, 1990; Kahneman, 2013).

Another potential factor that contributes to the lack of shared conclusions in this research field is that the majority of empirical studies on eco-friendly purchasing have employed a methodology that relies on customers' self-reported attitudes and practices (Wijekoon & Sabri, 2021). The process of self-reporting has been demonstrated to give rise to a number of potential issues, including the exaggeration of perceived benefits, the selection of answers that align with socially desirable norms, and the tendency to present oneself in a manner that does not align with reality (Schwarz, 1999). For this reason, in the present paper we brought a different contribution to this research field investigating another kind of data. Following some authors' suggestions about the lack of studies using methods for measuring implicit consumer attitudes (ElHaffar et al., 2020; Tabatabaei & Beldona, 2024), we addressed and integrated them with a qualitative exploration on the topic. A recent literature review, indeed, advocates for the use of mixed-method and qualitative approaches to deepen the understanding of consumer behavior regarding green products (Megha, 2024). We employed a mixed-method research design using an Implicit Association Test (IAT) and three Focus Groups on a population sample of Italian adult consumers to investigate which variables can contribute forming the attitude-behavior gap for the specific product category of green food. In this way, we collected both implicit (unconscious) and explicit (conscious) attitudes about GFPB, addressing both the theorical decisional pathways (fast and automatic vs slow and deliberate) we mentioned earlier.

Our research questions were:

1. Does an implicit negative attitude towards green food products versus traditional food exist? (IAT experiment).
2. Does implicit attitude together with other explicit factors influence self-reported green food purchase behavior? (IAT experiment)
3. What are explicit attitudes, perceived barriers, and people’s opinions about the green attitude-behavior gap and its causes? (Focus groups).

Ethical Considerations

Both the studies conducted in this research involved human participants and were approved by the Ethical Research Committee of the University of Bologna (protocol numbers 0139257 for Part 1 and 0173519 for Part 2), in accordance with ethical standards. In Part1, consumers participated voluntarily and gave their explicit consent at the beginning of the anonymous online experiment, after reading a consent form that explained the objectives of the study. In Part 2 all participants

were required to agree to an informed consent form before the focus group, which included a commitment to confidentiality of the information discussed in the focus groups. The focus groups were audio and video recorded. In the scientific materials produced, participants' identities were anonymized.

5.2 Part 1: Implicit and explicit attitudes towards green food

In the field of psychology, a multitude of paradigms are centered upon the study of mental chronometry. This is seen in the case of tasks such as the Stroop and lexical-decision tasks, which define constructs derived from a comparison of response latencies between different performance conditions (Meyer et al., 1988). The Implicit Association Test (IAT) (Greenwald et al., 1998) is a chronometric procedure that quantifies the strength of conceptual associations by contrasting latencies across conditions (Nosek & Sriram, 2007). The participants are required to categorize a series of stimuli, which are representative of four distinct categories (e.g., black, white, positive words, negative words). This is done in two different conditions: (a) categorizing black and positive words together with one response key, and white and negative words together with another response key; and on the contrary (b), categorizing white and positive words together with one response key, and black and negative words with the other. The difference in average response latency between conditions is taken as an indicator of the strength of the differential associations among the concepts.

Since its introduction, the IAT has gained considerable acceptance and influence, as implicit measures have had a significant impact on behavioral research (Nosek et al., 2011). It has been applied successfully to a multitude of research fields, including social psychology, to explore implicit biases related to race, gender, age (Greenwald et al., 1998), consumer behavior to investigate unconscious brand preferences (Maison et al., 2004), and health psychology to study implicit attitudes toward smoking and healthy eating (Perugini, 2005; Swanson et al., 2001). In the field of green consumerism, some studies found that participants exhibited more positive implicit attitudes toward ecological cleaning products compared to traditional ones (Vantomme et al., 2005) and towards green attributes versus conventional attributes associated with virtue (Spielmann, 2021), as indicated by shorter reaction times in the Implicit Association Test. However, in other similar experiments, no significant differences in implicit attitudes were observed, indicating variability in implicit biases across different contexts (Vantomme et al.,

2005). To the best of our knowledge, no research has employed the IAT to examine attitudes towards green food. Nevertheless, a book chapter provided a comprehensive overview of the theories that explain the mechanisms behind automatic behavior in food-related consumer research, particularly focusing on implicit associations with food items (Kraus & Piqueras-Fiszman, 2018). The authors states that, since consumer decisions are often influenced by subconscious factors (Payne & Gawronski, 2010), the IAT may help in revealing these hidden preferences and biases. Such methodology can provide a more comprehensive understanding of consumer dietary behavior beyond what is expressed in surveys or interviews, as it is particularly useful in understanding consumer preferences that are not easily articulated or consciously recognized by individuals (Kraus & Piqueras-Fiszman, 2018).

We adopted an IAT experiment to assess whether an implicit negative bias towards green food products versus traditional food exists. Our hypothesis relied on the fact that, while numerous consumers reports explicit positive attitudes towards eco-sustainable products in general, they often do not behave accordingly to this statement when they are at the grocery store or at the restaurant (Aschemann-Witzel & Niebuhr Aagaard, 2014). This could be particularly true for the specific green food category, as motivations and factors driving purchase behavior vary across different products (Luthra & Deshwal, 2022). For instance, while the use of energy-efficient appliances may be motivated by cost savings (Liobikienė & Juknys, 2016), the benefits of adopting a green diet may be less evident, especially in absence of environmental and health knowledge (Lazzarini et al., 2018). Moreover, A number of studies conducted in a variety of countries (Fehér et al., 2020; Weinrich, 2018) have identified several key factors that may act as barriers to consumers trying new eco-sustainable foods. Maybe not surprisingly, the principal obstacle preventing the majority of consumers from adopting alternative protein diets is simply their liking for meat and the difficulty of eliminating it from their diets (Stanley, 2022). While this may represent an underlying taste preference, it may also be due to cultural and traditional influences. In fact, in Italy, where the study has been conducted, meat-eating occasions are strongly embedded in sociocultural behaviors and relevant situations (such as family meals and outings, traditional Sunday lunches, barbecues and festive celebrations) (Ferronato et al., 2021). For this reason, we included in the experiment stimuli some foods highly representative of the local traditional cuisine, such as “Ragù”, “Cotechino” and “Tortellini”, a kind of dishes typically consumed in the Emilia-Romagna region, which we expected most of the participant of the study to come from or live in.

We hypothesized that it would be more difficult for them to associate such stimuli with negative-valued words.

At the end of the IAT, we introduced a short online questionnaire to collect participants' sociodemographic information and investigate some variables related to participants' explicit attitudes towards green food consumption. The variables we introduced in the online questionnaire were about the physical and environmental effects of green food consumption and the principal barriers to green food purchasing. We did this to allow interesting comparisons to emerge based on how the experiment would have gone. In fact, we were interested in investigating if green food consumption consequences (positive, explicit attitudes) and barriers (negative, explicit attitudes) were related to green food purchase behavior, and to match this result with a potential implicit bias towards green food.

5.2.1 Materials and Methods

This research employed an Implicit Association Test (IAT) experiment, followed by a self-report questionnaire, to assess consumers' implicit attitudes towards green food products. A exponential, non-discriminatory snowball sampling strategy was used to recruit participants through the researchers' personal contacts in order to reach as many people as possible in a cost-effective way, following the example and suggestions of other authors (Sexton et al., 2011; Thomson, 2014). Individuals were contacted via email and private messages with an invitation to participate into the study and a link to complete the IAT experiment. We also asked participants to complete a questionnaire at the end of the experiment and to invite their friends or acquaintances to do the same. Inclusion criteria to participate in the studies were being older than 18 years and having the opportunity to buy food at least occasionally.

A total of 338 adult Italian consumers completed the online experiment (50.6% females, age range 19-85 years old, SD = 15.46), that could be run exclusively through a PC or a device with a physical keyboard. The IAT experiment was implemented and presented online using the PsyToolkit platform (Stoet, 2010, 2017). Before the beginning of the experiment a screen appeared with a detailed definition of what green food is, to avoid participant confusion. Once the experiment started, respondents classified the words displayed in the center of the screen into four categories: (1) green food products, (2) traditional food products, (3) positive-value words, (desirable) and (4) negative-value words (undesirable); see Table 1 for the stimuli words used in the study. The words with positive valence (desirable) and negative valence (undesirable) were

taken from the original Greenwald experiment (Greenwald et al., 1998), while the words representing green and traditional foods were selected by the authors following Greenwald's recommendations about relevance, equivalence, semantic and cultural appropriateness (Greenwald et al., 1998; Nosek et al., 2005). Subsequently, the words were submitted to the evaluation of an expert from Ecoinnovazione Srl, an Italian consulting firm specialized in ecological transition and Life Cycle Assessment.

Table 1. Word stimuli used in the IAT (Part 1)

Green Food	Traditional Food	Desirable	Undesirable
Pears	Ragù	Beauty	Immorality
Apples	Mozzarella	Peace	Ugliness
Spinach	Speck	Health	Disgust
Swiss chard	Ribs	Laughter	Nastiness
Peas	Chicken	Honesty	Loneliness
Chickpeas	Clams	Forgiveness	Defeat
Beans	Cotechino	Kindness	Misery
Lentils	Turkey	Friendship	Sickness
Peaches	Tortellini	Love	Dishonesty
Potatoes	Prosciutto	Serenity	Hatred
Walnuts	Würstel	Gratitude	Pain
Carrots	Salami	Wellbeing	Hell
Oil	Sea Bass	Harmony	Fear
Tomatoes	Knuckle	Joy	Despair
Artichokes	Bream	Cheerfulness	Ignorance
Pasta	Milk	Celebration	Pollution
Lettuce	Salmon	Vacation	Harmfulness
Bread	Shrimps	Gift	Anguish
Rice	Steak	Elegance	Punishment
Barley	Ricotta cheese	Respect	Imprisonment
Cous cous	Bresaola	Optimism	Conflict
Sesame	Sausage	Trust	Incident

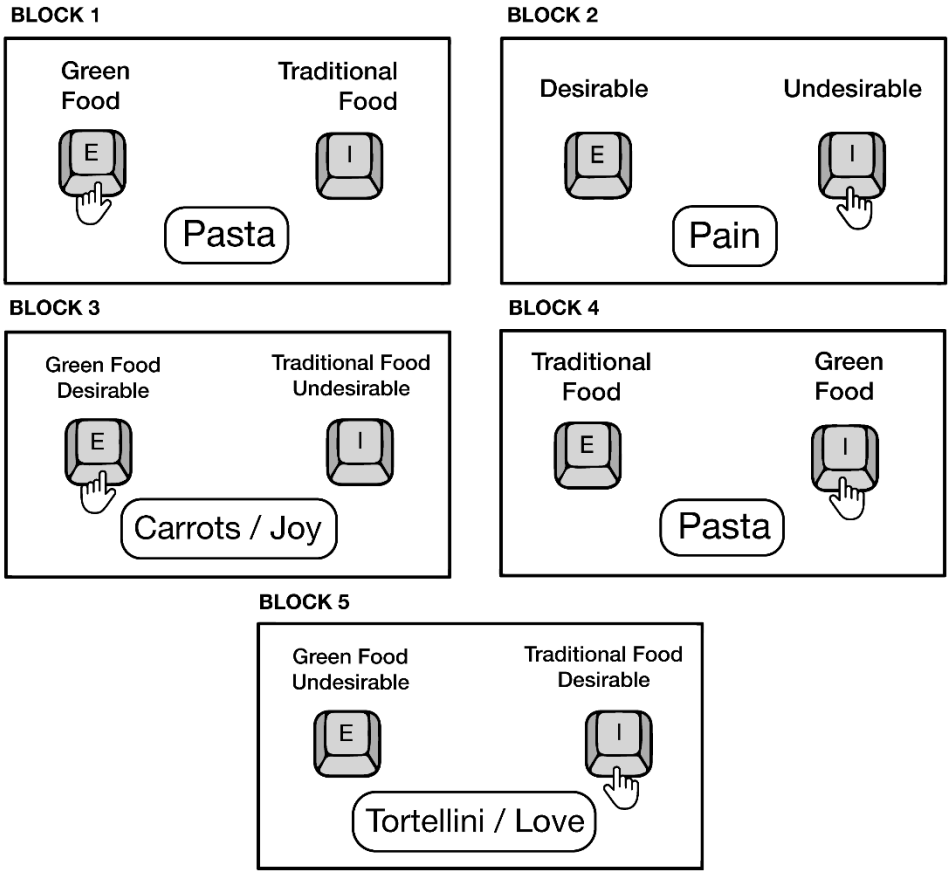
Polenta	Mussels	Self-esteem	Annoyance
Oats	Bacon	Capacity	Envy
Corn	Sardines	Praise	Murder

The IAT experiment comprised five blocks, following Greenwald (1998) original procedure. Blocks 1, 2 and 4 were for training the relation between the target (green/traditional foods and desirable/undesirable) and the left or right side, while blocks 3 and 5 were the experimental ones. Hence, the IAT effect is the difference in score between blocks 3 and 5, and those only were used for the analyses. The blocks were designed in the following format.

- Block 1 was the *practice block* for the target consisting of trials to sort words related to the two types of foods (e.g., green food/traditional food, 25 trials). The term trials refer to the number of times the words appear in the middle of the screen.
- Block 2 was also a *practice block* consisting of words/synonyms for two attributes (e.g., desirable/undesirable words, 25 trials).
- Block 3 was the first experimental block, the compatible condition, in which participants had to categorize stimuli (foods, either traditional or green, and desirable or undesirable words) in a way that aligns with societal or expected associations (Green food and Desirable words vs Traditional food and Undesirable words, 25 trials). Participants had to press one key for Green Food and Desirable stimuli, and another key for Traditional Food and Undesirable stimuli.
- Block 4 included 25 trials that were side-reversed to eliminate any left-right associations that may have been learned in the previous blocks. Now the words Green Food and Traditional Food are swapped, and participants had to make the same decision as in Block 1 (name classification only) but learning to use opposite responses. This is only training for the following block.
- Block 5 was the second experimental block, the incompatible condition, in which participants had to categorize stimuli in a way that reflects an implicit negative bias towards green food (Green food and Undesirable words vs Traditional food and Desirable words, 25 trials). Participants had to press one key for Green Food and Undesirable stimuli, and another key for Traditional food and Desirable stimuli.

Participants were instructed to classify the stimulus that appeared in the middle of the screen within one of the categorical words placed in the right and left corners of the screen. Respondents had to press either the “E” (left) or the “I” (right) button on the keyboard as quickly as possible to assign the word to the correspondent category. A representation of every block of the IAT screens is illustrated in Figure 1.

Figure 1. Visual examples of the IAT’s experiment blocks.



In order to ensure the validity and reliability of the results, we randomized and reversed the order of experimental blocks (Greenwald et al., 1998). Counterbalancing the sequence of compatible (“Green Food” with “Desirable”) and incompatible (“Green Food” with “Undesirable”) blocks minimizes the risk of order effects, such as practice or fatigue, which could systematically bias reaction times (Greenwald, Nosek, & Banaji, 2003). Moreover, randomization helps prevent participants from anticipating the task structure, mitigating potential learning effects that could distort the comparison between blocks (Greenwald, Nosek, & Banaji, 2003). These

measures are essential for the robustness of the IAT, as its primary metric (the difference in reaction times between compatible and incompatible conditions) relies on ensuring that any observed effects are due to implicit associations rather than procedural artifacts (Greenwald et al., 1998; Nosek & Smyth, 2007). For these reasons, we implemented two different experiments, with reversed experimental blocks order, and participants were randomly assigned to one of them.

At the end of the IAT experiments, participants had to complete a short online questionnaire, that included the following measures:

- Sociodemographic characteristics: age, gender, education level.
- Effect of Organic Food on Subjective Well-Being (EOFSWB; Ismael & Ploeger, 2020): 9 items (ω =0.94, α =0.95). It investigates the physical, emotional, social, intellectual and general dimension of food consumption-related well-being. Adapted by replacing "organic food" with "green food". Items: "Consuming green food…" 1. "Has a good impact on my health"; 2. "Helps me feel healthier"; 3. "Makes me have positive emotions (e.g., proud, satisfied, happy)"; 4. "Makes me feel good"; 5. "Makes me feel more connected to surrounding people"; 6. "Improves my self-image in front of others"; 7. "Helps me have a purposeful and meaningful life"; 8. "reflects more my self-knowledge and beliefs"; 9. "Has a good impact on my wellbeing".
- Consequences of Green Food Consumption (CGFC; Lee, 2019): 12 items (ω =0.93, α =0.93). Assesses attitudes toward the environmental and health consequences of green food consumption. Adapted by replacing "organic food" with "green food". Items: "When buying "green" food products, how important is it that this helps me…" 1. "Reduce the use of artificial fertilizers in agriculture"; 2. "Reduce the eutrophication of lakes and watercourses"; 3. "Reduce the pollution of the soil"; 4. "Reduce the use of herbicides and pesticides in agriculture"; 5. "Improve my own or my family's health"; 6. "Give myself a good conscience"; 7. "Avoid risks that may be associated with eating non-organic foods"; 8. "Give my children better food"; 9." Reduce the risk for illness in my family".
- Barriers to Green Food Purchase (BAR; Laheri, 2020): 7 items (ω =0.78, α =0.78). Assesses the barriers to organic food consumption. Adapted by replacing "energy-efficient products" with "green food". Items: "I buy fewer green food items than I wish because of…" 1. "Lack of well-known brands"; 2. "Lower availability"; 3. "Lower promotional activities"; 4. "Difficulty in identifying"; 5. "Higher price".

- Green Food Purchase Behavior (GFPB): created by the authors, 3 items (ω =0.83, α =0.81) rated on a 5-point scale (from 1 = "I strongly disagree" to 5 = "I strongly agree"). It included the following questions: 1. "How many "green" food products did you buy the last time you bought food?"; 2. "On average, in a month how many of the food products you buy are "green"?"; 3. "The last time you ate at a restaurant, how many of the foods you consumed were "green"?".

All items, except for those of Green Food Purchase Behavior scale, were rated on a 5-point scale (from 1 = "I strongly disagree" to 5 = "I strongly agree"). The scales were independently translated from English to Italian and then back translated by two academic bilingual speakers.

Participants' age range went from 19 to 85 years old (Mean = 39.61, SD = 15.46). The gender variable was equally distributed (50.6% females). The education level was as follows: 9.8% of participants had elementary or middle school licenses, 45% had a high school diploma, 36% had a university degree and 9.2% had a postgraduate certificate. The education level was mostly represented by a high school diploma (see Table 2).

Table 2. Part 1 participants' education level.

Education level	**N**	**%**
Elementary or middle school diploma	33	9.8%
High school diploma	152	45%
Bachelor's degree	122	36%
Postgraduate training	31	9.2%

Data Analysis

The IAT results were examined using the D score (Greenwald et al., 2002), which is a measure of the difference in participant reaction times between the compatible block (Block 3) and the incompatible block (Block 5). The IAT D-score was obtained by subtracting the congruent block mean reaction time from the incongruent block mean and dividing the difference by the pooled standard deviation. We computed as well the IAT effect score subtracting the mean reaction times (RTs) of the compatible condition from the incompatible condition (Greenwald et al., 2002; Nosek et al., 2005). The IAT effect score helps to quantify the difference in processing speed between

the two conditions, providing an index of implicit bias or association strength (Greenwald et al., 2002; Nosek et al., 2005). The D score is an indication of an individual's implicit attitude towards a specific target. A positive D score indicates that the respondent was faster with the compatible block, whereas a negative D score indicates that the respondent was faster with the incompatible blocks. A D score of 0 indicates that there is no meaningful difference between the compatible and incompatible blocks (Carpenter et al., 2019).

To ensure the validity and reliability of the analyses, the data were cleaned by removing people that did not complete the experiment and outlier responses that were extremely fast (<300 ms), extremely slow (>10,000 ms), or had high error rates. (>10% of wrong answers) (Carpenter et al., 2019; Tse & Tung, 2023). This reduced the sample from 458 to 338 participants.

The data retrieved from the post-experiment questionnaire was used to run a linear regression analysis in which Green Food Purchase Behavior was the dependent variable and Effect of Organic Food on Subjective Well-Being, Consequences to Green Food Consumption and Barriers to Green Food Purchase, were the independent variables. The IAT score was calculated using R software (R Code Team, 2023), while every other statistical analysis were run through the JASP software, version 0.19.1 (JASP Team, 2024). The established level of significance was $p < 0.05$.

5.2.2 Results

The mean response time was 1130.95 ms when respondents were asked to classify congruent categories (pairing Green Food with Desirable and Traditional Food with Undesirable) compared with 1121.07 ms when they classified stimuli in the incongruent categories (pairing Green Food with Undesirable and Traditional Food with Desirable) (Table 3).

Table 3. Experimental blocks mean RTs

Experimental block	N	Mean	SD
Congruent	338	1130.95	306.78
Incongruent	338	1121.07	286.13

The difference between the congruent and incongruent condition mean RTs was not significant in the paired samples t-Student's test we performed ($t(337) = 0.45$, $p = 0.66$).

The D score difference was not significantly different from zero too ($t(337) = -1.56$, $p = 0.12$). Since participants' RTs and D scores were not significantly different from the congruent to the incongruent condition, we did not find implicit negative bias either for green food products or traditional food products. Therefore, the IAT data were not entered into the subsequent regression analysis together with other explicit variables measured with the post-experiment questionnaire.

With regard to the post-experiment questionnaire, a linear regression analysis was conducted to examine the relationship between GFPB (Green Food Purchase Behavior, dependent variable) and Effect of Organic Food on Subjective Well-Being (EOFSWB), Consequences of Green Food Consumption (CGFC) and Barriers to Green Food Purchase (BAR). The overall model was statistically significant, [$F(7, 338) = 33.56$, $p < 0.001$], explaining 41% of the variance of GFBP (Adjusted $R^2 = .41$). As depicted in Table 4, among the predictors, EOFSWB and CGFC were positively associated with GFPB, indicating that higher levels of EOFSWB and CGFC are associated with higher GFPB. In contrast, BAR was negatively associated with GFPB, suggesting that increases in BAR correspond to decreases in GFPB.

Table 4. Linear Regression Analysis coefficients

Variable	β	p
EOFSWB	.52	.001
CGFC	.13	.025
BAR	-.17	.004

EOFSWB = Effect of Organic Food on Subjective Well-Being, CGFC = Consequences of Green Food Consumption, BAR = Barriers to Green Food Purchase.

5.2.3 Discussion

The IAT's non-significant outcome highlights the complexity of measuring implicit attitudes in the context of green food consumerism. A possible interpretation of the results is that there are no implicit negative or positive biases towards green food compared to traditional non-green food. This result makes it impossible to explore the effect of implicit attitude, whether negative or positive, towards green food on the tendency to purchase it, in addition to the effect of explicit attitudes. Another possible explanation for the lack of significance may be due to the test's reliance

on reaction times. Factors such as familiarity with the test format, individual differences in cognitive processing speed, and even temporary mood states have the potential to affect reaction times, which could subsequently skew the results (Kraus & Piqueras-Fiszman, 2018). The IAT is also sensitive to the context in which it is administered; however, we had no control over the setting in which the experiment was run, since it was not conducted in a laboratory, but online. The main reason was the need to gather the performance of a sufficiently large sample of consumers from various backgrounds and characteristics, which would have been more difficult to achieve with a laboratory experiment. Variations in the way questions are framed can also influence the results (Strack & Deutsch, 2004; Gawronski & Bodenhausen, 2006). De Houwer & De Bruycker (2007), in a similar research, conducted an IAT between meat versus vegetables and pleasant/positive and unpleasant/negative evaluative concepts, finding that implicit attitudes towards vegetables (as compared to implicit attitudes towards meat) were more positive in vegetarians than in non-vegetarians. Therefore, a limitation that may have influenced our results was calling meat and other animal-derived foods "traditional food", while not distinguishing vegetarians from non-vegetarians in our sample. Another relevant limitation of this study concerns the conceptual ambiguity surrounding the term "green food," particularly in relation to the stimuli used in the IAT. As acknowledged earlier, the classification of products as "green" or "traditional" was based on a predefined list of food items, which may not fully reflect how consumers perceive sustainability in food choices. In fact, while some products may be objectively more sustainable in terms of environmental impact, such distinctions are not necessarily internalized by consumers at an implicit level. Rather, consumers often rely on visible cues such as eco-labels or green claims, as shown in Study 1, to identify whether a product is environmentally friendly, because people are not often experts in food sustainability. Therefore, the absence of significant effects in the IAT could be attributed not to a lack of implicit attitudes, but to the difficulty in automatically assigning the "green" label to a food item in the absence of such cues. In addition, some stimuli categorized as "green food" (e.g., pasta or polenta) may not be immediately or unambiguously perceived as eco-sustainable compared to "traditional", especially within the Italian cultural context. Similarly, traditional items such as "ragù," "mozzarella," or "tortellini" may carry strong cultural and emotional connotations that are unlikely to evoke negative implicit associations, even if they are not classified as green foods. It is possible that only consumers with specific expertise (e.g., nutritionists or food sustainability specialists) may have clearly differentiated implicit

representations of food sustainability categories. Moreover, the comparative nature of the attribute of green food yields other complexity to the matter. In fact, although a definition of green food was provided before the beginning of both the IAT experiment and the focus groups, it is possible that the participants overlooked the comparative nature of the task, misunderstanding how to correctly assign the food items in the right category (green vs non-green), especially for what concerns the IAT. Future research should consider a short debrief to make sure that participants are aware of the facets of the definition of green food. It could also be useful to refine the definition and selection of stimuli for implicit measures, possibly relying on consumer-generated categorizations or including visible sustainability indicators to ensure ecological validity (Steiner et al., 2018). Another possibility is considering the repetition of this experimental design with food images with recognizable eco-labels instead of words stimuli.

Another potential influence in the results can be due to the fact that participants were aware of the objective of the test, namely identifying a preference for traditional foods (Rosseel, 2022). Despite these limitations, the findings encourage further exploration of implicit mechanisms in consumer behavior research. Finally, it is important to note that previous literature highlights the complexity and nuanced attitudes towards eating behavior. Such complexity might not align well with the implicit associations tested in the IAT. In fact, as the calculated IAT effect is based on a comparison of two opposite tasks, resulting scores cannot be interpreted as absolute and instead reflect relative preferences (e.g., a preference for pasta over chicken, regardless of their green or traditional status) (Blanton et al., 2007).

With regard to the results related to the post-experiment online questionnaire, the linear regression analysis we conducted showed that the Effect of Organic Food on Subjective Well-Being (EOFSWB) and Consequences of Green Food Consumption (CGFC) positively predicted GFPB, while Barriers to Green Food Purchase (BAR) negatively influenced reported Green Food Purchase Behavior. These results indicate that the more consumers feel that consuming green food has a positive impact on their lives (on the physical, emotional, social and intellectual dimensions), the more likely they are to buy green food. Furthermore, the perception that this behavior is beneficial for the environment is also a predictor of green food purchase behavior, while perceived barriers to purchase (such as lower availability and higher prices) are negatively associated with it. These findings, in line with results from previous research, extend those insights to the specific domain of green food. Indeed, the physical, functional value of organic products, such as

nutritional superiority, has been found to enhance consumer satisfaction and purchase intention (Rohman et al., 2023). Moreover, emotional, social and intellectual variables has been found to significantly influence consumer attitudes towards organic food (Roh et al., 2022; Rohman et al., 2023). A recent study from the Indian context highlighted that perceived consequences of organic food consumption, such as health benefits and environmental impact, influence its purchase (Harikrishnan et al., 2024). (Harikrishnan et al., 2024). Finally, several studies reported the fact that perceived purchase barriers, such as price sensitivity and lack of awareness, significantly hinder general green purchase behavior (Fehér et al., 2020; Malhotra et al., 2024). Even though most of the cited studies focus on organic food, the results could reasonably be extended, at least in part, to the purchase or consumption of green food.

In conclusion, this study represents the first attempt in literature to investigate implicit negative bias towards green food. Even though we did not find a significant IAT effect, maybe due to the experiment's design and stimuli, this result might represent a noteworthy starting point for future researchers' attempts to study implicit attitudes towards green food. The post-experiment online questionnaire provided some notable results. The regression analysis's results in fact showed that the Effect of Organic Food on Subjective Well-Being and Consequences of Green Food Consumption positively predicted Green Food Purchase Behavior, while Barriers to Green Food Purchase negatively influenced it. This can provide useful insights for marketers and policy makers, who should focus in their interventions on the positive impact of green food on people's lives, while at the same time trying to mitigate the influence of the main perceived barriers to green food consumption.

5.3 Part 2: Perceived barriers and intention-behavior gap regarding green food consumption.

The use of focus groups is a research method widely used to explore attitudes, perceptions, and behaviors in a dynamic and interactive setting. This method involves guided discussions among participants, enabling researchers to uncover in-depth insights that might not emerge in individual interviews or surveys (Morgan, 1996). Typically involving 6 to 12 individuals, focus groups are guided by a facilitator who prompts open-ended questions to promote discussions, encouraging interaction and dialogue among participants (Krueger & Casey, 2015). This interaction fosters the emergence of insights that may not surface in traditional data collection methods, as participants build on each other's contributions and reflect on different perspectives (Morgan, 1996). One of

the main advantages of focus groups is their ability to provide rich, detailed data within a relatively short timeframe, offering a dynamic understanding of group norms, shared attitudes, and divergent views (Barbour, 2024).

In the context of green consumerism, focus groups are particularly valuable for understanding consumers' motivations, barriers, and social norms surrounding sustainable purchasing behaviors. They allow researchers to capture the complexity of consumer attitudes toward green products, including the interplay of environmental concern, perceived product quality, and social influences (Krueger & Casey, 2015). For example, focus groups have been applied to explore the impact of greenwashing on consumers (Seberíni et al., 2024) and for testing marketing strategies, such as product labeling or promotional campaigns, to assess their appeal and resonance with target audiences (Hay et al., 2024). In order to conduct a qualitative analysis about the perceived green attitude-behavior gap regarding green food, similarly to what Bernardes et al. (2018) did regarding eco-sustainable footwear, we selected some influential factors from extant literature to undergo to participants. These were: Green Food Choice Motives, Perceived Attitude-Behavior Gap, Perceived Behavioral Control, Green Habits, Green Food Premium Price, Emotional Reactions to greenwashing and to negative environmental facts, Attitudes Toward Green Marketing, Individual Responsibility in Eco-sustainability and Alternative Appealing Names. These concepts are better explained below.

- *Green Food Choice Motives*. This construct represent the underlying reasons driving consumers' food preferences and consumption behaviors (Onwezen et al., 2019). The necessity for comprehension of consumers' motivations is widely recognized, particularly in the context of green food consumption (Tobler et al., 2011a; Verain et al., 2017). While factors such as environmental consciousness can facilitate the adoption of sustainable dietary choices, perceived barriers (such as the perception that sustainable options are less appetizing or convenient) also exist (Verain et al., 2016). The existence of potential conflicts and trade-offs among various food choice drivers highlights the necessity to explore sustainable consumerism motivations within the specific context of influences on food choices (Johnston et al., 2014). We included food choice motives in our examination to have a deeper understanding of the various drivers consumers consider when buying food and eco-sustainable food in particular.

- *Perceived Green Attitude-Behavior Gap*. This construct refers to the perceived discrepancy between a positive attitude toward green products and the actual purchase behavior of these products by people. During the focus group we addressed directly the green attitude-behavior gap, asking participants if their buying behavior was coherent with their thoughts and beliefs regarding green food.

- *Perceived Behavioral Control*. Perceived behavioral control (PBC) can be defined as an individual's perception of their ability to perform a given behavior (Kiriakidis, 2017). As aforementioned, this is one of the main predictors hypothesized by the Theory of the Planned Behavior. In this specific context, we used this concept in order to assess if participant perceived that they had all the necessary competencies, means and knowledge needed to buy green food and, if not, what they thought to be the underlying causes.
- *Green Habits*. Habit can be defined as the semi-automatic performance of well-learned behaviors (Charng et al., 1988). With "green habits" we refer to the consuetude of buying green food (Ghazali et al., 2018). The more frequently behaviors are performed, the more they become habitual. Consequently, they might lose their reasoned character and, in such cases, behavior is guided less by attitudes and intentions and more by the automaticity of stimulus-and-response (Verplanken et al., 1998).

- *Green Food Premium Price*. It refers to the fact that the price of green food is typically higher than that of conventional food products. This is due to the additional processing costs (Suh et al., 2015). In some cases, consumers may view this premium price as an indicator of quality. However, in other instances, they may perceive it as an unnecessary expense (Premadasa & Fernando, 2022).
- *Emotional Reactions*. It is widely acknowledged that emotions play a pivotal role in shaping human behavior, as evidenced by a substantial body of research across a range of disciplines (Johnson, 2001). The scientific literature provides indeed compelling evidence that emotions exert a direct influence on consumer behavior, particularly in the context of green purchasing (Wang & Wu, 2016). In this study, we thought it would have been useful to ask participant what emotions greenwashing and information about the polluting impact of food elicited to them.

- *Attitudes Toward Green Marketing*. In psychology, the term "attitude" is used to refer to the predisposition to assess something with favor or disfavor (Eagly & Chaiken, 2011). As previously outlined, this is one crucial behavior's predictor according to the Theory of Planned Behavior. In this focus group, the concept was selected in order to evaluate the participants' opinions about green marketing. In fact, despite some authors reports that sentiments toward green marketing are increasingly positive worldwide (Iannuzzi, 2024), other researches states that, due to greenwashing, consumers may have developed negative attitudes toward green products, consisting in the tendency to not believe the environmental information given by advertising (Manuel et al., 2014).
- *Individual Responsibility in Eco-sustainability*. The responsibility for environmental sustainability is multifaceted, involving individuals, organizations, and governments. Each plays a crucial role in fostering sustainable practices and mitigating environmental degradation (European Commission, 2020). The concept of self-efficacy was first proposed by Bandura (1977) and refers to an individual's belief in their capacity to execute or implement an action in order to achieve a successful outcome. Green self-efficacy can be defined as the belief in individuals' ability to perform a given task in order to achieve environmental goals (Chen et al., 2015). In other words, we wanted to know if participants believed that their actions could make a tangible contribution to the environmental cause, or whether they regarded it as a matter that was beyond their responsibility.
- *Alternative Appealing Names*. As already mentioned, meat is the most polluting kind of food. A number of factors have been identified by consumers as barriers to eating less meat. These include enjoyment of meat, perceived importance of meat for nutrition, preference for familiar foods and lack of knowledge and skills involving vegetarian food (Lea et al., 2006; Pohjolainen et al., 2015). Additionally, plant-based options are occasionally framed as the healthier alternative, which may contribute to the perception that they are less tasty (Raghunathan et al., 2006) or less filling (Suher et al., 2016). One simple and cost-effective method to influence consumer preferences may be to modify the terminology used to describe different food items. The influence of language on food choice has been demonstrated in both restaurant and grocery store settings (Wansink et al., 2001; Swahn et al., 2012). For instance, the use of indulgent descriptions for

vegetables has been demonstrated to significantly increase the number of people selecting these options in a university cafeteria (Turnwald et al., 2017). Similarly, the inclusion of vegetarian dishes in the main part of a restaurant menu, as opposed to in a separate vegetarian section, has been shown to significantly increase the proportion of people who chose a vegetarian dish in a prior online experiment (Bacon & Krpan, 2018). Thus, modifying the language and framing of plant-based dishes has the potential to be an accessible and cost-effective strategy for achieving sustainable dietary patterns (Vennard et al., 2018). With the implementation of focus groups, we aimed to gather rich, nuanced, and multilayered insights on the specific issue of green food purchase behavior through social interactions in a group setting. This method is particularly effective for exploring complex issues, generating ideas and understanding participants' attitudes and experiences (Ho, 2024). Given the large amount of quantitative research on the topic, we thought it might be interesting to supplement this body of data with firsthand consumers' opinion.

The aim of the focus group's analysis was to allow a better understanding about the gap related to what consumers think about green food consumption and their actual dietary habits.

5.3.1 Materials and Methods

In this study, we conducted three focus groups with a total of 21 adult consumers taken from the general population (52% females; age range 21-67 years old, mean = 28.10, sd = 9.34) with the aim of studying Italian consumers attitudes regarding green food products and their green consumption habits.

A sample of consumers was selected on the basis of disparate socio-demographic parameters, including age, gender, and education status, in accordance with the principle of maximum diversity (Kumari et al., 2021). Participants were recruited through the researchers' personal contacts via email and private messages invitations. Inclusion criteria for participating in the studies were being above 18 years old and having the opportunity to buy food at least occasionally. This was crucial because, according to the objectives of our research, it was important to recruit direct consumers able to give opinions regarding their motivations.

Despite our effort to recruit people with different characteristics, the educational level was largely skewed towards the first level of university education (see Table 5).

Table 5. Part 2 participants' education level

Education level	N	%
High school diploma	6	28.6%
Bachelor's degree	14	66.7%
Postgraduate training	1	4.8%

The Focus Groups were conducted online on the Google Meet platform (Google LLC, n.d.) and lasted approximately two hours each. The first focus group had 6 participants, the second 7 and the third 8. One of the authors moderated the discussion by giving cues and encouraging free speech among participants. A structured discussion guide with the questions and food images was used to direct the focus group. The guide also included a thorough definition of what "green food" is, and the first thing the moderator did was to explain and answer questions about this concept, to avoid confusion among participants. The food images we used are reported in the thesis' Appendix. The meetings were videotaped and transcribed verbatim after collecting participants' informed consent. In order to design solid focus groups, the influencing factors selected from the literature (Green Food Choice Motives, Perceived Attitude-Behavior Gap, Perceived Behavioral Control, Green Habits, Green Food Premium Price, Emotional Reactions to greenwashing and to negative environmental facts, Attitudes Toward Green Marketing, Individual Responsibility in Eco-sustainability and Alternative Appealing Names) were further subject of analysis on the focus groups. This section will analyze each of these factors allowing a better understanding of consumers' perceptions and consumption habits about green food.

Questions and stimuli about influential factors

To address green food choice motives, we asked: "What is your motivation for buying green food?"; "What do you think are the aspects that can positively influence your decision to buy green food?"; "What are the barriers to buying green food?"; "When you are at a restaurant, do you usually order vegetarian or vegan dishes? Why?". The last question was added to evaluate food choice motives in another setting in addition to the grocery store, i.e. restaurants.

To address the perceived green attitude-behavior gap, the following question was asked to participants: "Is there, in your opinion, a discrepancy between your intention to buy green food and your actual purchases? Why?".

For the perceived behavioral control, we asked: “Would you be able, if you wanted to, to start buying green food?”; “Can you identify green food products when you are shopping in stores or online? Why? Why not?”

To stimulate the discussion about green habits we asked: “Are you in the habit of buying green food? What do you usually buy?”; “Before you buy food, do you check whether it meets green standards?”.

To address the issue of green food premium price we asked: “Do you think green food is worth the extra financial effort? What do you think about it?”.

Concerning the emotional reactions to green food, we asked participants to try to recognize some greenwashed food product image among a set of truly green products. We used images that were intentionally difficult to distinguish in terms of sustainability cues. The rationale behind this choice was twofold: (1) to simulate the ambiguity consumers face in real-world purchasing scenarios when greenwashing is subtle and pervasive; (2) to induce a situation of possible deception, regardless of whether participants could correctly identify the greenwashed product. Immediately after the task, we asked participants to reflect on their emotional reactions upon discovering that at least one of the products was not genuinely sustainable. In this way, we aimed to explore not only their ability to detect greenwashing, but especially the feelings associated with being potentially misled despite their good intentions. Moreover, we informed them about some little-known foods production process that consume far more resources than one would expect. For instance, one of the foods considered was quinoa, which production process is causing harm to people and ecosystems (Palomino et al., 2023). Then we asked them: “Did you know that these foods had such a great impact on the environment? What do you think about it?”.

In order to explore Attitudes Toward Green Marketing, we asked: “What do you think about green advertising? How do you judge these ads?”; “What would you like to read or see (pictures, colors, symbols, etc.) on the packaging of a green product in order to have more incentive to buy it?”.

To address the individual responsibility in eco-sustainability we asked: “Who do you consider to be primarily responsible for environmental protection? Why?”.

In order to explore people’s opinions about alternative appealing names, we showed participants some vegetarian dishes (e.g. a vegetables lasagna, see Figure 2) and then we asked them: “What would you call these vegetarian dishes to make them more inviting? In your opinion, if they were called that, would you order them more?”.

Figure 2. Vegetarian lasagna showed during the focus groups

Data Analysis

To analyze the content of the focus groups we used the thematic analysis methodology, which was found to be an useful and flexible tool, as it belongs to the category of qualitative analytical methods independent of theory or epidemiology (Braun & Clarke, 2006). According to Braun and Clarke's (2006) definition, thematic analysis is a method for identifying, analyzing, and reporting patterns (called “themes”) within data. Thematic analysis can be considered as a realist method that reports on participants' experiences, meanings, and realities, or as a constructionist method that examines the ways in which events, realities, meanings, and experiences are the effects of a variety of factors operating within society (Braun & Clarke, 2006). Braun & Clarke (2006) provided a detailed, step-by-step definition of the process of thematic analysis which we followed for this study. The procedure is reported below.

1. Transcribe and re-read the data in order to gather initial ideas.
2. Code the interesting aspects of the data and collect the relevant data for each code. This involves organizing the data into groups that have meaning.
3. Group each code into a potential theme. This allows the researcher to collect each data item that is relevant to the potential theme.
4. Check that the theme works in relation to the extracted coding and within the data set, then make a theme map.

5. Define the specifics of each theme, generating clear definitions and a name to associate with each of them.
6. Final analysis of selected parts, tracing the thematic analysis back to the research question and inherent literature

In essence, thematic analysis involves the identification of recurrent patterns of meaning within a given data set, which can be conceptualized as themes. Although thematic analysis as conceptualized by Braun & Clarke (2006) is commonly associated with an inductive, data-driven approach, the method is inherently flexible and can also be applied in a theory-driven manner, as they themselves acknowledge. In this study, we adopted a predominantly deductive approach: themes and codes were developed based on prior theoretical constructs related to consumer behavior and green consumption, with the aim of examining how participants' discourse reflected, reinforced, or challenged these dimensions. This analytical choice was motivated by the exploratory-confirmatory nature of our research questions, which sought to test the resonance of established frameworks within qualitative narratives. Nevertheless, while the thematic structure was informed by existing theory, we remained open to emergent subthemes and unexpected insights, which were incorporated iteratively during coding. This hybrid orientation allowed us to maintain analytical consistency while also capturing the richness and variability of the data.

5.3.2 Results

The thematic analysis of the three focus groups resulted in the summary of participants' responses represented in Table 6. As visible in the table, participant's answers were represented schematically in codes, together with the frequency of the response and the correspondent percentage on the total of 21 participants. This method is in accordance with the one from Onwuegbuzie et al. (2009) as it combines thematic coding with the quantification of response frequencies, providing both qualitative depth and quantitative rigor. In line with their recommendations, multiple types of data were collected beyond verbal transcripts. Moreover, by quantifying the occurrence of themes, the approach follows the authors' suggestion to enhance the rigor of qualitative research by incorporating elements of descriptive statistics, such as response counts and percentages, to better capture group-level patterns

Table 6. Focus groups' participants schematic answers (codes) and correspondent questions and investigated variables.

Variable	Questions	Codes (number, %)
Green Food Choice Motives	"What is your motivation for buying green food?";	Environment protection (20, 95.2%), health benefits (7, 33.3%), better quality (4, 19%), market influence (2, 9.5%), animal welfare (1, 4.8%), resources conservation (2, 9.5%), local economy support (1, 4.8%), future generations' wellbeing (2, 9.5%), culinary innovation (1, 4.8%).
	"What do you think are the aspects that can positively influence your decision to buy green food?"	Price (15, 71.4%), recognizability (10, 47.6%), awareness campaigns (6, 28.6%), reliable eco-labels (6, 28.6%), greater availability (3, 14.3%).
	"What are the barriers to buying green food?"	Price (10, 47.6%), unclear labels (6, 28.6%), taste (1, 4.8%), aesthetics (1, 4.8%), defense of the tradition (1, 4.8%), little availability (4, 19%), lack of time (4, 19%).
	"When you are at a restaurant, do you usually order vegetarian or vegan dishes? Why?"	Yes (9, 42.8%), no (6, 28.6%). Dietary choices (4, 19%), taste (3, 14.3%), culinary innovation (2, 9.5%), little availability (1, 4.8%), curiosity (1, 4.8%).
Perceived Attitude-Behavior Gap	"Is there, in your opinion, a discrepancy between your intention to buy green food and your actual purchases?"	Yes (17, 80.9%), I don't know (1, 4,8%), No (3, 14.3 %)

	"Why?"	Lack of attention (5, 23.8%) lack of knowledge (4, 19%), price (4, 19%), lack of availability (1, 4.8%), lack of habit (1, 4.8%), recognizability (1, 4.8%), social norms (1, 4.8%).
Perceived Behavioral Control	"Would you be able, if you wanted to, to start buying green food?"	Partially (8, 38.1%), Yes (8, 38.1%), No (5, 23.8%).
	"Can you identify green food products when you are shopping in stores or online? Why? Why not?"	Lack of knowledge (12, 57.1%), reliable eco-labels (9, 42.8%), price, (7, 33.3%), lack of attention (2, 9.5%), lack of time (1, 4.8%).
Green Habits	"Are you in the habit of buying green food?"	Yes, for some kinds of foods (15, 71.4%), I don't know (4, 19%), No (2, 9.5%).
	"What do you usually buy?"	Fruits and vegetables (10, 47.6%), eggs (6, 28.6%), dairy (4, 19%), meat (4, 19%).
	"Before you buy food, do you check whether it meets green standards?"	Yes (15, 71.4%), No (6, 28.6%).
Green Food Premium Price	"Do you think green food is worth the extra financial effort?"	Yes (8, 38.1%), Only if it's not too much (3, 14.3%), I don't know (10, 47.6%).
	"What do you think about it?"	Unfair (4, 19%), better quality (2, 9.5%), incentives (2, 9.5%).
Emotional Reactions	"How does this greenwashing case make you feel?"	Surprised (9, 42.8%), teased (7, 33.3%), disappointed (3, 14.3%), angry (2, 9.5%), confident (2, 9.5%), ignorant (2, 9.5%), skeptical (1, 4.8%), anxious (1, 4.8%), confused (1, 4.8%).

	"Did you know that these foods had such a great impact on the environment?"	No (9, 42.8%), Partially (5, 23.8%), Yes (1, 4.8%).
	"What do you think about it?"	Not surprised (7, 33.3%), intention to change (3, 14.3%), guilt (2, 9.5%), awareness campaigns (2, 9.5%), weird (1, 4.8%), lack of interest (1, 4.8%).
Attitudes Toward Green Marketing	"What do you think about green advertising? How do you judge these ads?"	Too infrequent (7, 33.3%), skepticism (6, 28.6%), élite (1, 4.8%), paternalistic (1, 4.8%).
	"What would you like to read or see (pictures, colors, symbols, etc.) on the packaging of a green product in order to have more incentive to buy it?"	Recognizability (5, 23.8%), simplicity (4, 19%), guaranteed certificate (4, 19%), informative (4, 19%).
Individual Responsibility in Eco-sustainability	"Who do you consider to be primarily responsible for environmental protection? Why?".	Governments (8, 38.1%), multinational firms (7, 33.3%), everyone (5, 23.8%), consumers (4, 19%).
Alternative Appealing Names	"What would you call these vegetarian dishes to make them more inviting? In your opinion, if they were called that, would you order them more?"	Defense of the tradition (9, 42.8%), vegan/vegetarian label (6, 28.6%), descriptive language (4, 19%), I don't care/I don't know (4, 19%).

Note. In focus groups it was not mandatory for participants to respond to all questions, this is the reason why the total of the responses is not always equal to 21.

Subsequently, we grouped the codes in themes according to their meaning and similarity as represented in Table 7. The "Facilitators" and "Barriers" categories were in turn divided into sub-categories (sub-themes). This further classification allowed us to grasp additional interesting variables of interest that emerged from the focus groups.

Table 7. Codes' aggregation in themes and sub-themes

Theme	Sub-Theme	Codes
Facilitators	Environmentalist Motives	Environment protection, resources conservation, market influence
	Ethical Motives	Animal welfare, local economy support, future generations' wellbeing
	Openness to Novelty	Culinary innovation, curiosity
	Other Facilitators	Health benefits, reliable eco-labels, better quality, greater availability, incentives, dietary choices, price
Barriers	Lack of Resources	Lack of time, lack of attention, lack of knowledge, lack of habit
	Other Barriers	Unclear labels, little availability, taste, social norms, aesthetics, vegan/vegetarian label, price, tradition defense

Negative attitudes towards green marketing	Infrequent, skepticism, élite, paternalistic
Desired eco-labels characteristics	Simplicity, guaranteed certificate, informative, descriptive language

The following section presents the analysis of participants' answers to each of the influencing factors selected from the literature review:

Green Food Choice Motives: this construct gave us the opportunity to delve into a number of participants perceived green food purchase motives. Following the "What is your motivation for buying green food?" question, they described the reasons that brought them to buy green food in the past, hence factors that already determined an eco-sustainable shift in their choices, such as the reasons included in the sub-theme Environmentalist Motives (environment protection, resources conservation and the possibility to influence the market toward greener choices), Ethical Motives (animal welfare, local economy support, future generations' wellbeing) and Other Facilitators, that related to diverse kinds of benefits consumers can obtain from green food consumption, like health benefits, a better quality of the foods and the will to discover new ingredients and recipes. A male, 32-year-old participant stated: "My consumption decisions can influence the market and ensure future generations have the same resources". This kind of answer well represents the concept of green self-efficacy we described previously.

With the subsequent question ("What do you think are the aspects that can positively influence your decision to buy green food?"), we investigated which factors could further encourage participants' purchasing green food. These were a lower price, greater recognizability, also reached through reliable eco-labels, separate supermarket shelves dedicated to green food, awareness campaigns aimed to inform them on how to distinguish such products from traditional ones and a greater availability of these products, perceived as scarce at the grocery store.

Finally, we asked what, in their opinion, prevented them consuming more green food ("What are the barriers to buying green food?"). The perceived barriers were high prices, unclear labels, worst or unknown taste, worst aesthetics of some green food (such as biologic fruit), and

the fact that, when buying food, they often experienced a lack of resources such as time and availability of such products. A 23-year-old female participant stated: “I think there are some things whose taste are irreplaceable by green products, for example Nutella, I know there are substitutes but they are not comparable” (ironically, Nutella Company launched their Vegan Nutella only few months after the focus group). Moreover, some participants mentioned the fact that to adhere to traditional Italian cuisine some specific ingredients are necessary, and these ingredients are often not green. A 27-year-old female participant stated “We Italians value traditional cuisine very much. To ensure the traditionality of a certain product you must buy certain ingredients rather than others.” On the other hand, other participants stated the opposite opinion, saying that the will to experiment with new ingredients in the kitchen was one of the motives that brought them to buy green food in the past. One participant (male, 32 years old) stated: “It bothers me personally that people always continue to come up with the same recipes from traditional cuisine, full of dairy or meat. I'd like to experiment a new kind of nutrition”. We grouped these opposite attitudes in the Openness to Novelty sub-theme. Finally, to have a broader view on the reasons that may prevent green food consumption in another setting beside supermarkets, we also asked: “When you are at a restaurant, do you usually order vegetarian or vegan dishes?”. Almost half of participants said yes (43%), bringing as motives diets that we grouped in the Dietary choices sub-theme (such as being vegan or vegetarian or wanting to reduce meat consumption) and curiosity, that we already mentioned as a possible facilitator to green food consumption. The reasons given for not ordering these foods at the restaurant were, again, little availability of these dishes and taste preferences.

Perceived Green Attitude-Behavior Gap: this variable gave us the opportunity to address directly participants’ opinions about the green attitude-behavior gap. The majority of the participants (81%) stated that they belong to the category of people that don’t buy as much green food as they wished (“Is there, in your opinion, a discrepancy between your intention to buy green food and your actual purchases?”). The reasons they brought to explain this discrepancy were related to various sub-themes. First, the Lack of resources sub-theme (lack of time, lack of attention, lack of knowledge, lack of habit) was often mentioned. This is in line with the Dual Process Theory (Kahneman, 2013) we mentioned in the introduction paragraph, that states that people act in line with their beliefs only when they have enough resources (motivation, ability and opportunity) available. Moreover, a factor in line with the Theory of Planned Behavior emerged, that is social

norms. With this term we refer to the perceived social pressure to perform or not to perform a certain behavior (Ajzen, 1991), that in this case was eating traditional food. A participant (female, 25 years old) said: "I do my shopping through an environmentally sustainable company. The problem, however, is when I'm at the restaurant or having an aperitif with my friends because I don't want to be the only one eating different things." Other perceived reasons for the attitude-behavior gap phenomenon were price and recognizability, well-known green purchase barriers.

Perceived Behavioral Control: The concept was employed to ascertain whether participants perceived that they had access to the needed resources to purchase eco-sustainable foodstuffs and, if not, to identify the underlying factors that may have contributed to this perception. When we asked: "Would you be able, if you wanted to, to start buying green food?", the majority of participants answered "Partially" (38%) or "Yes" (38%). That is in line with recent findings, that indicate that a significant portion of consumers are aware of green products, which include food items produced in environmentally friendly ways (Chethan et al., 2024; Puja & Sharma, 2024). The factors that participants reported as obstacles to recognize green food products (question: "Can you identify green food products when you are shopping in stores or online?") were lack of knowledge, of time and of attention when shopping, as theorized by Kahneman's Dual Process Theory (Kahneman, 2013) and high prices, a well-known green consumption barrier.

Green Habits: To assess participants' habits in green food consumption, we asked: "Are you in the habit of buying green food? What do you usually buy?". The majority of participants stated that they usually buy some green food habitually (71%), mainly fruits and vegetables, eggs, dairy and meat. We also asked: "Before you buy food, do you check whether it meets green standards?"; Most of participants answered "Yes" (71%). These answers make us notice that the majority of participants already bought some green food habitually, although they declared to belong to the category of people affected by the intention-behavior gap phenomenon.

Green Food Premium Price: this variable aimed to assess participants' opinion on the premium price that is often applied on eco-sustainable foodstuff (question: "Do you think green food is worth the extra financial effort? What do you think about it?"). The majority of participants did not have a strong opinion about green food's premium price ("I don't know, 48%), while another part believed it was fair (38%), and the remainders thought that it was acceptable only if not too high (14%). The opinions that emerged were about the fact that the higher price is justified by

better quality, that paying a premium price for an eco-sustainable product is unfair, and that the government should compensate the price difference with eco-incentives. A female, 23-year-old participant declared: “In my opinion it is worth it because you pay for extra quality, however many people are held back by this excessive cost so maybe there should be incentives or promotions”.

Emotional Reactions: With this variable, we aimed to explore participants’ emotional reactions. We asked participant what emotions marketing deception elicited to them showing them some greenwashing case and then asking them how they felt. The emotions reported were: surprise, disappointment, anger, confusion, anxiety and the feeling of being teased. Moreover, participants reported the sensation to be ignorant for not recognizing the deception and the fact that after that realization they felt more skeptical about green products advertising. Then we presented them with information about the food production process heavily polluting and asked them if they knew these facts and how receiving that information made them feel. The majority of participants (43%) did not know that the mentioned foods polluted so much, while some knew it only partially (24%). They expressed their disappointment, though not surprised stating that this information made them feel guilty reluctant to consume those foods anymore. They also emphasized that more people should be informed and that awareness campaigns are necessary. A participant (female, 21-year-old) said: “I didn't know about that, in my opinion, there should be more talk about it, because if there is more awareness, then maybe there will be a reduction in purchases and also a demand reduction”. One participant was suspicious and commented that those facts were “Weird”. Another one said that he did not care about those facts.

Attitudes Toward Green Marketing: The concept was selected to evaluate participants’ opinions about eco-sustainable marketing. We asked: “What do you think about green advertising? How do you judge these ads?”. Participants stated that green advertising was too infrequent (many of them could not recall an example), that they were skeptical about it, that it was something intended for the élite, and that they found it paternalistic. A 27-year-old male participant stated: “I don't trust advertising, and I think that it should consist solely of information, rather than being paternalistic and wanting to bring out guilt, when it is not our fault! We need to be put in the position, through information and culture, to make the right choices. I would like to see a serious awareness campaign.” Then, to explore what participants wished to see on the green products packaging at the supermarket, we asked them: “What would you like to read or see (pictures, colors, symbols, etc.) on the packaging of a green product in order to have more incentive to buy it?”. Most of the

participants stated that they wished for a green advertisement that is recognizable, simple, guaranteed with a certificate, and informative. A 28-year-old male participant said: "I wish there was a symbol, something from an institution that can really demonstrate its reliability. Something simple, such as a sticker that can certify and that stands out."

Individual Responsibility in Eco-sustainability: With the following question "Who do you consider to be primarily responsible for environmental protection? Why?" we wanted to know if participant felt that their actions could make a tangible contribution to the environmental cause, or whether they considered it to be a matter outside their responsibility. The majority of participants stated that environmental protection was the government's responsibility. The second most frequent answer was "Multinational firms", followed by "Everyone" and individual consumers. According to these answers, participants' green self-efficacy was not very high, as most of them placed environmental protection responsibility outside of their responsibility and possibilities.

Alternative Appealing Names: In order to explore people's opinions about the possibility to frame plant-based dishes in a more appealing way, we showed participants some vegetarian dishes and then we asked: "What would you call these vegetarian dishes to make them more inviting? In your opinion, if they were called that, would you order them more?". A large proportion of the participants stated that traditional dishes' names could not be changed if the ingredients differed from the original recipe. Other participants thought that the vegetarian/vegan indication was the right denomination, while some other participants preferred a descriptive language, that depicts the dish's characteristics instead of labelling it as vegetarian. One 32-year-old male participant said: "In my opinion they should not use traditional dishes' names, like Lasagna, because people will think it's not good. Unfortunately, there is a lot of stigmas on the term "vegan" or "vegetarian"". This finding is in line with previous research that found that is possible to significantly increase the tendency of non-vegetarians to eat plant-based food by not labelling it as "vegetarian" (Vennard et al., 2018).

5.3.3 Discussion

The focus groups of this study provided a qualitative understanding of consumers' perceptions and behaviors. Participants shared with us their opinions that in part reflected barriers and facilitators well-known by literature and in part provided novel insights. Most of the variables emerged from the answers to the questions related to food choice motives were perfectly in line with the existing

research about green purchase facilitators and barriers. The drivers included in the Health and Environmentalist Motives sub-themes were already been associated with higher consumption of organic food products (Marty et al., 2022). Other facilitators recurrent in literature that emerged were the fact that these products are believed to have a better quality that partially justifies the high prices (Muñoz-Martínez et al., 2024), that green self-efficacy (i.e., the belief that the action of an individual can benefit the environment) is positively related to green purchase behavior (Sharma et al., 2023), that the availability of food is an important variable according to consumers (Abrahamse, 2020), and that ethical motivations (e.g., animal welfare, local economy support, or future generations' wellbeing) also play a role in green consumerism (Karsaklian & Fee, 2014). Moreover, the fact that many consumers would prefer green food products to be more recognizable through clear ad reliable eco-labels is also in line with extant literature, stressing the need for fewer, shared, and clearer eco-labels (Potter et al., 2024). One interesting thing to note regarding green self-efficacy is that while participants were aware of the fact that their actions can have a concrete positive impact on the environment and on society at large (as visible in the Environmentalist and Ethical motive's sub-themes), the majority of them stated that environmental protection was a governments and firms' responsibility. Future research could delve into this discrepancy between consumers' cognitive knowledge and their perceived responsibility.

Regarding green food purchase barriers, our results are consistent with the literature but also offer new insights. A price often higher than that of traditional food (Fehér et al., 2020) and product appearance (sometimes worst in eco-sustainable food) (Aertsens et al., 2009) have been reported by participants as significant barriers to green food purchasing. Moreover, we found that taste preferences can be a significant barrier. This could be true especially for some segments of the populations, since people that are not familiar with novel foods are more prompt to dislike their taste (Boukid, 2021). Finally, two opposite aspects relatively new to green food literature emerged: defense tradition and culinary innovation. Some of the participants indicated attachment to traditional food practices as a barrier to consuming green food. Such practices, in fact, are deeply embedded in cultural identity and heritage, so people may resist altering recipes that have been passed down through generations, even if they are less sustainable (Goel et al., 2023). Psychological barriers, such as nostalgia and the emotional connection to traditional foods can impede the adoption of new, sustainable dietary practices (Stevens, 2014). However, the opposite trend has also been reported by focus groups' participants. In fact, consumers who are more open

to new experiences tend to favor eco-sustainable food options as they are more likely to appreciate the benefits of environmentally friendly practices (Rabadán & Bernabéu, 2021). Moreover, in a recent paper on cultured food, curiosity was found to influence consumers' willingness to try new products (Arango et al., 2024). Future research could further delve into these interesting variables, investigating which factors bring people to adopt the defense of the tradition or the culinary innovation attitude.

Summarizing, the picture emerged from these three focus groups depicts a scenario more complex than the one of a "pure" attitude-behavior gap, in which consumers wish to buy green food and then do not do it. In fact, what resulted from our qualitative analysis is that most of participants are already used to buying some green food products but limited to a part of their grocery shopping. That is due to several reasons but the principal was a lack of resources (knowledge, time, attention), as posited by the fast decisional pathways theorized by Danner and Thøgersen (2022) and Kahneman (2013). Another notable attitude emerged from the discussions is that receiving information about greenwashing and polluting production processes elicited in participants various emotions, that fostered the intention to shift their behavior towards greener choices, but at the same time increased their skepticism and cynicism ("I'm disappointed but not surprised") toward green advertising. Future research should further deepen these emotional aspects. Another important point brought by participants was the necessity for recognizable, simple, and informative food eco-labels, accompanied by awareness campaigns aimed at increasing consumers' environmental knowledge. Marketers and policymakers should take a leaf out of this suggestion when designing advertising and informative interventions. These awareness campaigns could also help shifting consumers' perceptions of responsibility about environmental protection to a position of greater self-efficacy, a fundamental factor to support green purchasing choices that resulted scarce in our focus groups' participants. Finally, we analyzed the possible application of alternative appealing names in green food descriptions. Again, ambivalent opinions emerged, with part of the participants finding the use of the terms "vegetarian" and "vegan" a good decision, and the other finding it unsuitable because of tradition defense reasons and preferring a descriptive language. This alternative appealing strategy could be a cheap and effective method to foster green food purchase behavior that marketers should consider.

The Focus Group method is not without limitations. It is inevitable that group dynamics exert a direct influence on the discussion. Conformity or cohesion, in fact, may impede the

successful conduction of studies, resulting in distortions of the results and participants' reactions (Colucci, 2007). Moreover, the presence of a moderator and videotaping in the focus group can influence the respondents' behavior, as respondents may become more cautious, censor their responses or simply adjust to the expectations of the moderator (Puzanova et al., 2023). Indeed, the latter should maintain a neutral facial expression when conducting the group, which is an extremely challenging task. That is because, according to Ekman et al. (1969), mimic reactions appear involuntarily and are virtually uncontrollable.

5.4 General Discussion

This two-parts study sought to investigate the interplay between implicit and explicit attitudes toward green food and their influence on green food purchase behavior through two complementary methods. Part 1 utilized an Implicit Association Test (IAT) and a post-experiment questionnaire to quantify the predictors of green food purchase behavior, while Part 2 employed a qualitative approach via focus group discussions to explore consumer perceptions and explicit attitudes in greater depth. Together, these studies provide a nuanced understanding of the factors shaping consumer behavior regarding green food.

Part 1 revealed that while the IAT did not detect significant implicit associations towards green food, the explicit measures in the post-IAT questionnaire identified key predictors of green food purchase behavior (GFPB). Specifically, the Effect of Green Food on Subjective Well-Being (EGFSWB) emerged as the strongest positive predictor, highlighting the role of personal benefits in driving purchase behavior. Additionally, perceived Consequences of Green Food Consumption (CGFC) were positively associated with GFPB, while Barriers to Green Food Purchase (BAR) had a negative impact. These findings indicate that consumers who perceive a favorable impact of green food consumption on their lives (across the physical, emotional, social and intellectual domains) are more inclined to purchase green food products. In contrast, perceived barriers to purchase (such as lower availability and higher prices) are negatively associated with GFPB.

Complementing these findings, Part 2 provided rich qualitative insights into the practical and attitudinal barriers to green food consumption. Notably, the focus group analysis uncovered a tension between the defense of culinary traditions and a willingness to embrace innovation in green food offerings. Additionally, participants expressed a preference for descriptive labels over the term "vegetarian" when naming dishes, suggesting that language framing plays a crucial role in shaping consumer acceptance. These qualitative insights highlight the complexity of consumer

perceptions and underscore the need for tailored communication strategies to address both cognitive and emotional dimensions of food choice decision-making.

Together, the results of these studies underscore the importance of addressing both perceived benefits and barriers to green food consumption. While the focus group discussions yield numerous useful insights, implicit attitudes as measured by the IAT may require further exploration with refined methodologies or in different cultural or demographic contexts. The findings also highlight actionable pathways for interventions, such as emphasizing the positive benefits of green food, minimizing perceived barriers, and strategically framing green food options to align with consumer preferences. However, an important limitation of this study is that the results come from a completely Italian population sample, hence it is not possible to extend these results to other countries. In fact, each country has its own food culture and consequent consumption habits. It would be interesting for future research to conduct cross-country comparisons.

Future research should consider integrating longitudinal designs to capture changes in attitudes and behaviors over time, as well as testing interventions aimed at reducing barriers and enhancing the perceived benefits of green food. Additionally, exploring implicit attitudes with alternative methods or in specific consumer segments could provide further insights into the role of automatic processes in GFPB. We suggest that future research continue to use together quantitative and qualitative methods to grasp a more nuanced view of the phenomenon under study. The advantage of combining qualitative and experimental methods is the in-depth analysis of the phenomenon under study (Sciberras & Dingli, 2023). This is achieved by utilizing the focus group to provide context and insight into the opinions and experiences of participants, while the experiment allows for the control of conditions and the impact on respondents, as well as the testing of hypotheses (Puzanova et al., 2023). For a thorough overview on opportunities and limitations of combining focus group and experiment methods refer to Puzanova et al. (2023).

5.5 Conclusions

This research aimed to explore implicit attitudes toward green food and consumers' attitudes towards barriers and the attitude-behavior gap in green food purchasing through two complementary studies. Part 1 employed an Implicit Association Test (IAT) to measure unconscious associations but did not yield significant results. This outcome highlights potential challenges in capturing implicit attitudes in this context and suggests that such attitudes may play

a limited role in the green food purchasing process or require more refined methodological approaches. Nevertheless, the post-IAT online self-report questionnaire revealed a positive association between the Effect of Organic Food on Subjective Well-Being and Consequences of Green Food Consumption and green food purchase behavior, and a negative association between perceived Barriers to Green Food Purchase and Green Food Purchase Behavior. Part 2, which involved focus groups, provided rich qualitative insights, revealing explicit barriers and motivators that influence consumer behavior. Participants highlighted concerns such as product availability and recognizability, eco-labels trustworthiness, and the price barrier, alongside broader social and cultural factors shaping green food choices. Some notable factors, interesting for future research, emerged from the focus group discussions: the ambivalence between tradition defense and culinary innovation opinions and the vegetarian label versus descriptive language preference regarding dishes names.

The findings underscore the value of combining quantitative and qualitative methods to deepen our understanding of consumer attitudes and behaviors. Overall and despite its limitation, this research advances our understanding of the attitude-behavior gap in sustainable food consumption and offers valuable guidance for policymakers, marketers, and other stakeholders seeking to promote eco-friendly dietary choices. While implicit measures like the IAT may not always align with explicit self-reports or behavioral outcomes, the qualitative data offer actionable insights for marketers and policymakers. For instance, strategies that enhance product visibility, improve communication of product attributes, and address other specific consumer concerns could bridge the green food attitude-behavior gap. Future research should continue to refine implicit measurement techniques and explore how implicit and explicit attitudes interact over time. By doing so, we can better understand and influence consumer behavior to support more sustainable food choices.

Chapter 6. Study 3: Product Characteristics and Emotions to Bridge the Intention-Behavior Gap in Green Food Purchasing

Abstract

Promoting environmentally friendly behaviors is a pivotal strategy in addressing climate crisis. The food industry's impact on pollution and resource consumption underscores the importance of fostering eco-sustainable food consumption, which can significantly benefit the environment. However, despite the global surge in green purchase intentions, a noticeable discrepancy persists between these intentions and actual purchasing behavior. This study aimed to investigate the influence of various factors on the likelihood of purchasing green food. An online survey was administered to Italian adult consumers (n = 832, 66% female, aged 18–84 years), collecting sociodemographic data and assessing emotions related to green purchases, perceptions of green food characteristics, intention to buy green food, and frequency of green food purchases. Through cluster analysis, three distinct consumer categories emerged: Coherent Buyers (individuals willing to buy green food and actively doing so), Coherent Non-Buyers (individuals who have no intention to buy green food and do not buy it), and Non-Buyers with Favorable Intentions (individuals expressing willingness to buy green food but not following through with purchases). Results from multinomial logistic regression analysis revealed that several factors influenced the likelihood of being categorized in the other two categories, as opposed to the Coherent Buyers one. These factors included younger age, a lower sense of pride associated with purchasing green products, and considering healthiness, natural content, and eco-sustainability of food less important and familiarity of green food more important. These findings provide valuable insights for marketers and policymakers, facilitating efforts to bridge the gap between green food intentions and behaviors and promote a shift toward a more eco-sustainable dietary pattern.

6.1. Introduction

The climate crisis poses a formidable challenge for current and future generations. Recognizing its urgency, the United Nations designated it a high-priority issue within its sustainable development goals in 2018 (United Nations Department of Economic and Social Affairs, 2018). Despite decades of awareness (Matthes, 2019), only in recent years have we witnessed increased international institutional recognition and heightened public attention towards this critical topic.

As public environmental awareness and concern grows, so does the demand for green products among consumers (Wang et al., 2019). This phenomenon, termed "green consumption", involves making purchases that align with environmental conservation for both present and future generations (H. V. Nguyen et al., 2019). Examples include opting for organic products, clean and renewable energy sources, and items with minimal environmental impact (ElHaffar et al., 2020). Promoting such consumption has proven effective in reducing environmental harm without compromising the quality of the purchase's economic health (Liobikienė & Bernatonienė, 2017). However, despite consumers worldwide expressing a growing interest in pro-environmental products, research consistently reveals a gap between intention and actual buying behavior (Durif & Boivin, 2018; ElHaffar et al., 2020; Gleim & J. Lawson, 2014). Known as the "green attitude-behavior gap" (Park & Lin, 2020), the "green intention-behavior gap" (Frank & Brock, 2018), or the "motivation-behavior gap" (Groening et al., 2018), this phenomenon presents challenges for both scientific research and policymaking.

The European Commission's Joint Research Center recently highlighted that an individual environmental footprint is primarily influenced by food consumption, housekeeping, and transportation (Šajn, 2020). In this article, we focus specifically on food consumption. While previous research predominantly examined green products in general (Liobikienė & Bernatonienė, 2017), the increasing emphasis on sustainability warrants targeted investigations within specific products categories. Motivations and factors driving purchase behavior may indeed vary across different products (Luthra & Deshwal, 2022). For instance, use of energy-efficient appliances may be motivated by cost savings (Liobikienė & Juknys, 2016), while health concerns drive organic food and cosmetics purchases (Chen & Chang, 2012; Magnusson et al., 2001). For a comprehensive review refer to Luthra and Deshwal (2022).

Defining "eco-sustainable" or "green food" remains contentious due to widespread greenwashing (Peattie & Crane, 2005) and lack of consensus in the scientific community. Precisely determining what constitutes green food is complex, considering factors such as greenhouse gas emissions, cropland use, freshwater use, and fertilizer-related pollution (Springmann et al., 2018a). For our purposes, we adopted a comprehensive definition: green food encompasses products with features or manufacturing methods that have a lower environmental impact compared to other items in the same category throughout their entire life cycle, from raw material collection to disposal. This definition emerged from the work of Durif and colleagues (Durif et al., 2010), who

meticulously analyzed and compared 35 definitions sourced from academic, industrial, and consumer literature.

The Role of Eco-Sustainable Diets

Promoting eco-sustainable diets plays a pivotal role in combatting climate change. While the environmental impact of specific food groups varies, it is widely recognized that reducing the environmental footprint of food production necessitates curbing animal-based foods (Springmann et al., 2018a), particularly meat consumption. Meat production alone contributes approximately 14.5% of total global greenhouse gas emissions (Food and Agriculture Organization of the United Nations (FAO), 2013). This holds especially true in countries with high meat consumption (such as the USA and Europe) or rapid expansion (such as China and Brazil) (Machovina et al., 2015; Stoll-Kleemann & Schmidt, 2017). Besides meat, reducing other animal products (such as fish, eggs, and dairy) could significantly lower an individual's carbon footprint by up to 22%, surpassing the impact of most other household actions (Lacroix, 2018). Additionally, the livestock industry utilizes 33% of the world's arable land for cattle feed (Steinfeld & FAO, 2006). Redirecting this land to crop cultivation for human consumption could yield 70% more calories (Pribis et al., 2010), potentially feeding an additional four billion people (Cassidy et al., 2013), which is more than the expected population growth over the next 30 years (United Nations, 2019).

These data underscore our inefficient use of resources, converting a substantial amount of food suitable for human consumption into less efficient and more polluting animal-based products (Garnett, Godde, Muller, Röös, Smith, de Boer et al., 2017). Adopting a sustainable diet not only benefits the environment but also positively impacts physical health (Springmann et al., 2018b) and psychological well-being (Ismael & Ploeger, 2020). A comprehensive study (Springmann et al., 2018b) that explored mortality rates related to diet and environmental impact across 150 countries revealed that predominantly plant-based diets promote longevity and reduce the incidence of age-related diseases. Chronic disease-related mortality decreased by 19% for flexitarian diets (including small amounts of animal-source foods) and up to 22% for vegan diets (exclusively plant-based) (Springmann et al., 2018b). Furthermore, energy-balanced, low-meat dietary patterns significantly mitigate environmental impact globally, affecting greenhouse gas emissions, nitrogen and phosphorus application, cropland use, and freshwater consumption (Springmann et al., 2018b). Beyond environmental and public health benefits, evidence suggests that sustainable diets positively impact psychological well-being (Springmann et al., 2018a;Wang

et al., 2020). For instance, recent research found that green food consumption mediates the relationship between perceived consumer effectiveness (the belief that consumers' choices impact the environment) (T. T. H. Nguyen et al., 2019) and psychological well-being (Wang et al., 2020). When people recognize their choices' tangible contribution to environmental protection, positive emotions motivate them to engage in green food consumption, enhancing overall satisfaction and well-being (Wang et al., 2020; Xiao & Li, 2011).

While we have highlighted the significant benefits of transitioning to a more sustainable diet for society, the practical question remains: how can governments, marketers, and policymakers effectively encourage sustainable consumer behaviors? A promising starting point lies in profiling consumers, recognizing that different subgroups within the population respond to different inputs (Palnau et al., 2022). Drawing from the existing literature, we undertook consumer segmentation to identify variables predicting membership in specific categories. By understanding these distinctions, we gain valuable insights into tailoring strategies that promote sustainable choices and drive positive environmental impact.

Understanding Green Consumers: Segmenting Intention-Behavior Gaps

In recent decades, bibliometric analyses have explored the topic of green consumerism. One persistent research gap identified by these studies is the profiling of non-buyers who express favorable intentions (Haba et al., 2023). To address this gap, the authors suggest focusing future research on identifying distinct green consumer segments based on demographic, psychographic, and behavioral characteristics. To do this, it is crucial to recognize the need to study not only consumer characteristics, but to consider their relationship to green purchasing behavior. However, the majority of studies on this topic have mainly examined the characteristics associated with purchase intention. Such an approach would fail to contribute meaningfully to the goal of understanding and intervening in the attitude-behavior gap (H. V. Nguyen et al., 2019). Building upon insight from the existing literature, our study aimed to segment green customers based on their purchasing intentions and behaviors. Through a cluster analysis, we categorized consumers into three distinct groups, each representing a different intention-behavior combination. Coherent Buyers are individuals who consistently express a willingness to buy green food and follow through with their intentions. Non-Buyers with Favorable Intentions (NBFIs) are people who express a willingness to buy green food but do not actually make the purchase. Coherent Non-Buyers are consumers who neither intend to buy nor actually purchase green food. The division

into these clusters serves a critical purpose. While Coherent Buyers demonstrate consistent green buying behavior and Coherent Non-buyers are unlikely to change their habits, the NBFI group is the most intriguing one. Addressing the intention-behavior gap among people who are actually causing it, namely NBFIs, becomes essential (Frank & Brock, 2018). Although purchase intention is necessary, it alone does not guarantee actual buying behavior (Dul, 2016). To comprehensively address the intention-behavior gap among green consumers, it is imperative to conduct specific quantitative investigations into the barriers and facilitators influencing green purchase behavior. This research should particularly focus on the group of NBFIs in order to discern the factors that differentiate them from individuals who consistently align their intentions with actual green product purchases (Frank & Brock, 2018). To delve deeper, our focus was on understanding which consumer characteristics influenced the likelihood of belonging to the three aforementioned categories. Specifically, beyond sociodemographic variables, we also considered emotions related to green food purchase and the perceived importance of certain green food characteristics. By adopting this comprehensive approach, we can delve into the intricate dynamics between intention and behavior, shedding light on the factors that differentiate NFBIs from individuals who consistently act on their green intentions. Ultimately, this endeavor can contribute to a more informed understanding of sustainable consumer choices.

The Influence of Sociodemographic Characteristics

In our study, we explored the role of several sociodemographic characteristics in relation to green food purchasing behavior. Specifically, we considered the following factors: age, gender, income, education level, and people's involvement in environmental issues. While existing research has extensively explored most of these variables, our investigation uniquely incorporates the environmental involvement aspect. This aspect refers to whether individuals deal with environmental issues in their professional role or at least through active volunteering. Our underlying hypothesis posits that individuals who are actively involved in environmental topics will predominantly fall into the Coherent Buyers category. As a matter of fact, they are likely well-informed about environmental matters and previous studies have shown a clear link between environmental knowledge and both green consumption intention and behavior (Patwary et al., 2022; Peattie, 2010), particularly concerning green food choices (de Sio et al., 2022).

In the existing literature, considerable attention has been devoted to exploring the variations in green purchase attitudes and preferences across diverse population segments.

Notably, Wijekoon and Sabri (2021) conducted an extensive literature review in this domain; however, limited research has specifically focused on green food preferences. Research consistently indicates that consumers with higher educational attainment (Rezai et al., 2011; Siegrist & Hartmann, 2019; Singh & Verma, 2017) and income levels (Rezai et al., 2011; Zhang et al., 2008) exhibit greater willingness to purchase green food products and are more likely to prioritize environmentally conscious choices when shopping. The impact of gender remains inconclusive. While some studies suggest that women are more inclined to pay for and consume green and organic foods (Govindasamy et al., 1999; Vecchio & Annunziata, 2015; Petrescu et al., 2017), other findings do not establish gender as statistically significant (Thompson & Kidwell, 1998; Bernard et al., 2006). The relationship between age and green purchasing behavior is multifaced. Some studies identify older consumers as more receptive to eco-sustainable products (De Medeiros et al., 2016; Vecchio & Annunziata, 2015), while others find no significant age differences (Moons et al., 2018; Ricci et al., 2018; Stranieri et al., 2017).

The Role of Emotions in Green Food Purchasing Behavior

Emotions play a pivotal role in shaping human behavior, a consensus that is well-established across various domains (Johnson, 2001). In the realm of advertising, the traditional focus on rational consumer choices has long given way to an emotionally driven marketing approach (Schmitt, 1999). Scientific literature underscores the direct influence of emotions on customer behavior, particularly in the context of green purchasing (Sangroya & Nayak, 2017; Wang & Wu, 2016). Scholars have explored the relationship between green consumption behavior and a spectrum of emotions, including guilt (Kaiser, 2006), pride (Onwezen et al., 2014), regret (Kim et al., 2013), and fear (Van Zomeren et al., 2010). In a study conducted by Wang and Wu (Wang & Wu, 2016), the influence of four distinct emotions—namely, pride, respect, guilt, and anger—on consumers' intentions to select environment-friendly household appliances was examined. The results revealed that all four emotions positively influenced consumers' intentions to choose environment-friendly items, but pride emerged as the most potent influencer, as individuals experiencing it were significantly more inclined to make environmentally conscious purchase decisions.

In our study, we aimed to extend existing findings by examining how these four emotions specifically relate to green food consumption. By exploring the predisposition to experience these emotions in the context of buying or not buying green food, we sought to uncover their impact on categorization into the NBFI group, the Coherent Buyers group, or the Coherent Non-Buyers

group. These emotions refer to the compliance with or the violation of a personal or social norm (Tracy & Robins, 2004), formed on the basis of ethical standards (Ketelaar & Tung Au, 2003). In the context of green purchasing, they are elicited both when individuals themselves (pride and guilt) and others (respect and anger) make or refrain from eco-sustainable food purchases.

Let us now delve into a more detailed analysis of these four emotions. Pride is a positive emotion associated with self-worth that motivates behaviors aligned with personal values and goals (Williams & DeSteno, 2008). Previous research showed its positive influence on consumer purchases of sustainable products (Antonetti & Maklan, 2014) and sustainable travel behaviors (Onwezen et al., 2013). Guilt is a negative emotion arising from perceived responsibility for negative outcomes (Baumeister et al., 1995). Chen (2016) found that if people feel responsible for the negative impact of behaviors on the environment, they will be more likely to put an effort into adopting energy-saving and other ecological behaviors. Respect is a positive emotion that emerges when individuals genuinely recognize and admire others for their achievements, merits, or moral qualities (Li & Fischer, 2007). Although limited research has explored its impact on consumption behavior (Wang & Wu, 2016), respect may significantly influence sustainable choices. When someone respects others who exhibit sustainable consumption behavior, they are more likely to emulate such behavior themselves. Anger is a negatively valenced basic emotion that serves an adaptive function. Witnessing violations of moral standards, such as environmentally harming behavior, can trigger anger (Tangney et al., 2007). Previous studies have shown that anger and indignation in response to environmental damage motivate people to adopt ecological behaviors (Corral-Verdugo et al., 2009; Nerb & Spada, 2001). In summary, consumers experience pride for themselves and respect for others when they are in line with a moral value (i.e., safeguarding the environment by adopting sustainable consumption behavior). Conversely, they feel guilty and angry with other people when this ideal prescription is violated.

6.1.5. Consumer Food Choice Motives

Consumer food choices have been extensively studied, drawing on traditional variables such as those from the theory of planned behavior (Ajzen, 1991) (i.e., attitudes, social norms, perceived behavioral control) and socio-demographic factors (Aertsens et al., 2009; Onwezen et al., 2019; Stok et al., 2017). However, beyond these characteristics, researchers seek to unravel the product features most influential in consumers' decisions to select and consume specific items. Food choice motives represent consumers' underlying reasons for their food preferences and

consumption patterns (Onwezen et al., 2019). The complexity of understanding food choices arises from different factors at play, including consumer characteristics and cultural context (Stok et al., 2017). Adding to this complexity is the multidimensionality of sustainability, which encompasses social, environmental, and economic dimensions (Onwezen et al., 2019). Assessing an item's sustainability involves considering elements such as water usage, animal welfare, food healthiness, local and seasonal production, and ethical working conditions (Aleksandrowicz et al., 2016).

Recognizing the importance of understanding consumers' motivations, particularly in sustainable food consumption, numerous studies (Tobler et al., 2011b; Verain, Onwezen, Sijtsema, Dagevos, et al., 2016) underscore the need for insights into these drivers. While factors like environmental consciousness can promote sustainable dietary decisions, perceived barriers (such as sustainable options being less appetizing or convenient) also exist (Verain et al., 2021). Furthermore, distinct categories of sustainable food preferences may arise from varying underlying motivations (Tobler et al., 2011b). The existence of potential conflicts and trade-offs among various food choice drivers underscores the need to explore sustainability motivations within the broader context of influences on food choices (Steptoe et al., 1995). Steptoe and colleagues (1995), along with Onwezen (2019), identified nine key food choice motives: health, mood control, convenience, sensory appeal, natural content, price, weight control utility, familiarity, and ethical concerns. Health relates to choosing foods based on their perceived impact on health. People may prioritize foods that are nutritious, low in calories, or have specific health benefits. Mood control refers to selecting foods to regulate one's mood. For example, comfort foods (like chocolate) are often chosen to improve emotional well-being. Convenience plays a significant role in food choice. For example, busy lifestyles lead people to opt for quick and easy meals or snacks. The sensory experience of food—its taste, texture, aroma, and appearance—influences people's choices, leading them to prefer foods that are pleasurable to their senses. Natural content refers to the desire for foods that are minimally processed or closer to their natural state, like organic, whole, or locally sourced foods. Economic considerations, such as price, play a crucial role in food choices since people often balance taste and nutrition against cost. Individuals concerned about weight management may choose food based on their impact on weight, including both weight-loss and weight-maintenance goals. Familiarity with certain foods can drive choices, because people often stick to what they know and trust. Finally, ethical concerns refer to ethical factors that can drive food choices like environment friendliness, animal welfare, and fair-trade practices. These nine

choosing motives were employed to uncover patterns across various consumer subgroups. For instance, researchers have utilized these motives as a foundation for consumer segmentation, aiming to identify homogeneous groups (Bellows et al., 2010; Onwezen & Bartels, 2011; Verain et al., 2017). In our study, we explored different consumer subgroups by incorporating food choice motives. This allowed us to gain insights into the perceived product characteristics that hold particular significance for environmentally conscious consumers, aligning with their attitudes.

6.2. Materials and Methods

Participants and Procedure

This research employed a cross-sectional design. Participants were recruited using an exponential, online snowball sampling method, leveraging the personal networks of the researchers to maximize outreach in a cost-effective manner (Sexton et al., 2011; Young, 2015). The non-probabilistic sampling strategy, also known as "online network sampling", is commonly used in marketing survey research whenever the development of a sampling database of the target population is difficult or not possible to achieve by the researchers. To mitigate errors associated with this sampling method, researchers randomly selected individuals from their networks. In addition, the recruitment was limited to 20 for the researchers and to 10 for the respondents to minimize differential recruitment (where respondents with a large size of network may recruit a large number of persons with potentially similar characteristics). Potential participants received a link to an anonymous online survey with instructions to complete the questionnaires via email and private messages. Inclusion criteria included being 18 years or older and having access to food purchasing opportunities. For accurate segmentation analyses (Dolnicar et al., 2014), the sample size aimed for 100 times the number of clustering variables (in this case four), resulting in a comfortably met goal of more than 400 participants. The questionnaire in its original version (Italian) and in its English translation is reported in the thesis' Appendix.

Measures

The survey consisted of two main sections: a demographic section and a study variables section. In the demographic section, we collected information on age, gender, educational level, household monthly income, and active involvement in ecological issues. All questions, except for age, were close-ended and of the multiple-choice kind.

Before presenting the study variables, we provided participants with an explanation of what "green food" entails in our study to avoid confusion. The definition we provided was as follows: "A green product has characteristics or production methods that cause less damage to the environment throughout its life cycle (from production to end of life) compared to other products of the same category. For example, it uses renewable energy sources, non-toxic and/or biodegradable substances, is grown with organic methods, produced locally, is packaged with recyclable materials, etc." (Szabo & Webster, 2021).

To assess the targeted constructs, we predominantly adopted scales from existing consumer research (Haws et al., 2023). Our criteria for scale selection included relevance to focal constructs, psychometric robustness (e.g., acceptable/good reliability), and brevity to encourage higher response rates and survey completion (Kost & Correa Da Rosa, 2018). We did not assess social desirability bias due to exiting literature suggesting its negligible impact on sustainable behavior studies (Steptoe et al., 1995). To ensure cross-cultural equivalence, the scales were adapted and independently translated from English into Italian, with subsequent back-translation by two academic bilingual speakers. Reliability was evaluated within the study sample. Participants answered questionnaires using a 5-point scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"), except for the two questions developed to assess green food purchase behavior.

We assessed green food purchase behavior using the following questions: "I often buy green food", with a 5-point response scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"), and "How much green food did you buy last week?", with a response scale ranging from 1 to 10, in which participants had to indicate the actual number of green food items they bought in the last seven days. The reliability of this two-item scale was acceptable ($\alpha = 0.76$).

We measured participants' intention to buy green food with two items developed by Soyez (2012) by substituting the original term "organic food" with "green food". The reliability for this two-item scale in our sample was optimal ($\alpha = 0.94$).

We employed a 12-item scale developed by Wang and Wu (2016) to measure emotions related to green purchasing behavior; specifically, pride, respect, guilt, and anger. With approval of the authors, we adapted this scale shifting the focus from conserving household appliances to purchasing green food. The validation of this Italian version showed good psychometric properties in an independent sample of 865 Italian consumers with good CFA indexes (RMSEA = 0.07; SRMR = 0.04; CFI = 0.98) for the four-factor solution, good reliability (ω values between 0.90

and 0.93), and invariance across groups (Gambarota et al., 2022). In the present study, McDonald's omega varied between 0.91 and 0.93.

We used a short version of the Food Choice Questionnaire (FCQ) (Lindeman & Väänänen, 2000; Onwezen et al., 2019; Steptoe et al., 1995) to measure the motivations behind food choices. The original 9-factor, 36-item FCQ (Steptoe et al., 1995) assessed health and non-health related food characteristics across 9 motivational dimensions or food choice motives. These dimensions included health, mood, convenience, sensory appeals, natural content, price, weight control, familiarity, and ethical concern. The original FCQ was cross-validated among Italian, Belgian, and Canadian samples (Eertmans et al., 2006), demonstrating good validity and reliability. Consequently, the content of the items can be considered cross-culturally valid. Subsequently, a single-item FCQ, comprising 9 items, was developed (Onwezen et al., 2019) and cross-culturally validated at international level, showing good convergent validity with the original multi-item scale. To streamline the scale, the ethical concern dimension, previously considered limited in scope (Sautron et al., 2015), and items related to mood control and sensory appeal, due to questionable validity (Onwezen et al., 2019), were excluded. The reliability of the short FCQ was not calculated, as it consists of individual items measuring different aspects, treated individually. Previous studies, e.g., (Onwezen et al., 2019), recommended using the short FCQ as a context-specific measure to explore food choice motives in relation to specific food categories.

For detailed information on each scale, including item content, reference, and reliability, refer to Table 1.

Table 1. Constructs, references, items of measures and reliability indexes.

Constructs and Reference	Items	Reliability
Intention to buy green food (Lindeman & Väänänen, 2000)	1. If buy groceries next time, I will also buy green food. 2. I intend to buy green food next time.	$\alpha = 0.94$
Green Food Purchase Behavior	1. I often buy green food. 2. How much green food did you buy last week?	$\alpha = 0.76$

Emotions Related to Green Food Purchase (Onwezen et al., 2013; Wang & Wu, 2016)	Pride	When I purchase green food, I would… 1. Feel satisfied. 2. Feel worthwhile. 3. Feel proud.	ω = 0.90
	Respect	When people purchase green food, I would… 4. Admire them. 5. Appreciate them. 6. Respect them.	ω = 0.93
	Guilt	When I purchase non-green food, I would… 7. Feel guilty. 8. Feel remorseful. 9. Feel bad.	ω = 0.92
	Anger	When people purchase non-green food, I would… 10. Feel resent. 11. Feel disdain. 12. Feel angry.	ω = 0.91
Food Choice Questionnaire (FCQ) (Onwezen et al., 2019; Sautron et al., 2015; Steptoe et al., 1995)		It is important to me that the food I eat on a typical day is... 1. Healthy. 2. Convenient (in buying and preparing). 3. Natural. 4. Affordable. 5. Helping me control my weight.	*

	6. Familiar.
	7. Environmentally friendly.

α = Cronbach's alpha; ω = MacDonald's omega. *We did not calculate the reliability of the FCQ because it is composed of individual items measuring different aspects, which we treated individually (see, for instance Gliem & Gliem, 2003).

Ethical Consideration

The survey conducted in this study involved human participants and received approval from the Ethical Research Committee of the University of Bologna (protocol number 0090636), adhering to ethical standards. Consumers participated voluntarily and granted explicit consent at the outset of the online anonymous survey, following the reading of an informed consent statement outlining the study's objectives.

Data Analysis

We described the characteristics of the participants using descriptive statistics.

We assessed the reliability of the questionnaires using either MacDonald's omega or Cronbach's alpha, depending on the availability or non-availability of factor loadings. Acceptable reliability values were considered to be greater than 0.70.

We conducted a two-step cluster analysis with a fixed number of clusters set at 3, using as grouping variables items related to intention to buy green food and green food purchase behavior. Our decision to use these specific measures was driven by their relevance to the green attitude-behavior gap. These variables allowed us to define meaningful segments, which we later profiled in terms of sociodemographic and other characteristics. We selected 3 clusters based on our assumption and existing literature, expecting to find Coherent Buyers, Coherent Non-Buyers, and a cluster representing NBFIs. Two-step cluster analysis started by initially pre-clustering cases into numerous small sub-clusters using a sequential clustering algorithm. Subsequently, these nearby sub-clusters were recursively merged using an agglomerative hierarchical clustering algorithm to arrive at the final cluster solution. The number of clusters was based on the log-likelihood distance measure between clusters and Schwarz's Bayesian information criterion (BIC). The distance measure we adopted was the log-likelihood distance. The goodness of fit of the cluster solution was evaluated using the silhouette coefficient, which compares the average within-cluster cohesion with the average between-cluster separation. Silhouette coefficient values falling between 0.20 and

0.50 suggest a fair fit, while values of 0.50 or higher indicate a good fit (Mooi & Sarstedt, 2011). To validate and interpret the cluster solution, we conducted ANOVA analysis to assess whether the grouping variables exhibited significant differences across clusters. To assess the stability of our clustering solution, we replicated the two-step cluster analysis using a randomly selected 50% subsample of cases (Lange et al., 2004). Additionally, to explore the potential sampling selection bias, we conducted separate two-step cluster analyses within two subgroups based on sociodemographic characteristics that distinguished our sample composition from the target population.

Subsequently, we performed a series of preliminary ANOVAs and chi-squared tests to identify sociodemographic variables that varied significantly between different segments. These variables were later incorporated, along with those related to emotions associated with green food purchase and food choice motives, in a multinomial logistic regression. The goal was to determine which factors could influence the likelihood of belonging to the three identified clusters. We examined the residuals and tested for potential multicollinearity problems in logistic regression analysis using the Variance Inflation Factor (VIF). Standardized residuals between −2 and +2 are considered still acceptable (Hosmer & Lemeshow, 2000), and VIF values < 5 indicate that independent variables are not highly correlated (Hosmer & Lemeshow, 2000). The Coherent Buyers segment was set as the reference category. The goodness-of-fit of the logistic regression model was evaluated using the model χ^2, Pearson and deviance tests, and Nagelkerke Pseudo-R^2. A significant χ^2 indicates that the model, along with its independent variables, fits the data better compared to one lacking those variables. Non-significant Pearson and deviance tests suggest negligible disparities between the observed and predicted probabilities. Nagelkerke R^2 values exceeding 0.20 indicate an acceptable level of explained variability (Rogerson, 2001). Odds ratios (OR) and corresponding 95% confidence intervals (Cis) were provided for each independent variable. Interpretation of results was based on both statistical significance ($p < 0.05$) and effect size. For effect size, η^2 values of 0.01, 0.06, and 0.14 were categorized as small, medium, and large, respectively, and Cramer's V of 0.10 was considered small, 0.30 medium, and 0.50 large.

Statistical analyses were performed with IBM SPSS v.25 (IBM Corp., 2017).

6.3. Results

Sample Characteristics and Descriptive Statistics

The total sample (n = 832) consisted of 66% female participants. The mean age was 34 years (*SD* = 14.73, range 18–84). All participants met the inclusion criteria, indicating that they personally purchased food at least occasionally. According to the Italian educational system, 12% of the participants had a low level of education (5–8 years), 37% held a high school diploma (12–13 years), and 51% had attained a university degree or higher (master's/Ph.D.). In terms of household monthly income, 8% reported earning less than 1000 euros, 58% earned between 1000 and 3000 euros, 24% earned between 3000 and 5000 euros, and 10% earned more than 5000 euros per month. Finally, 22.6% of participants declared themselves to be actively involved in environmental issues by working or volunteering. In the subsequent analyses, the sociodemographic categorical variables were dichotomized as follows: education was considered higher for individuals with a university degree, and income was considered higher if above 3000 euros per month.

Compared with the Italian adult (18 years of age or higher) general population, in our sample females were slightly non-significantly overrepresented (66% vs. 51.3%; z-statistic = 1.66, $p = 0.09$), while the level of education was largely higher (people with university degree was 51% vs. 20.1%). The other characteristics were comparable with those of the Italian adult general population. Selection bias can occur when a study sample differs from the target population due to non-random participation in the study. In our study, having a higher level of education could have influenced the probability of participants being selected into the sample. To investigate the impact of potential selection bias, we performed a sensitivity test using subgroup analysis. Specifically, we conducted separate cluster analyses for lower and higher educated subsamples to assess whether results varied across different educational levels.

Cluster Analysis Based on Green Food Purchase Intention and Behavior

The three-segment solution identified by the two-step cluster analysis in the entire sample is presented in Figure 1 and in Table 2. The average silhouette coefficient of 0.40 indicates a fair-to-good level of both cohesion and separation within the clusters. Additionally, the ratio between the largest and smallest clusters was 1.79, demonstrating balanced cluster sizes. The first cluster (n = 246), comprising 29.6% of consumers, exhibited a high intention to buy green food and consistently engaged in frequent green food purchases. We named this cluster "Coherent Buyers". The second cluster (n = 210), representing 25.2% of consumers, consistently scored low in both intentions to buy green food and actual buying behavior. We referred to this segment as "Coherent Non-Buyers". The third and largest segment (n = 376), accounting for 45.2% of respondents,

reported a high intention to buy green food but demonstrated low purchase behavior. We identified this segment as "Non-Buyers with Favorable Intentions" (NBFIs).

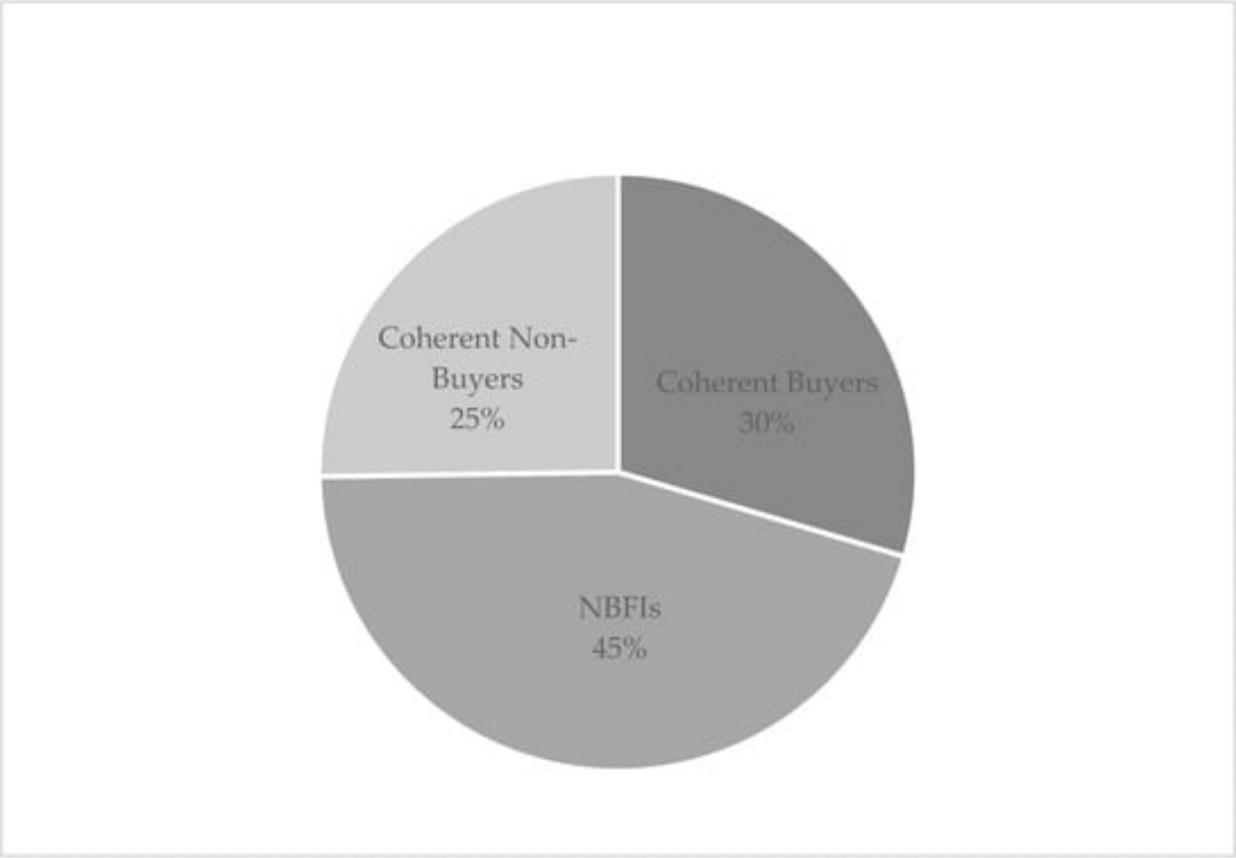


Figure 1. Cluster solution (n = 832), Coherent Buyers (n = 246), Non-Buyers with Favorable Intentions (NBFIs, n = 376), Coherent Non-Buyers (n = 210).

Table 2. Segments of consumers on the segmentation variables (n = 832).

	Coherent Buyers (n = 246)	**NBFI (n = 376)**	**Coherent Non-Buyers (n = 210)**	**Segment differences**
Items	Mean score (standard deviation)			$F_{2,829}(\eta^2)$
Intention 1	4.91 (0.30)	4.00 (0.61)	2.45 (0.78)	1824.373* (0.69)
Intention 2	4.94 (0.24)	4.12 (0.64)	2.50 (0.74)	1738.631* (0.68)
Purchasing	7.12 (2.05)	3.92 (2.28)	1.30 (1.63)	1015.906* (0.55)

Frequency	4.48 (0.62)	3.38 (0.81)	2.22 (0.79)	905.583* (0.52)

Intention refers to intention to buy green food (Lindeman & Väänänen, 2000); Purchasing and Frequency refer to purchasing green food. NBFI = Non-Buyers with Favorable Intentions. * $p < .001$.

All comparisons between segments on the segmentation variables, conducted through one-way ANOVA, were significant at $p < 0.05$, with medium effect sizes (see Table 2).

Results of the replication of the two-step cluster analysis with a randomly selected 50% of cases resulted in a comparable segmentation solution, as shown in Figure 2, indicating that the three-segment cluster solution had acceptable stability.

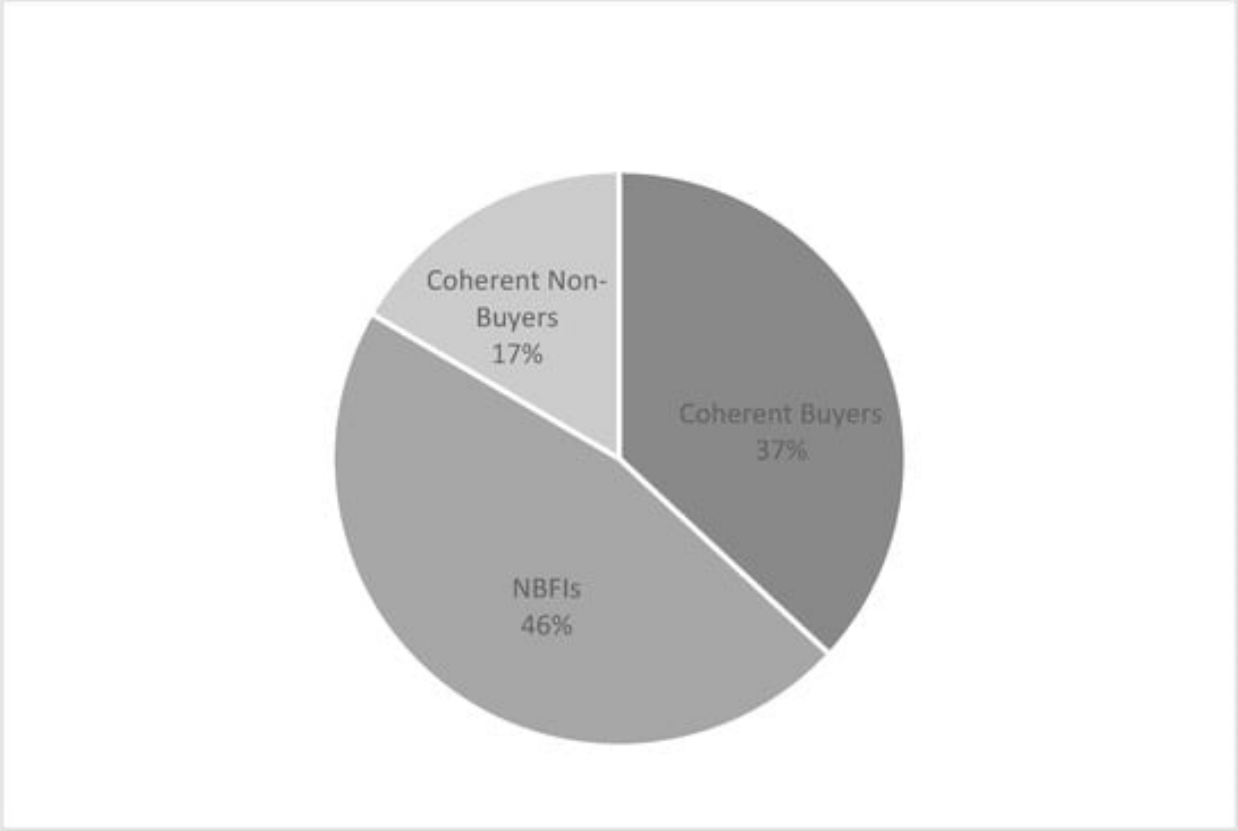


Figure 2. Stability test: cluster solution with a randomly selected 50% of cases (n = 416).

The results of cluster analyses conducted separately in the two subsamples based on level of education (lower educated n = 408; higher educated n = 424) were as follows*:* Coherent Buyers were 36% among people with lower education and 37.4% among those with higher education; Coherent Non-Buyers were 18% vs. 17.4%; and NBFIs were 46% vs. 45.1%. Overall, the

clustering results based on education level closely resembled the solution obtained from the random 50% subsample and were not largely different from the total sample results. It appeared that the three-segment solution remained consistent across different educational subgroups within our sample.

Profiling of the Clusters

In the multinomial logistic regression analysis, we used cluster membership as the outcome variable. The Coherent Buyers segment served as the reference category. The psychological variables included in the logistic regression were as follows: pride when buying green food, guilt when not buying it, respect when other people buy green food, anger when they don't buy it, and motives to choose green food based on its characteristics such as healthiness, convenience, natural content, price, weight control function, familiarity, and eco-sustainability.

We also preliminarily explored if sociodemographic variables were significantly associated with the outcome variable to enter them into the regression model. We explored the sociodemographic differences between the three groups with one-way ANOVA for age and chi-square test for categorical variables (Table 3). ANOVA for age indicated significant differences between groups ($F_{2,830} = 19.540$, $p < 0.001$, $\eta^2 = 0.45$). Specifically, based on post-hoc tests with Bonferroni correction, the Coherent Buyers group ($M = 38.87$; $SD = 16.81$) was significantly ($p < 0.001$) older than both the NFBI ($M = 33.22$; $SD = 13.94$) and the Coherent Non-Buyers groups ($M = 30.82$; $SD = 12.00$). Table 3 reveals significant differences between the groups concerning gender and involvement in environmental issues. Within the Coherent Buyers group, there were more females and more individuals working or volunteering in the environmental field (referred to as "involvement") than in the Coherent Non-Buyers group. However, these differences were not observed when comparing the Coherent Buyers group with the NBFI group.

Table 3. Sociodemographic differences between the clusters.

	Coherent Buyers	**NBFI**	**Coherent Non-Buyers (N = 210)**	**Segment differences**
	n = 246 (29.6%)	n = 376 (45.2%)	n = 210 (25.2%)	χ_1^2 (Cramer's *V*)
Gender (female)	174 (70.7%)	259 (68.9%)	117 (55.7%)	13.764* (0.13)

Income (high)	86 (35.0%)	133 (35.4%)	69 (32.9%)	395 (0.22)
Education (high)	138 (56.1%)	212 (56.4%)	129 (61.4%)	1.71; (0.04)
Involvement (yes)	73 (29.7%)	90 (23.9%)	25 (11.9%)	21.158** (0.16)

NBFI = Non-Buyers with Favorable Intentions. Involvement = having a job related to ecological issues or actively volunteering on this field. *$p < 0.01$; **$p < 0.001$.

The sociodemographic variables to be entered into the subsequent logistic regression model included age, gender, and involvement in ecological issues since they were significantly associated with the outcome variable.

The results of the multinomial logistic regression analysis are presented in Table 4, and VIF values for multicollinearity are presented in Table 5.

Table 4. Multinomial Logistic Regression of segments on sociodemographic and emotional variables and product characteristics preferences.

Independent Variable	**NBFI (N = 376)**		**Coherent Non-Buyers (N = 210)**	
	B (S.E.)	**OR (95% CI)**	**B (S.E.)**	**OR (95% CI)**
Sociodemographic variables				
Age	-0.01 (0.01)*	0.97 (0.97-1.00)	-0.01 (0.01)	0.98 (0.97-1.00)
Gender	-0.02 (0.21)	0.98 (0.65-1.48)	-0.37 (0.27)	0.69 (0.40-1.19)
Involvement	-0.06 (0.21)	0.94 (0.62-1.42)	-0.60 (0.32)	0.55 (0.29-1.03)
Emotional reactions related to green food purchase				
Guilt	-0.04 (0.02)	0.96 (0.92-1.01)	-0.06 (0.03)	0.94 (0.88-1.01)
Pride	-0.09 (0.03)*	0.92 (0.86-0.98)	-0.23 (0.04)**	0.79 (0.73-0.86)
Anger	0.001 (0.02)	1.00 (0.95-1.05)	0.02 (0.04)	1.02 (0.95-1.10)
Respect	0.04 (0.03)	1.04 (0.99-1.10)	0.02 (0.03)	1.02 (0.96-1.09)
Product-related preferences				
Healthiness	-0.21 (0.11)*	0.81 (0.66-1.00)	-0.27 (0.13)*	0.76 (0.59-0.98)
Convenience	0.07 (0.06)	1.07 (0.95-1.21)	0.18 (0.09)*	1.20 (1.00-1.42)

Natural	-0.31 (0.08)**	0.73 (0.63-0.85)	-0.62 (0.10)**	0.54 (.44-.66)
Price	0.04 (0.07)	1.04 (0.91-1.19)	0.19 (0.09)*	1.21 (1.00-1.45)
Weight Control	0.09 (0.06)	1.10 (0.97-1.27)	0.06 (0.08)	1.06 (0.90-1.24)
Familiarity	0.14 (0.06)*	1.15 (1.02-1.30)	0.16 (0.08)*	1.18 (1.00-1.39)
Eco-sustain.	-0.47 (0.09)**	0.62 (0.52-0.75)	-0.81 (0.12)**	0.44 (0.35-0.56)

SE = standard error, OR = odds ratio, CI = confidence interval. Involvement = having a job related to ecological issues or actively volunteering on this field. Reference category = Coherent Buyers. * $p < 0.05$; ** $p < 0.001$.

Table 5. Multicollinearity Diagnostics.

Variable	Tolerance	VIF
Age	0.887	1.128
Gender	0.946	1.057
Pride	0.731	1.368
Guilt	0.757	1.321
Anger	0.758	1.319
Respect	0.708	1.412
Involvement	0.966	1.035
Healthiness	0.784	1.276
Convenience	0.877	1.140
Natural	0.818	1.222
Price	0.827	1.209
Weight Control	0.787	1.270
Familiarity	0.837	1.195
Eco-sustain.	0.781	1.280

VIF = Variance Inflation Factor

The regression model explained 49% of the variability (Nagelkerke Pseudo-$R^2 = 0.49$), with an acceptable fit model ($\chi^2 = 470.508, p < 0.001$; Pearson $\chi^2 = 1520.552, p = 0.970$;

deviance $\chi^2 = 1304.490$, $p = 1.00$). Both residuals (see Table 4) and VIF values (see Table 5) were acceptable.

Focusing on our primary comparison—the one between NBFIs and the reference category (Coherent Buyers)—which addresses the green attitude-behavior gap, we observed the following:

1. NFBIs vs. Coherent Buyers: younger individuals, and those who feel less pride for buying green food and place less importance on healthiness, natural content, and eco-sustainability, while prioritizing familiarity of food, were more likely to be categorized as NBFIs.

2. Coherent Non-Buyers vs. Coherent Buyers: those who feel less pride for buying green food and prioritize convenience, price, and familiarity of food, while placing less importance on healthiness, natural content, and eco-sustainability, were more likely to be categorized as Coherent Non-Buyers.

6.4. Discussion

The present study contributed to a better understanding of the typologies of eco-sustainable food consumers by dividing them into three clusters that substantially differ according to green food purchase intention and behavior: Coherent Buyers, Coherent Non-Buyers and Non-Buyers with Favorable Intentions (NBFIs). Moreover, we described the three identified segments according to demographic factors, emotional reactions related to green purchase behavior, and food choice motives.

In terms of sociodemographic characteristics, the present study confirms what is stated in other research: older age was associated with environmentally-friendly choices (Bernard et al., 2006; Zhang et al., 2008). We extended this finding to the specific domain of green food. However, contrasting studies suggest that this trend may vary based on cultural and socio-economic contexts, highlighting the need for more nuanced understandings (Wijekoon & Sabri, 2021). In addition, and in line with previous research's contradictory results concerning socio-demographic features in eco-friendly purchase behavior (Bernard et al., 2006; Thompson & Kidwell, 1998), income and education level did not significantly differ between consumer clusters. This lack of significant difference might suggest that green purchasing behaviors are becoming less dependent on socio-economic status, possibly due to increased availability of green products or shifts in cultural norms.

Further research could explore whether this trend holds across different contexts or if specific barriers still exist for lower-income groups. Interestingly, more females were found in the Coherent Buyers and NBFI groups, though gender was not a decisive factor in the subsequent profiling of the segments. Furthermore, in the groups with favorable intentions (Coherent Buyers and NFBIs), we observed a higher proportion of individuals with jobs or volunteer activities related to environmental issues compared to the Coherent Non-Buyers group. This supports our hypothesis that these individuals may be more aware of the environmental consequences of their dietary choices. However, this characteristic was not decisive in the profiling of the segments. We invite future research to consider this novel variable we introduced in order to further validate these findings.

In relation to emotions related to green food purchases, we found that lower levels of pride when consuming green food were associated with a higher likelihood of being categorized as NBFIs or Coherent Non-Buyers compared to Coherent Buyers. This result extends the positive influence of pride, as shown in previous research on consumer's purchase behavior (Antonetti & Maklan, 2014; Williams & DeSteno, 2008) , specifically to green food choices. With regards to food choice motives, we found that a lower emphasis on health and sustainability motives (which include healthiness, natural content, and eco-sustainability) and a higher perception of familiarity of food are linked to a greater likelihood of being classified as NBFIs or Coherent Non-Buyers, rather than Coherent Buyers. A higher level of ease and accessibility motives, encompassing convenience and price, increased the odds of being classified as Coherent Non-Buyers, rather than Coherent Buyers.

Bringing these results together, we can describe the three typologies of eco-sustainable food consumers we found. The first cluster, Coherent Buyers, primarily consists of individuals who take pride in purchasing green food. They also highly value the healthiness, natural content, and eco-sustainability of the food they choose. This finding aligns with previous research that identified the experience of pride as a predictor of green purchase behavior (Antonetti & Maklan, 2014; Onwezen et al., 2013). Additionally, the emphasis on healthiness, natural content, and eco-sustainability is consistent with the existing literature. These three factors, collectively referred to as "health and sustainability motives" (Marty et al., 2022), are interconnected (Verain et al., 2021) and associated with higher consumption of organic food products (Baudry et al., 2017). The second cluster, Non-Buyers with Favorable Intentions, comprises individuals who prioritize the

familiarity of food. This aligns with the previous literature that has negatively associated valuing food familiarity with indicators of diet sustainability (Marty et al., 2022). The third cluster, Coherent Non-Buyers, consists of people who place greater importance on convenience, price, and food familiarity. This finding is consistent with earlier research that referred to these three variables as "ease and accessibility" motives and found them to be negatively associated with indicators of diet sustainability (Marty et al., 2022).

As we can observe from the results of this study, it is clear that although purchase intention is a fundamental step towards sustainable buying, it alone will not lead to actual buying behavior in most cases. The green attitude-behavior gap is a phenomenon that requires researchers to move beyond the classic theory of planned behavior (TPB) (Ajzen, 1991), which is the most used model in the literature on consumer purchase behavior. This model posits that attitudes, subjective norms, and perceived behavioral control contribute to creating behavioral intentions, which in turn will lead to the corresponding behavior. However, as we have already mentioned, purchase intention alone has proven insufficient for a large number of consumers. Several studies on ethical purchasing have found that only 30% of behavior variance can be attributed to intention and perceived behavioral control (Rivis et al., 2009; Webb & Sheeran, 2006). Understanding food choices, particularly sustainable diets, is complex due to a multitude of contributing factors that go beyond the classic TPB, such as socio-demographic factors, attitudes, values, norms, consumption contexts, and cultural contexts (Stok et al., 2017). Insights into food choice motives and emotions related to food purchases offer additional value in understanding dietary choices, beyond the abovementioned factors (Verain, Onwezen, Sijtsema, Dagevos, et al., 2016; Wang & Wu, 2016). In this study, we have further explored these two variables specifically within the context of green food. Future research should continue to focus on specific product categories to gain tailored insight that addresses the green attitude-behavior gap, extending the TPB with novel variables customized to the study subject. In summary, this research not only contributes to filling the existing gap in the literature regarding the profiling of green customers (Haba et al., 2023), but also aims to identify differences between coherent green food buyers and individuals who express an intention to buy green food but do not follow through. Understanding these distinctions is crucial for addressing the intention-behavior gap, specifically within the context of eco-sustainable food choices.

Limitations

There are several limitations that need to be acknowledged in this study. The non-random sampling approach used, while cost-effective, may have introduced biases. By relying on personal networks and referrals, we might have overlooked isolated community members or unintentionally favored subgroups with shared characteristics or interests. For example, not everyone has equal access to the Internet or digital devices. Respondents may have preferably referred to individuals with similar characteristics, including educational level or interest in the study topic. It is also plausible that individuals who were already interested in environmental issues were more motivated to participate in the online survey (Kowald & Axhausen, 2012). As we observed in our study, research has shown that women and more educated people are generally more likely to participate in online surveys than men and lower educated people (Becker, 2017; Mulder & De Bruijne, 2019). These and other potential selection biases should be considered when generalizing our findings. While it was not feasible to draw a sample by randomly selecting from the target population due to our lack of access to the list and addresses of all adults in the country, future studies should strive to obtain a more representative sample.

The cross-sectional nature of this study limits our ability to establish causal relationships. Longitudinal studies or experimental designs would provide stronger evidence to understand the dynamics between the intention to buy green food and actual purchasing behavior as well as potential changes in such dynamics. Furthermore, our study captures a snapshot in time. Seasonal variations, trends, or external events could influence green food behavior differently over time. Besides temporal factors, cultural factors could also influence our study's findings, since green food choices can vary significantly across different regions and societies.

Our study relied on self-reported data, which may be subject to various limitations. While social desirability bias does not appear to be an issue in sustainability research (Steptoe et al., 1995), other factors may have influenced participants' responses. Participants might not accurately recall their past behavior, especially when it involves frequent events like food purchases. Objective measures, such as actual purchase records, would offer more reliable insights. Additionally, qualitative research could provide deeper understanding of the personal motivations and barriers experienced by different consumer segments.

In conclusion, although our study sheds light on green food choices, the highlighted limitations serve as reminders to exercise caution in in interpreting our results and emphasize the need for further research to address these challenges.

Practical Implications

The findings of the present study provided some valuable practical insights for marketers and policymakers aiming to promote eco-sustainable food options. For instance, to effectively target the NBFI segment, marketing strategies should highlight the health benefits and environmental impact of green foods, potentially through labeling or certification schemes. Additionally, policies could be designed to make green products more accessible and affordable, addressing common barriers identified among Non-Buyers. For consumers with favorable intentions, triggering green purchase behavior can probably be enhanced by emphasizing references to the healthiness, natural content, and eco-sustainability of food. Additionally, fostering feelings of pride associated with eco-sustainable purchases could be effective. Encouraging experimentations with unfamiliar foods may also prove beneficial for this category. These insights are valuable for marketers and policymakers, especially when targeting the NBFI segment—a likely sizable portion of the consumer population. To address the green attitude-behavior gap, interventions for the NBFI segment should focus on improving the link between an intention to buy and consume eco-sustainable food. Strategies may include promoting environmental knowledge (de Sio et al., 2022) and developing green food options that are more convenient, affordable, and familiar.

As concerns emotions related to green food purchasing, one effective strategy could involve emphasizing the pride associated with consuming green food. By doing so, marketers can influence the behavior of their target customers, including those in the Non-Buyers with Favorable Intensions group, and the attitude behavior-gap. For instance, Starbucks successfully employed this approach in their "Holiday Red Cups" campaign, showcasing designs created by customers and effectively evoking feelings of pride among them. Moreover, the findings regarding food motives suggest that to promote a healthy and sustainable diet at a population level, consistent messaging based on health and sustainability motives is crucial for encouraging people to transition into the Coherent Buyers category. Organizations like the Institute for Public Policy Research in the UK (Coleman et al., 2020) already advocate for such messaging to raise global awareness about the connections between dietary choices, health, and environmental impacts, and our results underline the importance of persisting on this path. Addressing the barriers faced by the Coherent Non-Buyers group is equally important. Strategies could reshape the food environment to make healthy and sustainable options more accessible, affordable, and convenient. For instance, research has shown that increasing the availability of vegetarian (and thus, green)

options, reducing prices, or adjusting menu layouts can encourage the selection of vegetarian dishes in university cafeterias (Garnett et al., 2020, 2021; Remnant & Adams, 2015). These strategies should be promoted across various food service systems, especially in public institutions where local and national governments hold significant influence (Garnett et al., 2020). Furthermore, encouraging innovations from the food industry—such as developing healthier, more affordable, and environmentally sustainable meals based on familiar recipes—can facilitate dietary transitions for individuals motivated by ease, cost, accessibility, and familiarity with green food like members of the NBFI and Coherent Non-buyers segments (Remnant & Adams, 2015; Schmidt Rivera & Azapagic, 2019).

6.5. Conclusions

The pursuit of healthy and eco-sustainable diets in Western nations is well-established. Key principles include reducing consumption of animal-based foods, increasing intake of plant-based foods, and avoiding highly processed, unhealthy foods rich in saturated fats and added sugars. These dietary choices offer immense benefits for both individual health and the planet's well-being. However, understanding the psychological pathways that drive individuals to transition from their current diet to a greener and healthier diet remains an unexplored area of research. The findings from our present study contribute valuable insights toward addressing this gap. By better characterizing the three distinct consumer groups, we provide practical implications for marketers and policymakers aiming to promote healthy and eco-sustainable dietary choices.

Valuable insight to address the green attitude-behavior gap also emerged from comparing NBFIs with Coherent Buyers. While previous research primarily focused on regular green buyers and convinced non-buyers, the attention to NBFIs fills a gap in the literature in specific quantitative research on this segment of the population—the very group responsible for the green food attitude-behavior gap. Furthermore, our study offers valuable insights into the factors that contribute to individuals falling into the Coherent Non-Buyers cluster. This information can serve as a starting point for designing targeted interventions aimed at shifting their eating habits towards more sustainable choices. To promote a dietary transition for all, policymakers should develop strategies that specifically target individuals with low green food purchasing behavior. Consistent messaging about what constitutes a greener diet and reshaping the food environment to facilitate sustainable food choices are essential steps in this endeavor.

Chapter 7. Study 4: Nudging promotion of green food in an Italian canteen: a Case Study

Abstract

The present study evaluated the impact of a green food nudging strategy implemented in an Italian non-corporate canteen to promote sustainable dietary choices. The nudging campaign was introduced in a cafeteria ("Tavolamica 1"), while a similar canteen was used as a control group ("Tavolamica 2"). Both canteens were located in industrial areas in Emilia-Romagna, Italy, and mostly attended by workers. Repeated-measures ANOVAs within-between for plates typologies revealed no statistically significant differences in green food sales between the experimental ("Tavolamica 1") and control ("Tavolamica 2") canteens before and after the intervention, mainly due to the small sample size of dishes for each category (first courses, second courses, side dishes and pizzas). However, the effect size using calculation of Cohen's d for sales variation of specific dish categories indicated higher sales of second plates (Cohen's d = 0.90) and side dishes (Cohen's d = 0.61) in the experimental canteen compared to the control group, suggesting that the advertising strategy may have been particularly effective for these types of plates. Moreover, the percentage change rates between pre- and post-test single dishes of green food was higher in the experimental canteen compared to the control. These findings highlight the potential of targeted green food nudging strategies to influence consumer behavior in specific contexts, indicating a potential, albeit subtle, impact of the intervention that may not have reached statistical significance due to study design's limitations. Future research should explore the use of extended intervention periods, refined measurement approaches to address contextual differences and confounding variables, and either the adoption of complex statistical methods or the use of less dishes as dependent variables to better understand and enhance the effectiveness of sustainable food nudging strategies in cafeteria settings.

7.1 Introduction

The urgent need to address environmental challenges such as climate change, resource depletion, and biodiversity loss has intensified interest in environmentally sustainable food systems. Among the various strategies to reduce the environmental footprint of food consumption, the promotion of environmentally friendly foods, such as seasonal, local, and plant-based options, has emerged

as a key area of intervention. Shifting consumer choices towards these alternatives is not only beneficial for the environment but also contributes to healthier diets and broader societal benefits (Vermeir & Verbeke, 2008). However, despite increasing awareness and positive attitudes toward environmentally friendly foods are increasing worldwide, a persistent intention-behavior gap remains. In fact, while individuals may express a willingness to adopt greener (hereby used as a synonym for "environmentally friendly") food choices, actual purchasing and consumption behaviors often fail to reflect this intention. This phenomenon, well documented in literature, is called the "green attitude-behavior gap" (Park & Lin, 2020), and represents one of the greatest challenges pertaining the ecological transition (Zhuo et al., 2022). This discrepancy is particularly evident in workplace settings, where convenience, habits, and availability often influence food choices more strongly than environmental concerns. Workplace canteens represent a unique opportunity to bridge this gap, as they are controlled environments where interventions can be systematically implemented and evaluated (Thorsen et al., 2010). Workplace interventions promoting environmentally friendly foods can involve strategies such as altering food presentation, improving availability, offering incentives, or implementing informational campaigns (Grabs et al., 2016). Many of these interventions falls under the label of "nudging". Nudging refers to the concept of subtly guiding individuals towards making certain choices without restricting their freedom to choose, typically by altering the presentation or framing of options in a way that encourages a desired behavior (Thaler & Sunstein, 2008). In this case, the experiment applied a nudging strategy to steer the canteen customers toward more sustainable and healthier food choices by modifying the canteen menu to emphasize options that were more environmentally sustainable compared to other alternatives. There is still limited empirical evidence on the effectiveness of such strategies, particularly in the context of Italian workplaces, where food culture plays a central role in daily life and dining habits.

Some previous field research did test green food nudging strategies, Gravert and Kurtz (2021) for example conducted a field experiment in a restaurant to test if framing the menu in different orders would influence the choice of vegetarian options. They found that in an experimental condition with the menu that emphasized the vegetarian options more green food was sold (increasing from 3% to 9% of total dishes sold, a 200% increase) compared to the condition in which the meat option was highlighted. Hansen et al. (2021) as well tested a real-life nudging strategy by manipulating the lunch default option concerning the registration form at three

conferences, finding a significant increase in the number of participants choosing the vegetarian option when it was set as the default. Understanding how to effectively promote sustainable food choices within culturally specific contexts is crucial for designing successful interventions and this study is an attempt to do so in an Italian canteen located near an industrial area thus attended mainly by workers.

This is an Italian case study on the nudging strategy of green food consumption in a non-corporate self-service canteen where workers from various companies are served dishes during their lunch breaks for five-days a week. "Green food" is defined as a product that has less environmental impact throughout its entire life cycle, from production to disposal, compared to other products within the same category (Gil, 2000). The study investigates whether a nudging intervention can influence green food selection and consumption. Specifically, we addressed if a campaign based to lever mainly on consumers' environmentalist pride, sense of community, green self-efficacy, environmental and taste features of food would increase the consumption of green foods. We chose to test these five variables because they were found to be effective in influencing green food purchase behavior by literature and in other studies of the present thesis (environmentalist pride, environmental and taste features of food in Study 3; sense of community and green self-efficacy in Study 2). At the same time, the campaign delivered simple and clear information about what is meant by "green food" and referenced the involvement of CAMST Group's action in protecting the planet, alongside consumers. These aspects refer to the results of the first study regarding the importance of transparent communication and trust in the company to increase knowledge about environmental issues and reduce skepticism towards green washing, which influence the intention to buy green food. Pride and other positive emotions related to green purchases, moreover, have been often associated with the decision-making process for purchasing green products. Pride can contribute indeed to form favorable attitudes towards green purchases (Kolling et al., 2020). Study 3 of the present thesis too showed that pride associated with purchasing green products and the tendence to place more importance on the healthiness and eco-sustainability of food influenced the likelihood of being categorized in the category of consumers not affected by the intention behavior gap (the "Coherent Buyers" group), as opposed to non-buyers with favorable intentions and coherent non buyers regarding green food. Sense of community as well has been found to sustain green consumerism in various studies (e.g., Chitewere, 2017; Hong, 2022), since it has been suggested that it can foster collective action for

social change. Finally, green self-efficacy, defined as the belief in the possibility of being able to contribute personally to solve environmental issues, has been described as a significant green product purchase predictor (Chen et al., 2015). Study 3 of the present thesis too showed that pride associated with purchasing green products and the tendence to place more importance on the healthiness and eco-sustainability of food, influenced the likelihood of being categorized in the category of consumers not affected by the intention behavior gap (the "Coherent Buyers" group), as opposed to non-buyers with favorable intentions and coherent non buyers regarding green food.

To design the experiment, we collaborated with two organizations based in the Emilia-Romagna region, Italy: Ecoinnvazione Srl, a research and consulting firm specialized in sustainability assessment and strategies, and CAMST group a large Italian catering and facility services company, which is active in the catering industry both nationally and internationally. It was approached by Ecoinnovazione with an invitation to participate in the study. Together, we designed a nudging strategy aimed at increasing green food sales in a canteen managed by CAMST Group and located in an industrial area, thus frequented primarily by workers from various companies during lunch breaks. We then chose two canteens with similar features both run by the same company to act as the control and the experimental canteen respectively, while Ecoinnovazione Srl evaluated the environmental impact of each dish within the canteens' menus. We collected the sales data of the two canteens for two weeks, to set the purchases baseline, then we delivered in one of the two canteen the green food nudging strategy and checked whether it would increase green food sales during the two-weeks exposure of the campaign.

This study aimed to contribute to the growing body of literature on green food nudging strategies by concretely applying some of the extant research findings and providing practical insights for policymakers, employers, and canteen managers seeking to encourage sustainable eating habits during lunch breaks from work.

7.2 Materials and Methods

Experiment Planning

As aforementioned, this study was conducted thanks to the collaboration between the University of Bologna, Ecoinnovazione Srl and CAMST Group, a large Italian catering company, as part of a doctoral program funded by the European Union (FSE REACT-EU funds).

The nudging strategy ideating process took place as follows. First, CAMST Group's team provided a list of dishes scheduled to be distributed in their canteens in the subsequent weeks and selected two canteens similar to each other by turnout and client typology and suitable for the field experiment. The selected canteens were both situated in two metropolitan industrial areas of the Emilia-Romagna region, Italy). Then the Ecoinnovazione Srl team classified the foods in the menu according to their environmental impact, identifying the less polluting dishes for every day and for every dish category (i.e. first courses, second courses, side dishes and pizzas), utilizing the Life Cycle Assessment methodology (International Organization for Standardization, 2006a, 2006b).

The University team presented the variables found to be most effective to influence green food product purchase by extant literature and previous studies of this dissertation. Then, the three organizations met to discuss together the nudging strategy and the green food logo, later developed by the catering company communication and marketing team with the help of a graphic external consultant. Once the nudging strategy was ready, it was introduced in the experimental canteen ("Tavolamica 1") for a period of two weeks. Finally, the University of Bologna team conducted the statistical analyses reported in the "Results" paragraph.

The settings under test were two large self-service restaurants located near production areas. The menus of the two canteens were different every day as the CAMST Group concept combines traditional Italian dishes with more innovative ones, including vegetarian dishes, to offer a varied assortment. Their opening hours are limited to the lunch break (about 11:45 a.m. to 2:30 p.m.) during weekdays only (Mon-Fri). "Tavolamica 1" canteen has a daily attendance about one-third higher than "Tavolamica 2", but the composition of customers is comparable among the two canteens. Corporate customers (workers from companies that use the restaurant as a substitute for corporate cafeteria service) account for 45 % of the meals sold in "Tavolamica 1"and 50 % in "Tavolamica 2". Customers paying by ticket affiliated with nearby companies are proportionally equivalent in the two canteens. Contracted businesses are similar between the two venues with a predominance of firms belonging to the manufacturing and trade sector (mostly in "Tavolamica 2") and construction (mostly in "Tavolamica 1"). The workers attending both the canteens are predominantly men, approximately between the ages of 20 and 65 years.

Environmental Impact Assessment of Dishes

The Life Cycle Assessment (LCA) methodology (International Organization for Standardization, 2006a, 2006b) has been used for calculating the environmental impact of each dish, building upon

secondary data retrieved from commercial LCA databases such as ecoinvent[1] and agri-footprint[2], Environmental Product Declarations and product category rules of the Made Green in Italy labelling scheme[3]. Due to the lack of detailed information on all the environmental impact categories for all the dishes, the results have been calculated only for the impact category "climate change", which represents the potential contribution of a product or process to global warming, measured by the amount of greenhouse gases (GHGs) emitted throughout the life cycle of the products. The results then express the carbon footprint of each dish. The average carbon footprint of each dish category has been calculated for each day, and used as a reference against with each dish has been compared. The dishes with a carbon footprint value below the average have been marked as the green choice of the day, for that specific dish category. The results are then relative, i.e., they express the preferable environmental choice for that day for that dish category. This approach was chosen intentionally, because LCA is a method for relative evaluations, not identifying the absolute best product and therefore it promotes a mindset that to stimulates small virtuous behaviors every day, even with non-vegetarian products.

Nudging Strategy and Experiment Design

The nudging strategy we tested is reported below (Figure 1). The main, central sentence has been ideated to recall costumers' sense of community and green self-efficacy (*"*We choose to make a difference, even one plate at a time!*"*). Self-efficacy here is represented by the fact that even the smallest individual choice, one plate at the time, can make a difference. Environmental messages on menus, such as "Small changes can make a big difference," have been shown to double the likelihood of consumers choosing vegetarian options, highlighting the power of strategic messaging in influencing consumer behavior (Blondin et al., 2022). The color green we used for this sentence's background is commonly used in advertising to signal environmentally friendly options. It has been found effective indeed in creating positive attitudes and purchase intentions, especially when consumers have low persuasive knowledge, that is consumers' theories about persuasion, including beliefs about marketers' motives, strategies, and tactics (Campbell & Kirmani, 2000; Lim et al., 2020). The second sentence in the nudging ad ("We care about the planet! With pride we can choose every day the taste of the future") was inserted to activate

[1] https://ecoinvent.org/
[2] https://blonksustainability.nl/tools-and-databases/agri-footprint
[3] https://www.mase.gov.it/pagina/lo-schema-nazionale-made-green-italy

people's environmentalist pride. Literature indicates that if people associate positive feelings with consuming green food, they will be more likely to maintain these changes in the long term. Emotional involvement can facilitate the transition towards alternative dietary choices, creating a lasting impact on individual health and on the environment (Castellini & Graffigna, 2024). The use if the "taste" word intended to underline the fact that green food is as tasty as traditional food. The use of the term "we" was not casual. In fact, advertising that evokes positive emotions (pride, in this case) and uses community-oriented language have been found to directly enhance consumers' attitudes towards the advertising message itself (Abdelkader & Bouslama, 2014).

Furthermore, the term "we" refers to the involvement of CAMST Group, alongside consumers, in the environmental action, with the aim of increasing trust in the pro-environmental message by leveraging the long-established trust in the company, as most of the costumers are regulars. The fourth message, "Lower environmental impact compared to the alternative dishes on the daily menu", is a clear and synthetic explanation of what was the main characteristic of the suggested dishes with lower environmental impact (message 3) in this campaign. This informative message tries to address the need for knowledge about environmental issues related to food choice and, at the same time, to reduce the customers' perception that the campaign is based on greenwashing, as greenwashing typically uses advertising impressive terms without explaining them (Shanmugam et al., 2024).

Finally, we opted for a green and blue logo to identify the suggested dishes in the menu of the day, instead of an only green one, to avoid being confused with the marking normally used for vegetarian dishes (See Figure 2). In fact, this campaign was mainly aimed not at vegetarians, but at everyone, and hopefully at those who usually consume traditional foods that are impactful on the environment.

Figure 1. The nudging strategy.

Italian English translation: 1. "We choose to make a difference, even one plate at a time!"; 2. "We care about the planet! With pride we can choose every day the taste of the future" 3. "Search for this symbol and choose from our offerings the dishes with the lowest environmental impact*". 4. "*Lower environmental impact compared to the alternative dishes on the daily menu".

Regarding the field experiment implementation, the canteens' baseline data were collected for two weeks, then on the 11th on November 2024, we introduced the nudging strategy in the experimental canteen only ("Tavolamica 1"), which lasted another two weeks. The canteens menus varied from control week one (Rotation 1 Menu) to week two (Rotation 2 Menu), repeating themselves in the experimental period.

The nudging strategy was displayed on monitors and on physical posters in "Tavolamica 1" canteen, while every food selected by the Ecoinnovazione team was countermarked by the green food logo we created (see Figure 2). Moreover, posters were displayed on the food storefronts indicating, for each type of dish (first courses, second courses, side dishes and pizzas) which were the most environmentally sustainable among the other options (See Figure 3 as an example).

Figure 2. The green food logo.

Figure 3. An example of the posters displayed on the food storefronts.

Translation: 1. “We choose to make a difference, even one plate at a time!”; 2. “Today's lower environmental impact* first courses” 3. “Whole wheat spaghetti with

radicchio". 4. "*Lower environmental impact compared to the alternative dishes on the daily menu".

No changes were introduced in the control canteen ("Tavolamica 2"), that was comparable to the experimental canteen ("Tavolamica 1") for number and typology of clients. In fact, both canteens are situated in proximity to large corporations and attended mainly by workers during their lunch break.

Data Analysis

The first observation we made on the data was to assess if the advertising strategy we introduced caused an increase in green food overall sales in the experimental canteen ("Tavolamica 1"), compared to the sales trend in the control canteen. We conducted eight repeated-measures ANOVAs, one for each dish category (first courses, second courses, side dishes and pizzas) and menu (rotation 1 and rotation 2 menu). Then, we calculated the effect size with Cohen's d for sales variation of every dish category sold in both canteens since the small sample size related to the dishes for each category can influence the significance level of the statistic test used. Finally, we calculated the sales percentage change from pre- to post- test for every dish in both the canteens. All the analyses were run through the JASP software, version 0.19.1 (JASP Team, 2024).

7.3 Results

For this study we employed a longitudinal field study design. Sales data were collected in both canteens two weeks before the introduction of the intervention (t0) and two weeks after the implementation of the green food nudging campaign in "Tavolamica 1" canteen (t1).

For corporate protection reasons, we could not report the exact total number of purchases, that are thus represented as a percentage of the total sales. Unfortunately, some data is missing due to supply issues occurring during the experimental period.

The following tables report the results of repeated-measures ANOVA we conducted to compare the canteens sales at pre- and post-test time (before and after the introduction of the green food nudging strategy in the "Tavolamica 1" canteen). The analyses have been conducted separately for different typologies of plates (first courses, second courses, side dishes and pizzas) and for different menus (rotation 1 and rotation 2 menu), as well as for the average values of rotations 1 and 2.

Overall, all the ANOVAs results showed that the interaction between time and group was non-significant, suggesting that the change in sales over time did not differ between the "Tavolamica 1" (TA1) and "Tavolamica 2" (TA2) canteens. Looking at the main effect of time on each canteen, no significant main effect emerged, indicating that the green food sales did not significantly change from pre- to post-test.

Table 1. Repeated-measures ANOVA to examine the effect of time (PRE, POST) and condition (TA1, TA2) on the number of first courses purchased for rotation 1 menu.

Cases	Sum of squares	df	Mean Square	F	p
Within subjects effects					
PRE-POST	0.15	18	0.15	0.04	0.83
PRE-POST ✻ TA1_TA2	0.07	18	0.07	0.02	0.89
Between subjects effects					
TA1_TA2	53.94	18	53.94	3.63	0.07

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); df = degree of freedom.

Table 2. Descriptives of first courses sales for rotation 1 menu.

PRE-POST	TA1_TA2	Mean	S.D.	S.E.	Coefficient of variation
PRE	TA1	9.33	2.16	0.69	0.23
	TA2	11.56	4.09	1.29	0.35
POST	TA1	9.36	1.96	0.62	0.21
	TA2	11.78	3.34	1.06	0.28

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); S.D. = Standard Deviation; S.E. = Standard Error.

Table 3. Repeated-measures ANOVA to examine the effect of time (PRE, POST) and condition (TA2, TA1) on the number of first courses purchased for rotation 2 menu.

Cases	Sum of squares	df	Mean Square	F	p
Within subjects effects					
PRE-POST	2.32	7	2.32	0.94	0.36
PRE-POST ✻ TA1_TA2	1.32	7	1.32	0.49	0.49
Between subjects effects					
TA1_TA2	21.26	7	21.26	0.68	0.44

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); df = degree of freedom.

Table 4. Descriptives of first courses sales for rotation 2 menu.

PRE-POST	TA2_TA1	Mean	S.D.	S.E.	Coefficient of variation
PRE	TA1	8.66	5.39	2.41	0.62
	TA2	11.40	1.89	0.94	0.17
POST	TA1	8.49	4.68	2.09	0.55
	TA2	10.13	2.70	1.35	0.27

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); S.D. = Standard Deviation; S.E. = Standard Error.

Table 5. Repeated-measures ANOVA to examine the effect of time (PRE, POST) and condition (TA2, TA1) on the number of second courses purchased for rotation 1 menu.

Cases	Sum of squares	df	Mean Square	F	p
Within subjects effects					
PRE-POST	0.47	16	0.47	0.34	0.47
PRE-POST ✻ TA2_TA1	0.68	16	0.68	0.48	0.50
Between subjects effects					
TA2_TA1	25.99	16	25.99	0.91	0.35

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); df = degree of freedom.

Table 6. Descriptives of second courses sales for rotation 1 menu.

PRE-POST	TA2_TA1	Mean	S.D.	S.E.	Coefficient of variation
PRE	TA1	5.57	3.27	1.09	0.59
	TA2	7.00	3.87	1.29	0.55
POST	TA1	5.07	4.38	1.46	0.86
	TA2	7.04	3.86	1.29	0.55

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); S.D. = Standard Deviation; S.E. = Standard Error.

Table 7. Repeated-measures ANOVA to examine the effect of time (PRE, POST) and condition (TA2, TA1) on the number of second courses purchased for rotation 2 menu.

Cases	Sum of squares	df	Mean Square	F	p
Within subjects effects					

PRE-POST	0.61	11	0.61	2.11	0.17
PRE-POST ✻ TA2_TA1	3.77	11	3.77	0.92	0.36
Between subjects effects					
TA2_TA1	108.82	11	108.82	3.60	0.08

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); df = degree of freedom.

Table 8. Descriptives of second courses sales for rotation 2 menu.

PRE-POST	TA2_TA1	Mean	S.D.	S.E.	Coefficient of variation
PRE	TA1	4.62	3.26	1.23	0.71
	TA2	9.49	4.52	1.85	0.48
POST	TA1	4.23	3.11	1.17	0.73
	TA2	7.57	5.54	2.26	0.73

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); S.D. = Standard Deviation; S.E. = Standard Error.

Table 9. Repeated-measures ANOVA to examine the effect of time (PRE, POST) and condition (TA2, TA1) on the number of side dishes purchased for rotation 1 menu.

Cases	Sum of squares	df	Mean Square	F	p
Within subjects effects					
PRE-POST	0.13	8	0.13	0.09	0.77
PRE-POST ✻ TA2_TA1	0.63	8	0.63	0.45	0.52

Between subjects effects					
TA2_TA1	36.84	8	36.84	1.19	0.31

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); df = degree of freedom.

Table 10. Descriptives of side dishes sales for rotation 1 menu.

PRE-POST	TA2_TA1	Mean	S.D.	S.E.	Coefficient of variation
PRE	TA1	2.38	2.94	1.70	1.24
	TA2	5.73	4.43	1.68	0.77
POST	TA1	2.94	0.95	0.55	0.32
	TA2	5.52	4.52	1.71	0.82

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); S.D. = Standard Deviation; S.E. = Standard Error.

Table 11. Repeated-measures ANOVA to examine the effect of time (PRE, POST) and condition (TA2, TA1) on the number of side dishes purchased for rotation 2 menu.

Cases	Sum of squares	df	Mean Square	F	p
Within subjects effects					
PRE-POST	3.45	10	9.34	0.79	0.36
PRE-POST ✻ TA2_TA1	13.15	10	14.19	3.44	0.09
Between subjects effects					
TA2_TA1	20.17	10	20.17	0.55	0.47

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); df = degree of freedom.

Table 12. Descriptives of side dishes sales for rotation 2 menu.

PRE-POST	TA2_TA1	Mean	S.D.	S.E.	Coefficient of variation
PRE	TA1	3.03	3.85	1.72	1.27
	TA2	6.39	5.22	1.97	0.82
POST	TA1	5.30	5.40	2.41	1.12
	TA2	5.66	3.25	1.23	0.57

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); S.D. = Standard Deviation; S.E. = Standard Error.

Table 13. Repeated-measures ANOVA to examine the effect of time (PRE, POST) and condition (TA2, TA1) on the number of pizzas purchased for rotation 1 menu.

Cases	Sum of squares	df	Mean Square	F	p
Within subjects effects					
PRE-POST	0.09	28	0.09	1.06	0.31
PRE-POST ✻ TA2_TA1	0.04	28	0.04	0.47	0.50
Between subjects effects					
TA2_TA1	6.67	28	6.67	16.37	<0.001

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); df = degree of freedom.

Table 14. Descriptives of pizzas sales for rotation 1 menu.

PRE-POST	TA2_TA1	Mean	S.D.	S.E.	Coefficient of variation
PRE	TA1	0.56	0.22	0.06	0.39
	TA2	1.28	0.71	0.18	0.56
POST	TA1	0.54	0.28	0.07	0.52
	TA2	1.53	0.59	0.15	0.51

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); S.D. = Standard Deviation; S.E. = Standard Error.

Table 15. Repeated-measures ANOVA to examine the effect of time (PRE, POST) and condition (TA2, TA1) on the number of pizzas purchased for rotation 2 menu.

Cases	Sum of squares	df	Mean Square	F	p
Within subjects effects					
PRE-POST	1.76	23	1.76	0.89	0.35
PRE-POST ✻ TA2_TA1	0.38	23	0.38	0.19	0.66
Between subjects effects					
TA2_TA1	1.30	23	1.30	0.17	0.68

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); df = degree of freedom.

Table 16. Descriptives of pizzas sales for rotation 2 menu.

PRE-POST	TA2_TA1	Mean	S.D.	S.E.	Coefficient of variation
PRE	TA1	1.09	1.81	0.50	1.65

	TA2	1.24	0.57	0.16	0.46
POST	TA1	1.29	3.10	0.86	2.40
	TA2	1.79	2.84	0.66	1.27

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); S.D. = Standard Deviation; S.E. = Standard Error.

Summarizing, all the repeated-measures ANOVA we carried out to compare the green food purchases before and after the introduction of the green food nudging strategy in the experimental canteen were non-significant. The only exception was the within-subjects effect for the pizzas sales for the rotation 1 menu. However, this result is of negligible interest as, according to our hypothesis, we were looking for significant within and interaction-subjects effects.

In order to further investigate the differences between the control and experimental canteen we took into consideration the effect size which was not strictly influenced by the sample size as the statistically significance level. We calculated Cohen's d for within-subjects designs to assess the sales variation of different dishes categories after averaging rotation 1 and 2 values (Table 17).

Table 17. Cohen's d for every dish category in each canteen.

Type	**Canteen**	**Mean-pre**	**Mean-post**	**SD-pre**	**SD-post**	**Pre-post correlation (Pearson's r)**	**Cohen's d**
First Courses	TA2	11.56	1.77	4.09	3.34	0.74*	3.54
	TA1	9.32	9.36	2.16	1.6	0.71*	0.03
Second Courses	TA2	7.99	7.25	4.18	4.42	0.81*	0.28
	TA1	3.37	5.00	3.16	3.81	0.88*	0.90
Side Dishes	TA2	6.47	6.09	4.94	3.86	0.86*	0.15
	TA1	3.00	4.23	3.65	4.27	0.88*	0.61

(Pizzas)	TA2	11.38	10.27	3.57	2.74	0.01	0.25
	TA1	4.65	4.37	0.34	1.24	0.98*	0.31

TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); * = $p < 0.05$.

These results show that the magnitude of the difference between sales from pre- to post-test was higher in the experimental canteen ("Tavolamica 1") for green second plates and side dishes, regardless of statistical significance. In fact, second plates' Cohen's d in the experimental canteen is 0.90, a large effect size according to Cohen's classification (Cohen, 2013), while in the control canteen is equal to 0.28, a small effect size. Side dishes' Cohen's d is equal to 0.61 in "Tavolamica 1", a medium effect size, versus 0.15 in "Tavolamica 2", a small effect size. This could mean that the green food promotion strategy was particularly effective for these two typologies of plates.

Finally, in the following tables, percentage variations at pre-test (t0) and at post-test (t1) are presented considering each suggested dish. The pre-test data used are the average between rotation 1 and rotation 2 menu in Table 18, rotation 1 data in Table 19, and rotation 2 data in Table 20. Dishes that appeared more than once, because they were included on menus on different days, were merged and their averaged value was used. Data on the plates for which we have only "Tavolamica 1" sales information, due to supply problems in "Tavolamica 2"'s canteen, are given in the Appendix.

Table 18. Suggested less impactful dishes: percentage of change between pre- and post-test (at pre-test the sales of the first and second menu rotations were averaged).

Type	Dish	Canteen	Average Pre-test (%)	Post-test (%)	Change (%)
First Course	Tortelli with potatoes and mushrooms	TA2	18.00	13.84	-30.06
		TA1	9.58	9.88	**+3.04**
First Course		TA2	5.08	6.57	+22.68

	Whole wheat tortiglioni with cauliflower	TA1	6.50	6.72	+3.27
First Course	Penne “Arrabbiata”	TA2	16.85	16.88	+0.18
		TA1	8.96	13.12	**+31.71**
First Course	Risotto with artichokes	TA2	6.81	11.83	+42.43
		TA1	8.02	9.03	+11.18
First Course	Gnocchi mushrooms and saffron	TA2	11.51	15.41	+25.31
		TA1	10.49	8.09	-29.67
First Course	Whole wheat tortiglioni with pesto	TA2	9.98	8.91	-12.01
		TA1	7.67	8.82	**+13.04**
First Course	Mezze maniche with pepperoni	TA2	9.18	8.11	-13.19
		TA1	9.86	12.34	**+20.10**
First Course	Whole wheat penne with tuna	TA2	11.01	10.02	-9.88
		TA1	6.49	8.26	**+21.43**
First Course	Tomato gnocchi	TA2	13.76	13.99	+1.64
		TA1	13.1	8.95	-46.37
Second course	Mackerel fillet with herbs and potatoes	TA2	6.29	6.73	+6.54
		TA1	7.19	3.64	-97.53
Second course	Vegetable burgers with salad	TA2	6.89	6.89	+0.00
		TA1	2.90	2.39	-21.34
Second course	Grilled chicken breast*	TA2	7.53	2.6	-189.62
		TA1	5.67	5.79	**+2.07**
Second course		TA2	9.84	9.77	-0.72

	"Pizzaiola" turkey cutlets	TA1	3.49	3.81	**+8.40**
Second course	Falafel tomato cream, olive and capers	TA2	2.58	3.42	+24.56
		TA1	2.00	2.14	+6.54
Second course	Grilled cod fillet	TA2	9.18	7.26	-26.45
		TA1	7.25	5.82	-24.57
Second course	Fried fish with vegetables	TA2	15.09	15.82	+4.61
		TA1	11.96	16.25	**+26.40**
Second course	Vegetable flan	TA2	3.85	3.45	-11.59
		TA1	2.02	2.2	**+8.18**
Second course	Chicken with mushrooms	TA2	9.01	8.11	-11.10
		TA1	4.04	2.51	-60.96
Second course	Quinoa and kale roll with salad	TA2	3.94	5.09	+22.59
		TA1	1.76	2.04	+13.73
Second course	Tuna steak	TA2	13.34	13.15	-1.44
		TA1	0.36	0.59	**+38.98**
Second course	Spicy chicken leg	TA2	15.26	14.79	-3.18
		TA1	10.53	8.21	-28.26
Side dish	Baked vegetables*	TA2	1.95	2.43	+19.86
		TA1	0.39	2.04	**+81.05**
Side dish	Baked potatoes*	TA2	12.94	9.64	-34.23
		TA1	5.44	5.535	**+1.72**
Side dish	French Fries	TA2	14.38	10.65	-35.02
		TA1	8.82	13.89	**+36.50**
Side dish	Sautéed spinach	TA2	4.68	8.65	+45.90
		TA1	0.12	2.37	**+94.94**

Pizza	Vegetables Pizza*	TA2	0.60	1.61	+62.58
		TA1	1.42	1.86	+23.64
Pizza	"Quattro Stagioni"*	TA2	1.93	1.59	-21.27
		TA1	0.62	0.52	-19.61
Pizza	Tuna and onions*	TA2	1.93	1.59	-5.42
		TA1	0.62	0.52	-2.96

Bold numbers indicate when percentage changes greatest in the experimental canteen ("Tavolamica 1"); TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); * = Average of dishes that appeared in more than one day.

The following table (Table 19) depicts the percentage change occurred during the rotation 1 menu, that is the first half of the experimental period (from 18th to 22nd November 2024).

Table 19. Rotation 1 menu. Suggested less impactful dishes: percentage of change between pre- and post-test.

Type	Dish	Canteen	Rotation 1 Pre-test (%)	Post-test (%)	Change (%)
First Course	Tortelli with potatoes and mushrooms	TA2	20.46	13.84	-47.83
		TA1	8.36	9.88	**+15.38**
First Course	Whole wheat tortiglioni with cauliflower	TA2	4.57	6.57	+30.44
		TA1	5.64	6.72	+16.07
First Course	Penne "Arrabbiata"	TA2	18.98	16.88	-12.44
		TA1	8.02	13.12	**+38.87**
First Course	Risotto with artichokes	TA2	6.82	11.83	+42.35
		TA1	8.52	9.03	+5.65
First Course	Gnocchi with mushrooms and saffron	TA2	12.04	15.41	+21.87
		TA1	9.77	8.09	-20.77

First Course	Whole wheat tortiglioni with pesto	TA2	8.56	8.91	+3.93
		TA1	7.05	8.82	**+20.07**
First Course	Mezze maniche with pepperoni	TA2	10.88	8.11	-34.16
		TA1	9.86	12.34	**+20.10**
First Course	Whole wheat penne with tuna	TA2	10.37	10.02	-3.49
		TA1	6.58	8.26	**+20.34**
First Course	Tomato gnocchi	TA2	10,16	13.99	+27.38
		TA1	12,72	8.95	-42.12
Second course	Mackerel fillet with herbs and potatoes	TA2	6.20	6.73	+7.88
		TA1	5.20	3.64	-42.86
Second course	Vegetable burgers with salad	TA2	6.20	6.89	+10.01
		TA1	3.21	2.39	-34.31
Second course	Grilled chicken breast*	TA2	9,05	2,60	-248.08
		TA1	5,24	5,79	**+9.50**
Second course	“Pizzaiola” turkey cutlets	TA2	5.24	9.77	+46.37
		TA1	4.83	3.81	-26.77
Second course	Falafel with tomato cream, olive and capers	TA2	2.78	3.42	+18.71
		TA1	2.00	2.14	+6.54
Second course	Grilled cod fillet	TA2	8.92	7.26	-22.87
		TA1	7.25	5.82	-24,.57
Second course	Fried fish with vegetables	TA2	15.09	15.82	+4.61
		TA1	11.96	16.25	**+26.40**

Second course	Vegetable flan	TA2	1.81	3.45	+47.54
		TA1	1.39	2.2	+36.82
Second course	Chicken with mushrooms	TA2	9.01	8.11	-11.10
		TA1	4.88	2.51	-94.42
Second course	Quinoa and kale roll with salad	TA2	5.27	5.09	-3.54
		TA1	2.04	2.04	+0.00
Second course	Tuna steak	TA2	13.81	13.15	-5.02
		TA1	0.36	0.59	**+38.98**
Second course	Spicy chicken leg	TA2	15.63	14.79	-5.68
		TA1	11.11	8.21	-35.32
Side dish	French Fries	TA2	12.41	10.65	-16.53
		TA1	9.52	13.89	**+31.46**
Side dish	Sautéed spinach	TA2	4.24	8.65	+50.98
		TA1	0.12	2.37	**+94.94**
Side dish	Baked potatoes	TA2	14.18	6.92	-104.91
		TA1	3.84	7.35	**+47.76**
Pizza	Vegetables Pizza*	TA2	1.69	1.95	+13.33
		TA1	0.60	0.46	-30.43
Pizza	"Quattro Stagioni"*	TA2	2.03	1.59	-27.67
		TA1	0.69	0.52	-32.69
Pizza	Tuna and onions*	TA2	1.34	1.28	-4.69
		TA1	0.54	0.53	-1.89

Bold numbers indicate when percentage changes greatest in the experimental canteen ("Tavolamica 1"); TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); * = Average of dishes that appeared in more than one day.

The following table (Table 20) illustrates the percentage change occurred during the rotation 2 menu, that is the second half of the experimental period (from 18th to 22nd November 2024).

Table 20. Rotation 2 menu. Suggested less impactful dishes: percentage of change between pre- and post-test.

Type	Dish	Canteen	Rotation 2 Pre-test (%)	Post-test (%)	Change (%)
First Course	Tortelli with potatoes and mushrooms	TA2	15.54	13.84	-12.28
		TA1	10.79	9.88	-9.21
First Course	Whole wheat tortiglioni with cauliflower	TA2	5.59	6.57	+14.92
		TA1	7.36	6.72	-9.52
First Course	Penne “Arrabbiata”	TA2	14.72	16.88	+12.80
		TA1	11.2	13.12	**+14.63**
First Course	Gnocchi with mushrooms and saffron	TA2	10.97	15.41	+28.81
		TA1	1.22	8.09	**+84.92**
First Course	Whole wheat tortiglioni with pesto	TA2	11.31	8.91	-26.94
		TA1	8.28	8.82	**+6.12**
First Course	Whole wheat penne with tuna	TA2	11.65	10.02	-16.27
		TA1	6.41	8.26	**+22.40**
First Course	Tomato gnocchi	TA2	17,37	13.76	-26.24
		TA1	13,49	13.10	-2.98
Second course	Mackerel fillet with herbs and potatoes	TA2	6.39	6.73	+5.05
		TA1	9.17	3.64	-151.92
Second course	Vegetable burgers with salad	TA2	7.58	6.89	-10.01
		TA1	2.58	2.39	-7.95

Second course	Grilled chicken breast*	TA2	6.03	2.60	-131.92
		TA1	6.10	5.79	-5.35
Second course	"Pizzaiola" turkey cutlets	TA2	14.44	9.77	-47.80
		TA1	2.16	3.81	**+43.31**
Second course	Vegetable flan	TA2	5.88	3.45	-70.43
		TA1	2.66	2.2	-20.91
Second course	Quinoa and kale roll with salad	TA2	2.61	5.09	+48.72
		TA1	1.49	2.04	+26.96
Second course	Spicy chicken leg	TA2	14,89	14.79	-0.68
		TA1	9,95	8.21	-21.19
Side dish	Baked vegetables*	TA2	2.20	1.98	-11.11
		TA1	0.17	2.51	**+93.23**
Side dish	Baked potatoes	TA2	11.76	9.64	-21.99
		TA1	4.80	5.54	**+13.36**
Side dish	French Fries	TA2	16.35	10.65	-53.52
		TA1	8.12	13.89	**+41.54**
Pizza	Vegetables*	TA2	1.63	1.61	-1.24
		TA1	1.52	1.84	**+17.39**
Pizza	"Quattro Stagioni"*	TA2	1.88	1.65	-13.94
		TA1	0.49	0.55	**+10.91**
Pizza	Tuna and onions*	TA2	1.28	1.28	+0.00
		TA1	0.58	0.53	-9.43

Bold numbers indicate when percentage changes greatest in the experimental canteen ("Tavolamica 1"); TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1"); * = Average of dishes that appeared in more than one day.

According to the previous three tables it is possible to observe, from the perspective of the post-test, that the green food consumption in the pre-test was worse by the percentage represented in the "change (%)" column. Notably, in every table (that used alternatively the mean selling scores

at pre-test between rotation 1 and 2 menu, the rotation 1 pre-test data and the rotation 2 pre-test data) the sales of green dished in the experimental canteen ("Tavolamica 1") increased more than the purchases in the control canteen ("Tavolamica 2") only for some dishes. Specifically, Table 18 showed that, averaging the first and second menu rotations, in "Tavolamica 1" canteen 5 of the 9 first dishes suggested, 5 of the 12 second dishes suggested, and 4 of the 4 side dishes suggested increased their sales after the campaign in higher proportion compared to change in "Tavolamica 2" canteen.

The next table (Table 21) provides a representation of the percentage change in sales of dishes that had been designated as the suggested less impactful dishes in previous days but were not labeled as so on other days, although they were present on the menu. We reported this data as it is reasonable to assume that costumers attending the experimental canteen several days a week remembered that such plates were previously labelled as less impactful even though they were not mentioned as preferable in the menu of the day and thus they tended to choose them anyway.

Table 21. Green dishes not labeled but suggested in previous days: percentage of change between pre- and post-test*

Type	Dish	Canteen	Average Pre-test (%)	Post-test (%)	Change (%)
Second Course	Mackerel fillet with herbs and potatoes	TA2	1.31	0.81	-38.17
		TA1	0.96	1.79	+86.46
Second Course	Grilled chicken breast	TA2	1.89	10.57	+459.26
		TA1	7.32	5.94	-18.85
Side dish	Baked potatoes	TA2	10.46	12.14	+16.06
		TA1	0.9	1.25	+38.89
Side dish	Baked potatoes[2]	TA2	16.6	14.15	-14.76
		TA1	7.58	9.8	+29.29

*At pre-test the consumption of the first and second menu rotations was averaged; TA2 = control canteen ("Tavolamica 2"); TA1 = experimental canteen ("Tavolamica 1")

As depicted in the table, all plates previously labeled as less impactful (except for grilled chicken breast) were sold more in the experimental canteen, compared to the control one, suggesting that the effect of the advertising campaign for the same dishes may have been extended to later days, as consumers might have remembered that those plates were previously labeled as less impactful.

7.4 Discussion

The present longitudinal experiment aimed to assess the impact of a nudging strategy designed to promote green food choices. The experiment was carried out in two canteens situated in the Emilia-Romagna region, Italy, "Tavolamica 2" (TA2, control group), and "Tavolamica 1" (TA1, experimental group), both run by CAMST Group. The experiment was designed thanks to the collaboration between the University of Bologna, Ecoinnovazione Srl, a research and consulting firm based in Bologna, and CAMST Group, an Italian large catering and facility services company.

Contrary to expectations, the repeated measures ANOVA revealed no statistically significant differences in green food sales between the two canteens before and after the introduction of the green food nudging strategy. These findings suggest that the nudging intervention did not produce a statistically detectable change in sales patterns over time that differentiated the two canteens. Nevertheless, sales data analyzed using Cohen's d to detect the effect size of the variations revealed that overall green second plates and side dishes sales increased more in the "Tavolamica 1" canteen than in "Tavolamica 2" canteen after the introduction of the green food nudging strategy, with some effect sizes reaching values indicative of meaningful differences, regardless of statistical significance. Moreover, observing the percentage change rates between pre- and post-test of the single dishes it was possible to notice that several sales of dishes suggested by the nudging campaign augmented more in the experimental canteen ("Tavolamica 1") compared to the control ("Tavolamica 2"). These findings hint at a potential, albeit subtle, impact of the intervention that may not have reached statistical significance due to several limitations.

Some further considerations could be made. Firstly, the great complexity of the issue of this study must be considered. The experimental setting was indeed a canteen with a very large menu. This implies that numerous trade-offs were likely to happen together with customers' decision-making process. For instance, it is possible that costumers, after seeing the green food promotion posters displayed at the entrance or on the canteen monitors (see Figure 1), may have

bought a traditional first course, due to personal preferences, but a green second course in order to adhere to the campaign, or vice versa. We will take as an example the first Wednesday of the experimental period to illustrate what might have happened. On that day, it was possible to observe that, in "Tavolamica 1" canteen (experimental group) the sales of Lasagna Bolognese, a very popular first course in Emilia-Romagna, decreased from 11.70% before the introduction of the nudging intervention to 9.03% after the start of the experimental period, a reduction of 22.82%. In the meantime, the same plate served on the same day in "Tavolamica 2" canteen (control group) increased from 8.02% at pre-test to 13.09% at post-test, an increment of 63.22%. In addition, is it possible to notice that, in "Tavolamica 1" canteen, some suggested green plates sales increased (e.g. Penne "Arrabbiata" from 8.02% to 13.12%, Baked Vegetables from 0.11% to 3.22%), while those same dishes sales hardly changed from pre- to post- test in "Tavolamica 2" canteen (Penne "Arrabbiata" from 16.85% to 16.88%, Baked Vegetables from 1.33% to 1.89%). This could mean that, despite statistical significance, the nudging campaign may have had a general, larger effect beyond that related to the suggested dishes.

Moreover, the effect of the campaign might have been extended beyond the explicit suggested plates of the menu. In fact, it is impossible to ascertain the effect of the posters that was placed to promote green food in general (Figure 1). It is probable though that these billboards did have an effect on consumers' purchases. For instance, one, after seeing the ad campaign, could have discarded the first course suggested option (e.g. whole wheat tortiglioni with cauliflower) due to personal nutritional needs or, again, taste preferences, falling back on an option that was intuitively greener than the others (e.g. pasta with tomato sauce) or opting for a green second course or side dish. To summarize, the complexity of the issue was such that it could not be addressed in this context and within the time constraints imposed by the collaboration with the catering company. Future research should consider utilizing complex statistical analyses such as Multilevel Modeling (Hoffman & Rovine, 2007) or Latent Class Analysis (Weller et al., 2020) in order to address such complexity adequately, although it will require a much larger sample size that can be reached by extending the duration of the campaign to collect more data.

This study contributes to the literature on green food consumerism during working lunch breaks in non-company cafeteria settings by providing valuable insights into the effectiveness of green food nudging strategies in a real-world setting, addressing the literature gap on the topic (Sharma et al., 2023). The effect size of the variations for each dish category and the percentage

change of consumption for each dish revealed the potential influence of targeted nudging strategies on consumer behavior in foodservice environments, even when conventional statistical tests do not capture a clear-cut effect. The use of Cohen's d as a measure of effect size and calculation of the percentage change provided a more nuanced understanding of the data, suggesting that while the overall impact may be modest, there are specific dishes (second courses and side dishes) where the green nudging intervention may have led to noticeable changes in consumer choices. A possible explanation for this result may be that second courses are often composed of meat, a food typically associated with significant environmental impact, so the effect of the campaign may have been to make it easier to opt for meat alternatives as a second course and for side dishes, as vegetables are commonly considered an environmentally friendly food (Tobler et al., 2011b). We invite future research to delve into this hypothesis, that can be articulated as follows: green food nudging is particularly effective on the promotion of alternatives to notoriously polluting foods, such as meat. In fact, although there is a growing body of research on green food nudging strategies and its role in promoting sustainable food choices, studies specifically comparing its effectiveness on meat alternatives versus other food types are scarce. It is important, though to raise public awareness about the fact that there are several foodstuffs heavily polluting beyond meat, such as seafood (Zhao et al., 2011), dairy (Foster et al., 2007) and rice (Xu et al., 2021). Hence, our suggestion for future research is to focus on the fact that different kinds of green foods may need different nudging strategies (Mansour et al., 2024).

A further contribution of this study is adding to the literature an example of green food nudging strategy in the specific context of Italian cafeterias during working lunch breaks. It is important indeed that this kind of campaigns are tailored to specific cultural and socioeconomic contexts, in order to enhance their impact and reach (Scalabre et al., 2024).

Finally, some practical implications can be drawn by these findings. If the findings about the greater effectiveness of green nudging regarding second plates and side dishes will be confirmed, marketers could prioritize advertising these plates categories to maximize the impact of green food promotions. Moreover, firms and restaurants that wants to promote green food options may redesign their menus including more plant-based second plates or eco-labeled side dishes. Lastly, organizations and policymakers promoting sustainable practices in workplace settings could consider this study as a starting point to design cost-effective, evidence-based

strategies that encourage environmentally friendly food consumption, making sure that the advertising physical supports are well visible in order to be noticed in crowded situations.

Limitations

The lack of statistical significance in the repeated-measures ANOVA we run could be attributed to several factors. First of all, the number of dishes of each type (first courses, second courses, side dishes and pizzas) were too few to yield significant results. That was mainly due to the supply issues occurring in the experimental canteen after the introduction of the nudging strategy, that unfortunately reduced the amount of available data. The unavailability, for privacy reasons of the catering company, of the raw number of sales of each dish at pre- and post-test largely reduced the sample size. The aggregated data expressed as percentages of the total sales limited the types of statistical test that could be used. Another limitation concerns the relatively small number of suggested less impactful dishes for selection within the menu of the day, compared to a varied menu with many possible choices. It was related to variations in the menu between the two canteens and between pre- and post-tests within them due to the availability of the raw food materials.

Second, it is possible that the duration of the intervention (two weeks) was insufficient to produce measurable behavioral change. The summer period was not used because it could not guarantee the frequency of the same clients between pre- and post-test due to work holidays. Additionally, a fairly limited period had to be chosen for the entire experiment to account for menu rotations and the seasonality of raw food materials to ensure comparability between the pre-and post-test conditions. In addition, the experimental period was curtailed by a total of two days, due to two significant events: the 1st of November, a national religious festivity, and a countrywide general strike occurred on the 24th of November 2024. Consumer behaviors often require sustained exposure to interventions before changes become evident (Golding et al., 2022), suggesting that a longer-term study might better capture the effects of the nudging strategy. A more stable advertising exposure is indeed required for the development of consumer habits and the reinforcement of desired behaviors, increasing the likelihood of achieving significant and enduring outcomes (Verplanken & Wood, 2006). Research indicates that habit formation can vary significantly among individuals, with behaviors becoming automatic over a span ranging from a few weeks to several months (Gardner et al., 2012). Therefore, extending the duration of nudging

interventions beyond two weeks in future research is advisable to facilitate habit formation and achieve sustainable behavior change.

Third, differences in canteen size or clientele may have introduced confounding effects, particularly in the smaller experimental canteen (TA1), where operational factors such as crowding, or menu visibility could influence food choices. Another possible confounding effect could be the one caused by the great variety of proposed dishes in the examined canteens. In fact, several food options present in the two canteens (e.g. bowls, soups and cold dishes) were not included in the study in order to avoid excessive complexity and fragmentation in the analyses, that were limited to the main and more popular courses.

A further limitation was the fact that it was not possible, for privacy and company policy reasons, to administer a questionnaire to the canteen customers to match their pre- and post-test data and at the same time to collect information on the sociodemographic composition and eating habits of the sample to take them into account in the analyses. These aspects typically often limit field research.

Finally, it is worthwhile to highlight the peculiar characteristics of the experimental setting. It was in fact a noisy, crowded cafeteria, mainly attended by workers with a short lunch-break time who regularly have lunch there. Therefore, the likelihood that they would have the necessary attention to notice the new billboards and begin an evaluating process of new food alternatives outside their own habits is low. This is probably one of the main causes that led to non-significant results, because, even if the canteen's clients have had been willing to consume green food in a context in which they could have reflected on this option, they weren't able to do it due to the fact that they didn't see the billboards, or were in a hurry, or were thinking about something regarding their workday. These considerations are perfectly in line with the Dual Process Theory of Kanheman (2013), that states that people act in line with their beliefs only when they have enough resources (motivation, ability and opportunity) available. Future research should use a quieter experimental setting with people who have more time available to evaluate the alternative food options proposed.

7.5 Conclusions

The present study aimed to assess the impact of a nudging strategy designed to promote green food choices in an Italian canteen. The repeated-measures ANOVAs we conducted revealed no statistically significant differences in green food sales between the two canteens before and after

the introduction of the green food nudging strategy, mainly due to the small number of dishes entered into the analysis. Nevertheless, the effect size of the variations on each category of food and the percentage change rates between pre- and post-test on single dishes showed an increase of green food consumption that was larger in the experimental canteen ("Tavolamica 1") compared to the control ("Tavolamica 2"), suggesting that the intervention may have had a potential, although limited, impact. The green second plates and side dishes were those that increased more in the experimental canteen ("Tavolamica 1") compared to "Tavolamica 2" (control group), indicating that the nudging campaign may have been particularly effective on those types of dishes. The findings indicate that the intervention may hold promise, serving as an interesting starting point for further investigation. Future research should consider using a more extended intervention period, additional measures to control contextual differences and confounding variables, and more manageable dependent variables (dishes), to better understand the drivers of consumer behavior in this specific context.

Appendix

Table 2 bis. Rotation 1 menu. Suggested green dishes: percentage of change between pre- and post-test only in the experimental canteen ("Tavolamica 1")

			Rotation 1		
Type	**Dish**	**Canteen**	**Pre-test (%)**	**Post-test (%)**	**Change (%)**
First Course	Whole wheat spaghetti & radicchio	TA1	0.35	0.79	+125.71
Second course	Grilled chicken breast	TA1	5.79	4.68	+35.87
Second course	Mackerel fillet with "Crudaiola" sauce	TA1	8.58	8.63	+0.58
Second course					
Pizza	Vegetable Pizza	TA1	0.38	0.41	+7.89
Pizza	Vegetable Pizza	TA1	6.23	11.58	+85.87
Pizza	Vegetable Pizza	TA1	0.57	0.48	-15.79

Table 3 bis. Rotation 1 menu. Suggested green dishes: percentage of change between pre- and post-test only in the experimental canteen ("Tavolamica 1")

			Rotation 1		
Type	**Dish**	**Canteen**	**Pre-test (%)**	**Post-test (%)**	**Change (%)**
First Course	Whole wheat spaghetti & radicchio	TA1	0.54	0.79	+46.30
Second course	Grilled chicken breast	TA1	7.50	4.68	-37.60
Second course	Mackerel fillet with "Crudaiola" sauce	TA1	5.86	8.63	+47.27

Second course	Chicken with mushrooms	TA1	3.2	2.51	-21.56
Pizza	Vegetable Pizza	TA1	0.39	0.34	-12.82

Chapter 8. General Discussion

The aim of the present dissertation was to contribute to the understanding of the psychological variables related to green food consumption and the green food attitude-behavior gap phenomenon. This research work is intended to serve as a foundation for designing interventions aimed at conserving ecosystems and biodiversity, reducing the impact of climate change, and promoting sustainable development, thereby supporting the broader goal of green recovery. In particular, the studies presented in this thesis were ultimately aimed at developing and implementing a marketing strategy to help green companies communicate the distinctive features of their products in an effective and engaging way. This strategy was tested for its effectiveness in encouraging informed consumer choices, based on scientific evidence rather than misleading marketing practices.

The present chapter will begin by discussing the rationale and main findings of the four studies presented, followed by an overview of the theoretical and practical implications of the results. It will conclude with an examination of the limitations of the studies and suggestions for future research.

The four studies that constitute this thesis were designed in accordance with recommendations for future research identified in the extant literature on the subject. Although the green attitude-behavior gap in green purchase behavior is a well-known reality, the large amount of research on this topic remains marked by inconclusive findings and a lack of systematic continuity (Carrington et al., 2014; Zhuo et al., 2022). This thesis thus contributes to the branch of research on the green consumerism attitude-behavior gap in the context of green food.

Firstly, we concentrated our efforts on one specific product category: green food. This decision was based on the understanding that motivations and factors driving purchase behavior can largely vary across different products categories. An increasing number of authors have called for a shift in research focus towards specific product categories, rather than eco-sustainable products in general (Liobikienė & Bernatonienė, 2017; Luthra & Deshwal, 2022). We chose food for several reasons, as discussed in the introduction chapter. These reasons can be summarized by the great impact of diet on people's health and well-being, as well as the substantial environmental burden posed by the food industry.

Secondly, we followed previous research recommendations to incorporate data beyond self-reported measures (Sharma et al., 2023; Wijekoon & Sabri, 2021). In Study 2, in fact, we employed reactions time measures (via the IAT) and qualitative data from focus groups to

investigate consumers' implicit and explicit attitudes toward green food and green food purchasing. Additionally, in Study 4, we collected actual purchase data through a field-study experiment conducted in local canteens.

The following section will now proceed to examine each specific study.

Study 1 investigated the cognitive predictors of green food purchase intention, namely perceived environmental knowledge, trust in green claims, and green advertising skepticism. An online survey was administered to a large sample of Italian adult consumers to understand how these variables are related. The results showed that trust in green claims serves as a mediator between environmental knowledge, green advertising skepticism, and green food purchase intention. The fact that trust fully mediated the relationship between green advertising skepticism and intention to buy green food implies that consumers with higher skepticism perceive green claims as less trustworthy, which, in turn may hinder their willingness to purchase green food. Additionally, the relationship between environmental knowledge and intention to buy green food showed that the more people know about environmental issues, the more willing they are to buy green food. This relationship was partially mediated by trust in green claims, indicating that environmental knowledge may foster trust in eco-sustainable advertising, thereby positively affecting green food-purchasing intentions. These findings suggest that consumers' purchase intentions are bolstered by environmental awareness and trust in green claims, challenging the assumption proposed by T. T. H. Nguyen et al. (2019) that higher environmental awareness leads to greater skepticism toward green advertising. This discrepancy may be due to the fact that such customers react differently when exposed to different kinds of green advertising. Research in fact indicates that specific ads are effective in reducing skepticism among consumers who possess greater environmental awareness (Pham & Barretta, 2024). In contrast, these same consumers exhibit backfiring behavior when exposed to vague environmental ads, resulting in increased skepticism (Pham & Barretta, 2024). This could have been the case of our study, in which participants were not exposed to actual green advertising, but they were only asked their opinion about green advertising in general.

Study 2 used focus groups and the Implicit Association Test (IAT, Greenwald et al., 1998) to investigate explicit and implicit attitudes towards green purchase behavior in a sample of Italian adult consumers. While the IAT score analysis did not yield significant results, the thematic analysis of the focus group provided valuable insights. This indicates that self-reported purchasing

is probably not influenced by implicit attitudes about green food, but by explicit (conscious) factors. The qualitative analysis revealed that, participants identified as consumers who do not buy as much green food as they would like, the majority still regularly purchased some kind of green food, indicating established green food purchasing habits for part of their grocery shopping. Facilitators of green food purchases included environmentalist motives (environment protection, resources conservation, market influence), ethical motives (animal welfare, local economy support, future generations' wellbeing) and other facilitators (health benefits, reliable eco-labels, better quality, greater availability, incentives, dietary choices, price), as well as openness to novelty factors (culinary innovation and curiosity). Barriers to green food purchases were identified as a lack of material or cognitive resources (time, attention, knowledge, habit) and other obstacles (unclear labels, little availability, taste, social norms, aesthetics, vegan/vegetarian label, price, tradition defense).

With regard to the attitude behavior gap, the majority of the participants believed to belong to the category of people that don't buy as much green food as they wished. The reasons they brought to explain this discrepancy were, again, the lack of resources (lack of time, lack of attention, lack of knowledge, lack of habits), high prices and little recognizability of green food products, and social norms (i.e. social pressure or conformism). Other notable themes emerged from the group discussions included mistrust of green marketing, perceived as too infrequent, paternalistic, reserved for the élite and source of skepticism and participants' preferences for eco-labels, which they believed should be simple, informative, guaranteed and descriptive. Discussions also revealed that information about greenwashing and polluting production processes elicited mixed emotions. While such information fostered the intentions to adopt greener behaviors, it simultaneously increased skepticism toward green marketing and cynicism. The study further explored the potential impact of alternative naming conventions for green food. Some participants viewed terms like "vegetarian" and "vegan" favorably, while others found them unsuitable because of tradition defense reasons, preferring a descriptive language.

Finally, regression analysis from the post-IAT online questionnaire showed that the effect of organic food on subjective well-being and consequences of green food consumption positively predicted green food purchase behavior, while barriers to green food purchase negatively influenced reported green food purchase behavior. These findings suggest that the more consumers perceive green food as beneficial to their physical, emotional, social, and intellectual well-being,

as well as to their health and the environment, the more likely they are to buy it. Conversely, perceived barriers, such as lower availability and higher prices, are negatively associated with green food purchasing.

Study 3 profiled different categories of green food consumers and examined how purchase-related emotions, motives to buy green food, and sociodemographic characteristics influenced the likelihood of belonging to each category. The categories were: people who are willing to buy green food and do so ("Coherent-Buyers"), people who are willing to buy green food but do not ("Non-Buyers with Favorable Intentions"), and people who are not willing to buy green food and do not ("Coherent Non-Buyers"). The results showed that older individuals, and those who feel more pride in buying green food and place more importance on attributes such as healthiness, natural content, and eco-sustainability, were more likely to belong to the "Coherent-Buyers" category. In contrast, consumers who feel less pride in buying green food and prioritize convenience, price, and familiarity of food were more likely to fall into the "Coherent Non-Buyers" or "Non-Buyers with Favorable Intentions" categories. The latter group is of particular interest to researchers in this field, as it represents the people actually causing the attitude behavior gap (Frank & Brock, 2018).

Study 4 was made in collaboration with Ecoinnovazione Srl and CAMST Group, a catering and facility services company, and it consisted in the field test of a green food marketing strategy in a non-corporate canteen based on the main green food purchase drivers we identified in the first three studies of the thesis. Sales variation of specific dish categories and specific dishes indicated higher sales of second plates and side dishes in the experimental versus the control cafeteria, suggesting that the advertising strategy may have been more effective for these types of plates.

In conclusion, this thesis' results converged into the creation of communicative model based on factors that positively influence the choice of green food (i.e., relatively less impact on the environment than other dishes on the menu). An initial attempt to apply this communicative model yielded partially positive results, albeit with the many limitations typical of field research, with many interfering variables that couldn't be controlled. The complexity of human eating behavior, including food preferences, habits, aesthetic and presentation of dishes, etc. should be taken into account in future research to better understand how to promote green food.

8.1. Theoretical Implications

The findings of the four studies that constitute this thesis provide valuable contributions to existing theories on green consumer purchase behavior, its antecedents, and the attitude-behavior gap phenomenon regarding a specific category of eco-sustainable items that is green food.

8.1.1 Theory of Planned Behavior Limitations

Our findings support and extend the Theory of Planned Behavior (TPB) framework by showing that attitudes, subjective norms, and perceived behavioral control (PBC) influence green food purchasing intentions and behaviors. The TPB has been largely employed in the context of environmentally friendly food to elucidate the role of motivational factors in food choices. For instance, a recent meta-analytic study confirmed that the TPB is a robust framework for understanding eco-sustainable food consumption, identifying purchase intention as the most influential predictor of behavior (Shen et al., 2022). Our results are in line with this conclusion. Study 1 further clarified the cognitive antecedents of green food purchase intentions, which are fundamental prerequisites for green purchase behavior. Moreover, in Study 2's focus groups, all TPB variables (i.e., attitudes, social norms, and PBC) emerged from participants' responses.

Nevertheless, delving deeper reveals that the TPB requires additional variables to fully explain green purchase behavior. As mentioned in Chapter 2, the TPB alone does not sufficiently capture the complexity of explaining green food consumerism. Many scholars have proposed extending the TPB with additional constructs to better reflect this complexity (Chen & Tung, 2014; Liobikienė & Bernatonienė, 2017; Rakhmawati et al., 2023). In this context, many of the variables examined in this thesis fall under PBC, which reflects an individual's perception of the ease or difficulty of executing a specific behavior. PBC encompasses two components: "Control Beliefs", which reflect the perceived likelihood of success in performing a behavior, and "Perceived Power", which indicates the perceived influence of facilitating or inhibiting factors on behavior (Jha et al., 2022; Purnama et al., 2024).

We argue that control beliefs could incorporate green self-efficacy, or the belief that one's actions can effectively protect the environment (Chen et al., 2015). In Study 2's focus groups, participants often attributed environmental responsibility to external entities such as governments or multinational firms. This aligns with the literature indicating that many individuals lack personal responsibility for environmental issues despite being environmentally aware (Ndum et al., 2022). The majority of people, in fact, tend to shift environmental responsibility away from themselves

and onto others, particularly in non-activist contexts (Eden, 1993). Without a sense of personal impact, individuals may feel their actions as futile.

Regarding the perceived power component of PBC, it should comprise the facilitators and barriers identified in this thesis and prior literature. Ajzen (1991) described PBC as the control beliefs about the presence or absence of factors that can facilitate or impede behavior. This breakdown effectively distinguishes between facilitators (enablers of action) and barriers (hindrances or obstacles). In this perspective, one could test Study 1 perceived environmental knowledge and trust in green claims as facilitators (PBC antecedents), and green advertising skepticism as a barrier; Study 2's themes "Facilitators" and "Desired eco-labels characteristics" as facilitators, and "Barriers" and "Negative attitudes towards green marketing" as barriers; and Study 3 pride in green food purchasing and "health and sustainability" motives as facilitators, and "ease and accessibility" motives as barriers. In this perspective, the TPB tree of variables becomes broader, as illustrated in Figure 1. Furthermore, the other classical TPB predictors (attitudes and subjective norms) could also be decomposed into subcomponents, similar to PBC, to enhance the framework's explanatory power.

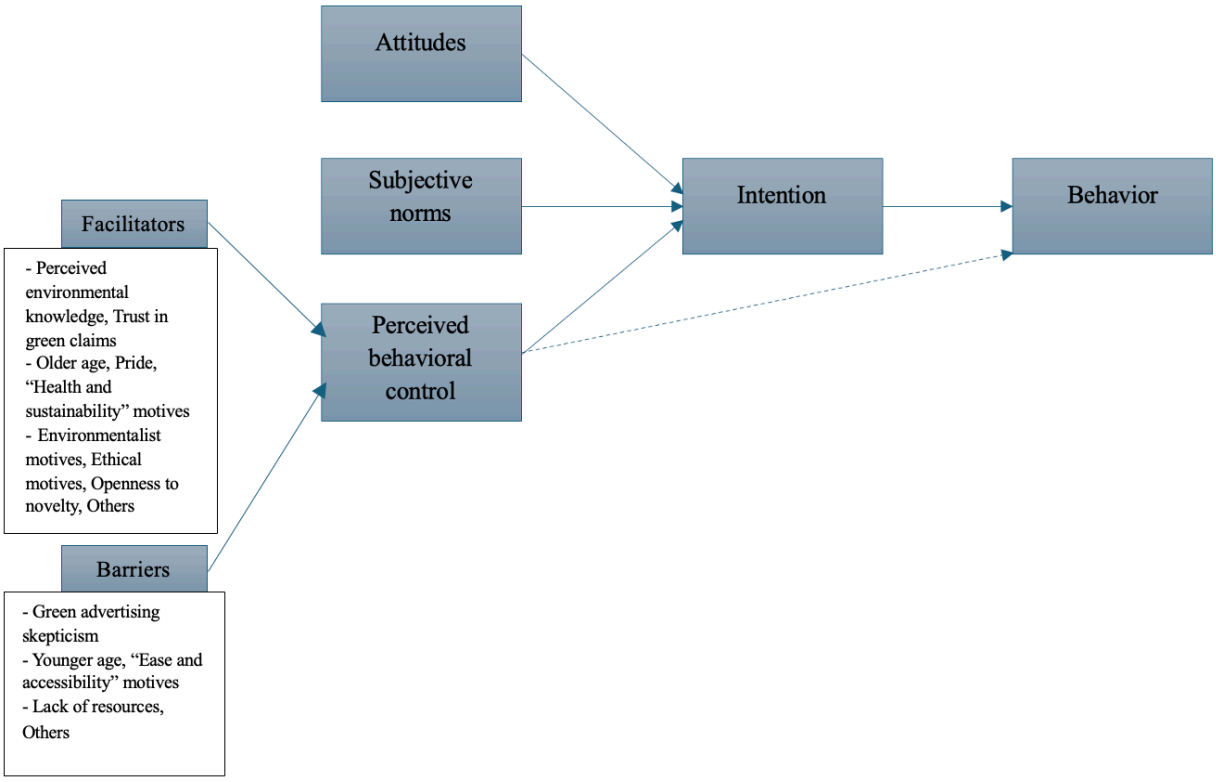


Figure 1. Theory of Planned Behavior extended according to our studies' results

This is problematic for many reasons. Having too many variables in a theoretical model can lead to significant issues, such as overfitting, increased complexity, and challenges in interpretability (Deng et al., 2018; Durstewitz, 2017). Specifically, an excessive number of variables within a theoretical framework can create difficulties in estimating and evaluating Structural Equation Modeling (SEM) models, particularly when small sample sizes are involved. This can result in unreliable parameter estimates, amplified standard errors, and challenges in model evaluation (Deng et al., 2018).

In light of these considerations, it is important to point out that the author's intention is not to assert that the TPB is an inadequate theory. Instead, this critique, informed by the thesis' findings, aims to contribute to the ongoing discussion on the application of TPB in the field of green consumerism research and to highlight one potential reasons for the disjointed and inconsistent nature of the literature on green purchase behavior, that is the presence of too many variables in the model. In fact, other authors have stressed the need to avoid fragmentation of skills and knowledge within multidisciplinary research, such as that regarding green consumerism. They advocate for collaboration across various fields, including psychology and behavioral sciences, to enhance theoretical modeling and address complex issues effectively (dell'Isola et al., 2016).

Moreover, the use of robust statistical methods has been recommended to better understand complex topics like green food purchase behavior, as traditional methods may overlook some important factors (Stamovlasis et al., 2013). Advanced techniques like SEM are particularly suited for analyzing the interrelationships among the many variables influencing green consumerism behavior (Martey, 2024; Synodinos et al., 2023). For instance, identifying mediating variables between attitudes and purchase intentions, as demonstrated in Study 1, can inform more targeted marketing strategies (Martey, 2024; Synodinos et al., 2023). Furthermore, utilizing a combination of qualitative analyses and experimental approaches, as in Study 2, has been suggested to enhance the reliability of findings and provides a more nuanced understanding of consumer motivations (Cheng et al., 2024; Synodinos et al., 2023). Similarly, methods such as cluster analysis have proven effective for categorizing consumers based on their purchasing behavior patterns and motivations, as we did in Study 3, offering valuable insights into distinct consumer groups (Lakner et al., 2007), with a particular focus on Non-Buyers with Favorable Intentions, the cluster that constitutes the green attitude-behavior gap (Frank & Brock, 2018).

In conclusion, although the TPB presents various limitations, it undoubtedly serves as a fundamental canvas to keep in mind when studying behavioral determinants, as it exemplifies the main variables that influence people's actions.

8.1.2 The Slow and Fast Decision Path Model

In this section, we will consider the thesis' findings within the framework of Danner and Thøgersen's integrated model (2022) and Kahneman's Dual Process Theory's (Kahneman, 2013). Our results yield support both the "Fast" (automatic, intuitive, Kahneman's System 1) and "Slow" (deliberate, analytical, Kahneman's System 2) decision-making pathways hypothesized by these models.

Study 1 underlines the importance of perceived environmental knowledge and trust in green claims in fostering green food purchase intentions, which, in turn, predict green food purchase behavior. In essence, the more informed consumers are about environmental issues and possible countermeasures, the more they trust eco-labels claims and are inclined to buy green food. These findings support the slow decision-making pathway, showing how knowledge can influence purchase decisions.

Study 2 lends support to both the fast and slow pathways. Focus group participants addressed the lack of available resources (e.g., knowledge, attention, time, habit) at the point of purchase as a major barrier to purchasing green food. This represents precisely what Danner and Thøgersen stated in their integrated model, which explains that purchase actions are often guided by automatically activated attitudes when motivation, ability, and opportunity are insufficient. Interestingly, although these instances are typically theorized as unconscious, participants were well aware of them during discussions about green food purchase barriers. Future research could explore this paradox further, investigating how these seemingly automated decisions may not be as unconscious as previously assumed.

From a practical perspective, marketers and policymakers might concentrate their efforts on addressing changeable factors, such as enhancing consumer knowledge and motivation, to encourage green food purchase. Study 2 also provides evidence for the slow decision-making pathway. Participants discussed a number of well-reasoned food choice motives (such as environmental and ethical considerations) that influence their green food purchase behavior, further supporting the slow pathway theorization. With regard to Study 2's IAT, although the experiment did not yield significant results to support the fast decisional pathway, the regression

analysis conducted on the post-IAT questionnaire offered further insights. Variables such as the effect of organic food on subjective well-being, consequences of green food consumption and barriers to green food purchase indicated that several conscious motives drive consumer green purchasing behavior.

Study 3 results also are in line with both the fast and slow pathways. Specifically, "health and sustainability" food choice motives supported the deliberate, conscious pathway. Meanwhile, evidence that emotional factors, such as pride in purchasing eco-sustainable products, may influence green food purchasing behavior suggests the involvement of the fast, unconscious pathway.

Study 4 provided an opportunity to test theory in a real-life setting. The marketing strategy introduced in this study leveraged both consumers' reasoning and emotional reactions. The billboards messages, in fact, recalled both variables belonging to the slow pathway, such as sense of community and green self-efficacy, and fast pathway elements, such as pride in consuming green food. The local canteen offered an ideal environment to test the theoretical framework of the present thesis in a realistic setting. The collection of actual sales data addresses indeed one of the most stressed research gaps in extant literature. Moreover, this study provides an example of the application of a green food marketing strategy in the specific context of an Italian canteen during working lunch breaks, meeting the need to study specific cultural and socioeconomic contexts, in order to enhance the impact of such interventions (Scalabre et al., 2024).

In summary, the "Two Pathways" theoretical framework is a robust model for studying green food purchase behavior and the green attitude-behavior gap. Emotional appeals and automatically activated attitudes (System 1) can drive immediate purchasing decisions, while rational evaluations (System 2) can foster long-term commitment to green products (Oliva et al., 2024). The literature indicates that consumers often rely on quick, emotional responses when making purchasing decisions. This tendency can lead to impulsive green product purchase if these products evoke strong emotional resonance but may also result in superficial engagement with sustainability issues (Yanghui, 2023). At the same time, consumers take several rational considerations into account when shopping. Deliberate decision-making can enhance their understanding of a product's environmental impact; however, this requires access to clear, comprehensive information, which is often unavailable (Scales, 2014).

This thesis contributes to the literature by evaluating the efficacy of the “Two Pathways” theoretical framework in the specific context of environmentally friendly food. It does so through both cross sectional and longitudinal data, enriching our understanding of green consumerism.

8.2. Practical implications

The findings of this thesis have a number of practical implications. This section outlines potential applications for marketers, food service managers, policymakers, individuals and firms based on the results of each study.

Study 1 offers valuable recommendations for marketers and policymakers seeking to implement more efficient and targeted advertising strategies for green foods. Marketers could conceptualize environmental knowledge as a tool to promote green food purchases. One potential strategy may involve educating consumers about the benefits of purchasing ecologically sustainable products. This could be achieved by including reliable environmental facts and their sources in advertisements or in product packaging. Moreover, governments, agencies, and policymakers could consider the importance of environmental knowledge and trust in green claims when developing interventions to enhance public awareness about the individual and societal benefits of purchasing green foods and adopting a green diet. The findings of this study also have implications for individual consumers. Consumers can improve their environmental awareness, enhance their ability to discern authentic from deceptive advertisements, and build trust in green marketing. By engaging in green food consumption, individuals can contribute to their own wellbeing while creating value for society as a whole.

Study 2 provides precious hints for marketers and policymakers. When designing advertising and informative campaigns, it is essential to consider consumers' desire for food eco-labels that are recognizable, simple, and informative. Awareness campaigns could also assist in shifting consumers' perceptions of responsibility for environmental protection, fostering a stronger sense of green self-efficacy. This is a key factor in supporting green purchasing choices, as evidenced by both the literature and the responses of our focus group participants. Finally, the potential for alternative, appealing names in green food descriptions was examined. Participants expressed ambivalent opinions: one group viewed terms such as "vegetarian" and "vegan" as adaptable for describing green food, while another found them unsuitable for reasons related to tradition, namely the defense of traditional recipes. These participants expressed a preference for

labelling that simply describes the ingredients of vegetables (e.g. "dessert with vegan cream instead" of "tiramisù"). This descriptive approach could prove an inexpensive and effective method to foster green food purchase behavior bypassing tradition-defense resistances, making it a worthwhile consideration for marketers and restaurant managers.

Study 3 provides valuable and actionable recommendations tailored to each consumer group identified through cluster analysis: Coherent Buyers, Coherent Non-Buyers, and Non-Buyers with Favorable Intentions (NBFI). To effectively target the NBFI segment, marketing strategies should highlight the health benefits and environmental protection features of green foods, potentially through the implementation of labelling or certification schemes. Policy initiatives could also enhance accessibility and affordability, addressing prevalent barriers identified among Coherent Non-Buyers who typically prioritize cheap, familiar, and convenient foods. For NBFI, green purchase behavior can likely be encouraged by emphasizing attributes such as healthiness, natural content, and eco-sustainability. Additionally, fostering feelings of pride associated with eco-sustainable purchases and encouraging experimentation with unfamiliar foods may prove beneficial for this category. These insights are particularly valuable for marketers and policymakers, especially when targeting the NBFI segment, which contributes to the attitude-behavior gap (Frank & Brock, 2018) and likely represents a significant proportion of the consumer population, at least in developed countries.

Study 4 also provides practical implications. Organizations and policymakers promoting sustainable practices in the food service industry could use this study as a starting point to design cost-effective strategies to encourage green food consumption. If future research supports the effectiveness of green marketing for second plates and side dishes, marketers could prioritize promoting these dish categories to maximize the impact of green food campaigns. Furthermore, firms and restaurants seeking to promote environmentally friendly food options may redesign their menus to include more plant-based second plates or eco-labeled side dishes.

Overall, the practical implications derived from this thesis highlight the necessity for policymakers, as well as those responsible for green food distribution and advertising, of considering the dual pathways described in the theoretical section, namely the fast and slow decision-making processes. The fast, emotional pathway can be activated through strategies targeting people’s emotions (e.g., pride, as demonstrated in Study 3) and immediate resources. For example, Study 2’s focus group participants identified lack of time and attention as a major barrier

to green food purchasing. Consequently, marketers should design green food products that are immediately recognizable and catch consumers' attention without requiring them to scrutinize product characteristics, appealing to their emotional and "nonrational" side. Conversely, the slow, rational pathway can be engaged by augmenting consumers' awareness of the benefits of buying green food. Governments and policy makers could design awareness campaigns focused on the environmental and health payoffs of adopting eco-sustainable diets, a strategy that would be interesting to further investigate basing on the findings of Studies 1, 2, and 3. Informative intervention might also highlight culinary innovation motives to counteract the tradition-defense barriers identified in Study 2.

8.3. Limitations and future research

Each study within this dissertation had its own strengths and limitations, which have been thoroughly discussed in the preceding chapters. Nevertheless, some overarching considerations should be made.

First, the present thesis did not address certain variables known to influence green purchase behavior. Examples include environmental concerns, perceived seriousness of environmental problems, neophobia, and product appearance (Wijekoon & Sabri, 2021). However, as previously noted, the range of variables affecting consumers' decision-making processes for environmentally friendly products is vast. A recent literature review found 212 variables affecting green purchase intention and 135 determinants influencing green purchase behavior (Wijekoon & Sabri, 2021). Given this breadth, it was impossible to address all relevant variables. Instead, this research focused on those identified as particularly promising by recent literature reviews (Sharma et al., 2023; Wijekoon & Sabri, 2021) and those included in the main theoretical frameworks on the topic.

Second, most measures employed in this research relied on self-reported data, which has inherent limitations related to introspective abilities and the informativeness of the data. Participants may not always recall their past behavior accurately particularly for frequent activities, such as food purchases. This limitation was one of the reasons for collecting actual purchase data in the final study of this thesis.

Third, a non-random sampling approach was used in all studies except Study 4. By relying on personal networks and referrals, some individuals, such as isolated community members, may have been excluded, while certain subgroups with shared characteristics or interests may have been

overrepresented. For instance, not all individuals have equal access to Internet or digital devices, and those already interested in environmental issues may have been more motivated to participate in the online survey. These and other potential selection biases should be considered when generalizing our findings.

Finally, it is important to mention the lack of statistically significant results in the repeated measures ANOVAs conducted in Study 4, although some interesting results emerged from a more qualitative observation. This analysis aimed to evaluate the impact of a green food marketing strategy in a local canteen setting. As a result, we cannot conclusively state that the strategy was statistically effective in promoting green food options. Various factors may have contributed to this outcome, and we invite future research to replicate similar experiments, incorporating the recommendations outlined in Chapter 7.

8.4. Conclusions

Filling the green attitude-behavior gap is crucial for addressing environmental issues. Consumers often express concern for the environment but fail to translate that concern into actual purchasing decisions. Bridging this gap can increase demand for green food products, encouraging businesses to adopt more sustainable practices (Li & Kim, 2024). Reducing this gap could promote sustainable consumption patterns, improve public health, drive economic and cultural change and enhance environmental protection (Sun & Sun, 2022).

This doctoral thesis explored the intricate dynamics between cognitive, emotional, and attitudinal factors influencing green food purchase behavior. Through four interrelated studies, it aimed to understand and contribute to filling the green attitude-behavior gap in the specific context of green food. Each study employed distinct methodologies to examine various facets of green food purchase behavior, resulting in a comprehensive analysis of the factors that drive or hinder the adoption of eco-friendly dietary choices. This work culminated in the development and implementation of an advertising strategy designed to help green companies promote their products in an effective and engaging way, encouraging informed consumer choices.

Study 1 investigated the cognitive predictors of green food purchase intention, focusing on perceived environmental knowledge, trust in green claims, and green advertising skepticism. The findings highlighted the critical mediating role of trust in green claims, showing that consumers with higher environmental knowledge are more likely to trust eco-sustainable advertising and thus

to form stronger intentions to buy green food. These results challenge the assumption that greater environmental awareness leads to heightened skepticism toward green marketing, instead suggesting that informed consumers can develop trust in credible green claims.

Study 2 employed focus groups and the Implicit Association Test (IAT) to delve into explicit and implicit attitudes toward green food. While the IAT did not yield significant results, analysis of post-IAT questionnaire showed that perceiving green food as beneficial for personal and environmental well-being was positively associated with green food purchase behavior, while perceived barriers, such as low availability and high prices, were negatively associated with it. Focus group discussions provided qualitative insights into consumers' facilitators and barriers, including environmental and health motives, traditional culinary values, and practical obstacles. The study also highlighted the ambivalence between increased intent to adopt greener choices and skepticism and cynicism toward greenwashing practices. Transparent and informative eco-labeling emerged as a crucial tool for building consumer trust and encouraging green food purchases. Moreover, it highlights some interesting factors that have been overlooked in the existing literature, such as the ambivalence between defending traditional culinary practices and embracing innovation, as well as divergent preferences for using vegetarian labels versus more descriptive language when naming dishes.

Study 3 profiled different food consumers, identifying three groups: "Coherent-Buyers" who consistently purchase green food, "Non-Buyers with Favorable Intentions" who intend to buy but do not, and "Coherent Non-Buyers", who neither intend to buy nor purchase green food. Older consumers and those who feel pride in purchasing green food and value healthiness, natural content, and eco-sustainability were more likely to be "Coherent-Buyers". Conversely, those prioritizing convenience and price tended to fall into the other categories. These findings highlight the need for tailored marketing strategies and interventions for different consumer segments.

Finally, Study 4 tested a green food marketing strategy in a non-corporate canteen, collaborating with Ecoinnovazione Srl and an Italian catering company (CAMST Group). Although there were no significant results for overall green food sales, measures of effect size indicated moderately-to-largely higher sales of second plates and side dishes in the experimental canteen compared to the control. This finding suggests that targeted marketing strategies may be more effective for certain dish categories, encouraging further investigation into targeted interventions to promote sustainable eating habits.

Overall, this research advances the understanding of the cognitive and attitudinal factors influencing green food purchase behavior, offering practical insights for developing green food marketing strategies and promoting these products among the general population. Addressing both perceived benefits and barriers and employing transparent communication can help stakeholders align their initiatives with consumers' motivations.

Like every human matter, green food purchase behavior is a complex phenomenon with many facets. This thesis contributes to confirming and extending insights from the literature on green consumerism within the specific context of green food. It also advances theoretical frameworks on the subject and provides suggestions for future research and practical implications for marketers and policy makers aiming to bridge the green attitude-behavior gap regarding green food. The environmental crisis is a global issue that requires society-wide solutions including governments, NGOs, businesses, and individual consumers (European Parliament and of the Council, 2021). Resolving this crisis demands coordinated action at all levels, making the findings and implications of this research particularly relevant.

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Appendix

Appendix 1. Study 1's questionnaire.

Study variable	Items (English)	Items (Italian)
Green Advertising Skepticism (GAS)	1. Most environmental claims made on package labels or in advertising are true. (R)	1. La maggior parte delle affermazioni sulle confezioni dei prodotti o nelle pubblicità è vera. (R)
	2. Because green claims are exaggerated, consumers would be better off if such claims in advertising were eliminated.	2. Le affermazioni pubblicitarie sulla ecosostenibilità sono esagerate, quindi per i consumatori sarebbe meglio se fossero eliminate dalle confezioni dei prodotti.
	3. Most environmental claims on package labels or in advertising are intended to mislead rather than to inform consumers.	3. La maggior parte delle affermazioni sulla sostenibilità sulle etichette dei prodotti o nelle pubblicità è fatta per ingannare i consumatori, invece che per informarli.
	4. I do not believe most environmental claims made on package labels or in advertising.	4. Non credo nella maggior parte delle affermazioni sulla ecosostenibilità scritte sulle etichette dei prodotti o nelle pubblicità.
Perceived Environmental Knowledge (PEK)	1. I prefer to buy products and packages that are environmentally safe.	1. Preferisco comprare prodotti e confezioni che siano sicuri per l'ambiente.
	2. I know less about recycling than the average person.	2. Credo di sapere meno sul riciclaggio dei rifiuti rispetto alla media delle persone.
	3. I know how to select products and packages that reduce the amount of waste ending up in landfills.	3. So come scegliere prodotti e confezioni che riducano i rifiuti che finiscono nelle discariche

		(es. prodotti con poco scarto, con confezioni ridotte o riciclabili ecc.).
	4. I understand the environmental phrases on product packages.	4. Capisco le diciture ecologiche sulle confezioni dei prodotti.
	5. I understand the environmental symbols on product packages.	5. Capisco i simboli ambientali sulle confezioni dei prodotti.
	6. I am very knowledgeable about environmental issues.	6. Sono molto informato sulle problematiche ambientali.
Trust in Green Claims (TR)	1. I trust that those selling or produce bio-based adhesives are honest about the bio-based nature of their products.	1. Credo che coloro che vendono prodotti alimentari verdi siano onesti sulla natura verde della loro merce.
	2. I trust that eco-friendly companies comply with environmental standards.	2. Ho fiducia nel fatto che le aziende ecosostenibili rispettino gli standard ambientali.
	3. I trust eco-certification and eco-labels.	3. Mi fido delle certificazioni di ecosostenibilità.
	4. I trust the information on eco-labels.	4. Mi fido delle etichette ecologiche.
Intention to Buy Green Food (INT)	1. If I buy groceries next time, I will also buy organic food.	1. Quando faro la spesa la prossima volta, comprerò anche dei prodotti alimentari verdi.
	2. In the future I am going to buy organic food.	2. In futuro comprerò prodotti alimentari verdi.
	3. I intend to buy organic food next time.	3. Intendo comprare prodotti alimentari verdi la prossima volta.

		4. I intend to recycle my recyclables in the next four weeks. 5. I will recycle my recyclables regularly.	4. Intendo riciclare quello che posso nelle prossime 4 settimane. 5. Riciclerò i rifiuti in modo regolare.

(R) = Item reverse

Appendix 2. Study 2's questionnaire.

Study variable		Items (English)	Items (Italian)
Intention to buy green food		1. If buy groceries next time, I will also buy green food. 2. I intend to buy green food next time.	1. Quando faro la spesa la prossima volta, comprerò anche dei prodotti alimentari verdi. 2. In futuro comprerò prodotti alimentari verdi.
Green Food Purchase Behavior		1. I often buy green food. 2. How much green food did you buy last week?	1. Compro spesso prodotti alimentari verdi. 2. Quanti prodotti alimentari verdi ha comprato la scorsa settimana?
Emotions Related to Green Food Purchase	Pride	When I purchase green food, I would… 1. Feel satisfied. 2. Feel worthwhile. 3. Feel proud.	Quando acquisto prodotti alimentari verdi, mi sento… 1. Soddisfatto. 2. Meritevole. 3. Orgoglioso.
	Respect	When people purchase green food, I would…	Quando le altre persone acquistano prodotti alimentari verdi provo…

	4. Admire them.	1. Ammirazione.
	5. Appreciate them.	2. Apprezzamento.
	6. Respect them.	3. Rispetto.
Guilt	When I purchase non-green food, I would…	Quando non acquisto prodotti alimentari NON verdi, mi sento…
	7. Feel guilt.	4. In colpa.
	8. Feel remorseful.	5. Pentito.
	9. Feel bad.	6. Dispiaciuto.
Anger	When people purchase non-green food, I would…	Quando le persone acquistano prodotti alimentari NON verdi io provo…
	7. Feel resent.	10. Risentimento
	8. Feel disdain.	11. Disprezzo.
	9. Feel angry.	12. Rabbia.
Food Choice Questionnaire (FCQ)	It is important to me that the food I eat on a typical day is...	Per me è importante che il cibo che mangio di solito sia…
	1. Healthy.	1. Salutare.
	2. Convenient (in buying and preparing).	2. Comodo, da comprare e da preparare.
	3. Natural.	3. Naturale.
	4. Affordable.	4. Economico.
	5. Helping me control my weight.	5. Un aiuto per tenere sotto controllo il mio peso.
	6. Familiar.	6. Familiare/conosciuto.
	7. Environmentally friendly.	7. Ecosostenibile.

Appendix 3. Focus Groups' stimulus (with censored brands).

1) Cocoa powder 1.

2) Cocoa powder 2.

3) Cocoa powder 3.

4) Cocoa powder 4.

5) Tuna 1.

6) Tuna 2.