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Clean food consumerism: scale development and validation

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ABSTRACT

Clean foods are perceived as natural, pure, simple, and nutrient-dense foods that support overall health and well-being, prioritizing nutritional quality, transparency in sourcing, and ethical farming practices. Clean food consumerism is an emerging and growing international phenomenon, albeit one that is often loosely defined and under-researched. To enable consistency and encourage research in the area, a scale to measure clean food consumerism (CFC) is proposed. The structured scale-development procedure involved four stages and four quantitative and qualitative studies: scale design, item generation and evaluation, item purification, initial validation, and final validation. The final version of the CFC scale contains 18 items in a 5-factor structure: health benefits (6 items), ease of use (3 items), product familiarity (3 items), product authenticity (3 items), and transparency of the manufacturing process (3 items). Two additional factors—consumer lifestyle and eating habits—were identified as having a direct impact on clean food consumption. All tests confirm that the proposed CFC scale is suitable for measuring clean food consumerism. The development and introduction of this scale advances the understanding and conceptualization of this phenomenon and hopefully stimulates further research.

1. Introduction

More people worldwide have begun paying closer attention to their food, its source and sustainability (Edenbrandt et al., 2023; Kumar et al., 2021), its content (Ali et al., 2021; Cerri et al., 2018), and how products are made, see industry report by Ingredia Dairy Experts (2023). This consumer-driven movement, labeled “clean food consumerism,” focuses on food production and sourcing, advocating a return to natural, additive-free foods while highlighting the importance of transparency, authenticity (Asioli et al., 2017), and sustainability (Marchi et al., 2024; Peschel et al., 2016). In an industry report, Askew (2021) indicated that 60 percent of global consumers want to learn more about the origins of their food. This shift entails the preference for recognizable, natural ingredients perceived as healthy, safer, and more genuine (Cao & Miao, 2023).

The increasing demand for clean food is evident in the growing market share of products perceived as clean. As highlighted in an industry report by Brewster (2021), global sales reached $180 billion in 2020 and are expected to grow to $250 billion by 2025 at a compound annual growth rate of 6.8%, driving the evolution of the clean food industry. According to a recent industry survey by (2024), a sales and marketing research agency, 81 percent of shoppers attribute significant importance to purchasing clean food products.

Despite this substantial shift toward clean food, many consumers and researchers lack a clear understanding of clean food. Multiple definitions of clean food exist (Vashisht et al., 2025), many of which are unsupported by scientific research (Asioli et al., 2017; Osborne, 2015; Varela & Fiszman, 2013). Defining clean food is challenging as it encompasses a wide range of aspects and themes, such as healthiness, naturalness (the more natural a product, the "cleaner" it is perceived), transparency (complete information on how ingredients are sourced and how products are made), and authenticity (do Nascimento et al.Koster & Mojet, 2018; Kozup et al., 2003; Wang & Adhikari, 2023). Despite the growth of clean food consumerism, there has been limited focus on understanding this phenomenon (Chen et al., 2022; Vashisht et al., 2025). The factors driving it remain largely under-researched, with insufficient information on consumer demand for clean food (Cao & Miao, 2023).

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From the supply perspective, the concept of clean food is widely recognized within the food industry. Yet, the lack of an agreed-upon definition for clean food makes it challenging for suppliers to fully further the development of clean products. Furthermore, there is a noticeable gap between suppliers' and consumers' perceptions of what constitutes clean food (Cao & Miao, 2023). Consequently, meeting consumer demands for clean food can be difficult as many manufacturers do not consistently use the term 'clean food,' and the lack of clarity and certainty affects consumers.

There remains a gap in the literature between consumer perception and consumption decisions regarding clean food. From a consumer behavior perspective, this area is under-researched, so this study introduces the concept of "clean food consumerism" and aims to develop a scale to measure consumers' clean food perceptions. This will enable the determination of the most significant characteristics of clean food through an empirical analysis of the key factors influencing consumers' choices when shopping for clean food. This will allow us to propose a well-founded and comprehensive definition of clean food consumerism.

Research on the clean food phenomenon is increasingly important for retail managers, food manufacturers, and academics. This study is the first to develop a scale that tests and integrates factors in consumers' clean eating patterns. No less important is the idea that clean food consumerism aims to deepen our understanding of "holistic nutrition," an integrative approach to health and well-being that recognizes individuals as whole beings, emphasizing the dynamic connection between food, lifestyle, and overall wellness while considering physical, mental, emotional, and environmental influences on nutrition (Dave et al., 2023; Maudrie et al., 2024; Robison et al., 2004). This, in turn, would enable food manufacturers to focus not only on ingredient lists but also on other aspects of their supply chain, helping them to present a 'clean' image for their brands. Clean food products could offer manufacturers a way to differentiate their offerings while tapping into demand for premium clean foods.

The article opens with a description of the theoretical framework followed by the literature review integrating relevant themes and outlining the measurement challenges associated with clean food consumerism. A scale development procedure is then used comprising four studies to develop a scale for clean food, referred to as the clean food consumerism (CFC) scale. The article concludes by discussing key theoretical and practical contributions, alongside recommendations for future research.

2. Theoretical framework

The conceptual framework of this study is built on two theories of food choice development, namely, Regulatory Focus Theory (RFT) (Higgins, 2000, 2005) and the Mojet model (Köster, 2009; Köster and Mojet, 2018), together with the limited empirical studies investigating the antecedents of shopping for clean food products (Aschemann-Witzel et al., 2019; Asioli et al., 2017; de Boer & Schosler, 2016).

Regulatory Focus Theory (RFT) examines how individuals pursue goals, addressing the relationship between individuals' motivation and their strategies for achieving their desired objectives. The theory proposes two distinct self-regulatory orientations: promotion and prevention. Individuals may adopt a *promotion focus* to achieve desired end-states, or a *prevention focus* to avoid actions that could hinder the attainment of their goals. In the context of nutrition and health claims associated with food consumption, past research has indicated that consumers may be motivated by achieving particular outcomes (e.g., health and nutrition), or preventing undesired results such as infection or disease (van Kleef et al., 2005). The promotion vs. prevention focus can help explain consumers' choices regarding clean food (de Boer and Schösler, 2016), as well as inference biases such as 'negative bias' and 'optimism bias'. According to Asioli et al. (2017), a negative bias occurs when a single disliked or unfamiliar ingredient in a product's ingredient list leads to disproportionally negative evaluations of the entire food product. The optimism bias implies that a food ingredient perceived positively can result in an overly favorable evaluation of the food overall. Hence, the presence of a single ingredient perceived as healthy may prompt the view that the entire product is healthier or "clean". Some terms associated with clean food may initially be classified as 'approach', such as those labeled authentic or organic. In contrast, others may fall under 'avoidance', such as products claiming to be 'free from' certain ingredients. According to RFT, consumers who prioritize one orientation over the other exhibit different preferences, and thus communication strategies should be tailored to each group to ensure an appropriate 'fit' (Hoyer, 1984). A review of the literature on the antecedents of natural product choice indicates that the motivation to 'avoid something' is a powerful, significant factor. This is evident in contemporary health concerns toward new food technologies (Krings et al., 2022), especially those involving genetically modified organisms (GMO) products (McCluskey, 2015; Palmquist et al., 2017), negative perception of chemicals (Dickson-Spillmann et al., 2011), and the avoidance of contamination or unfamiliar ingredients (Evans et al., 2010).

Mojet's model is a comprehensive and structured framework outlining and categorizing healthy and unhealthy factors that drive choice. The model has been widely utilized in identifying and analyzing consumer preferences, as well as the drivers and barriers influencing food choices (Caso & Vecchio, 2022; Saidi et al., 2023; Savarese et al., 2021). Drivers and barriers include product characteristics (such as extrinsic expectations like price and product knowledge, and intrinsic perceptions, including health concerns, food types, naturalness, and additives), consumer-related characteristics (encompassing sociocultural, biological, physiological, and psychological factors), and situational factors (e.g., availability, store factors).

3. Research Methodology

This study adheres to a structured scale-development procedure (Churchill, 1979; Cox & Evans, 2008; Netemeyer et al., 2003) and employs a multiple-step approach integrating qualitative and quantitative methods, a literature review, expert evaluations, and four field studies. Step 1 considers construct definition and scale design based on reviewing the relevant literature followed by a qualitative study (Study 1), and content evaluation; Step 2 addresses item purification based on Study 1. Step 3 includes scale validation through Study 2 and Study 3. Step 4 covers the final validation (Study 4).

4. Step 1: Scale construction and item generation

The objective of this step is to create an initial set of items for further evaluation. This involves reviewing the relevant literature to identify key factors influencing consumers' perceptions of clean food, followed by an exploratory study (Study 1) to test the factors.

4.1. Literature review

4.1.1. Method

This literature review aims to answer the following research questions: 1) What key factors influence consumers to perceive food as clean? and 2) What other factors influence consumers' preferences and decision-making regarding clean food? To identify relevant studies for developing an initial set of potential items that explain consumers' motivations for clean food, queries were conducted in the following databases: Web of Science, ScienceDirect, ProQuest, Taylor & Francis Journals, Wiley Online Library, Emerald Insight, and PsychINFO. Additionally, scientific and industry reports published by international institutions in the food and beverage sector—such as William Reed, FoodNavigator, IFT, Ingredion, DairyReporter, and Ingredia- were reviewed. Time frame: articles and reports published since 2001. The following terms and combinations were used as research keys in titles, abstracts, and keywords: "clean food" OR "clean food label", OR "clean

ingredients", OR "healthy food", OR "natural food", OR "organic", OR "authenticity", OR "transparency", OR "familiarity", OR "green food" OR "sustainable". Articles were retrieved from online research engines and systematically recorded in a comprehensive database. A total of 449 publications were identified.

Regarding eligibility criteria, publications were included only if they were written in English and, in the case of journal articles, published in peer-reviewed journals. Additionally, studies that focused on broad intentions yet were partially related to clean food consumption were excluded. Consequently, only 32 publications were fully relevant, including 19 peer-reviewed articles (see Appendix A).

4.2. Antecedents of clean food consumerism

Clean food consumerism is a consumer-driven movement that looks at food production and sourcing while emphasizing the importance of health, transparency, authenticity (Asioli et al., 2017), and sustainability (Marchi et al., 2024; Peschel et al., 2016). A review of numerous publications reveals several factors that may influence consumers' intentions to buy clean food, including:

4.2.1. Health concerns

The growing focus on health and wellness has made consumers more selective about their diets. As they become more health-conscious, they seek out clean food that provides essential nutrients and satiety (Chen et al., 2022; Edenbrandt & Lagerkvist, 2023; Liu et al., 2017; Talwar et al., 2021). According to a scientific study by McKinsey and Company (2023), about 82 percent of U.S. consumers view wellness as a top or important priority in their daily lives - a trend that aligns closely with consumers in the United Kingdom and China, where 73 percent and 87 percent, respectively, share the same view. Another survey on eating patterns in Asia-Pacific found that 71 percent of respondents plan to increase their spending on health and well-being in the coming years (Neo, 2022). Similarly, the meta-analysis by Asioli et al. (2017) demonstrated that 'health' is a key driver behind the clean food trend. Previous studies have also found that "health claims" are frequently linked to organic-labeled food products (Aertsens et al., 2009; Parashar et al., 2023), and Schleenbecker and Hamm (2013) noted that consumers generally perceive organic products as healthier than conventional ones.

4.2.2. Naturalness

Consumers are increasingly interested in natural foods, believing these products are better for health and wellness (Kumar et al., 2021; Molinillo et al., 2020; Moscato & Machin, 2018). "Natural" is among the most frequently used claims in food consumption, probably because it is believed to enhance consumers' perception of product quality (Almeida Sá et al., 2023; Maruyama & Lim, 2021). Additionally, the term 'natural' mostly evokes positive evaluations, resulting in the perception that natural food is tastier, healthier, or more environment-friendly (Binninger, 2017; Talwar et al., 2021). It implies that the food contains no additives or preservations, and features natural flavours and colours (Azman & Sahak, 2014; Wang & Adhikari, 2023). According to an industry report conducted by Kerry Group (a global food provider) (2019), clean food signifies products made with genuine, all-natural ingredients that convey freshness and wholesomeness and are free from additives and preservatives. A 2017 cross-national scientific study conducted for the GNT Group (a pioneer in plant-based, sustainable ingredients) revealed that many respondents indicated that attributes related to naturalness significantly influence their food purchasing decisions. These attributes include the natural state of products (77%), freshness (76%), and natural colors (71%). In addition, respondents preferred natural foods that do not contain artificial colors (79%), preservatives (79%), artificial flavors (77%), or artificial sweeteners (77%).

4.2.3. Familiarity with clean foods

Product familiarity refers to the extent of a consumer's accumulated experiences with a product. Sheau-Fen et al. (2012) found that consumers' decision-making for frequently purchased products is greatly influenced by familiarity. Likewise, Lin et al. (2009) concluded that product familiarity reduces the perceived risk associated with purchasing private labels. When it comes to adopting new products like clean foods, familiarity is a critical factor in evaluating product characteristics and the perceived benefits of consumption, ultimately shaping consumer behavior (Cao & Miao, 2023). Numerous empirical studies indicate that consumers tend to refrain from buying products containing unfamiliar components, especially those viewed as artificial or synthetic chemicals that are hard to recognize and understand (Aschemann-Witzel et al., 2019; Moskowitz et al., 2012; Wang & Adhikari, 2023). Familiarity with food ingredients and production methods influences consumers' perceptions of clean foods (Asioli et al., 2017; Hsu et al., 2023).

4.2.4. Transparency

A product is also deemed clean when its origins are transparent (Ingredia Dairy Experts, 2023). Consumers increasingly value information about the sourcing matrix (chemical, animal, plant), the geographical origin of the product, and production details such as supply chain traceability or the "farm-to-fork" approach (Asioli, 2017; Cheung et al., 2016). Consequently, consumers are demanding more comprehensive information about ingredients and production methods (Wang & Adhikari, 2023).

4.2.5. Authenticity

Authenticity is a primary concern in food consumption arising from a lack of trust in product quality and numerous widely reported instances of food fraud worldwide (Ugochukwn & Hobbs, 2015). Authenticity is defined as being original, unique, traditional, and genuine (Beverland & Farelly, 2010; Chousou et al., 2018). In the context of food consumption, authenticity is linked to an objective and consistent quality that characterizes traditional products (Sims, 2009; Wansink et al., 2014). This is especially important for consumers who value the lifestyle and ethnic-cultural values related to the preparation and eating of traditional meals (Hino & Levy, 2016).

Additional factors that may affect intentional consumer behavior toward clean food include sustainability (Asioli, 2017) and price (Holt et al., 2024; van Bussel et al., 2022; Wu et al., 2013). Sustainability refers to products offer environmental and social advantages (Kerry Group, 2019). Key aspects of sustainability include being environmentally friendly, sustainably produced, and ethically sourced. These aspects are key factors in shaping attitudes and behaviors toward food (Shashi et al., 2015). According to Binninger (2017), product sustainability is linked to environmental friendliness, influencing consumers' preferences for natural food. Taste is a significant predictor of consumer attitude and a key criterion for both food purchases and repeated buying (Asioli et al., 2017; Hemmerling et al., 2016; van Bussel et al., 2022). For many consumers, taste often outweighs all other attributes (Bernard & Liu, 2017). Finally, numerous studies claim that high-priced products, relative to conventional alternatives, especially organic and natural food options, adversely impact consumer choice and lead to fewer repeat purchases (Marian et al., 2014; Rödiger & Hamm, 2015). However, other reports indicate that consumers would pay more for clean food (Hsu et al., 2023). According to a health and nutrition industry survey by Innova Market Insights (2022), nearly half of global consumers are willing to pay premium prices, with Asian consumers being particularly inclined to pay extra.

4.3. Study 1: Method and sample profile

Utilizing insights from RFT and Mojet's model for generating scale items, data were collected and evaluated in a three-phase process. In the first phase, the above literature review was analyzed to identify

potential items related to consumer preferences for clean eating, which were then categorized into 6 core themes representing motivational or prevention factors (constructs). The second phase involved analyzing responses from an open-ended survey (Study 1) to uncover additional themes, further expanding the constructs developed in the first phase. An open-ended survey was conducted with a sample of 100 participants from Israel, recruited via an online panel. Participants were requested to answer a single open-ended question about their attitudes and motivations toward clean food. The sample was all 18 or over and consisted of 46% males and 54% females with an average age of 35.28 (SD 9.28). The questionnaire responses were analyzed using an inductive (bottom-up) coding approach, allowing themes to emerge directly from the data. This process led to the identification of seven core themes. In the third phase, a comprehensive review was conducted to ensure consistency and completeness. These themes were combined with those developed via the literature review and together, resulting in the development of 28 items designed to define motivational focus constructs. Given the interrelated nature of the items, they are considered reflective of the resulting constructs (Jarvis et al., 2003).

4.4. Content validity

Content validity examines how effectively the scale items appropriately and sufficiently represent the construct (Hinkin, 2005). Based on this criterion, items are either revised or removed as needed. As stated above, 28 items were generated from the literature review and Study 1. After summarizing and removing duplicates, 22 items were retained for content validity evaluation, see Table 1. For instance, "clean food contains no artificial ingredients", and "clean food contains no chemical ingredients" were considered similar to "clean food contains nothing but natural ingredients," so the latter was retained.

5. Step 2: Item purification and scale validation

5.1. Study 2: Method and sample profile

To test the reliability and validity of the initial 22-item CFC scale from Study 1, data was collected from an online sample of 327 Israeli (Jewish) participants. The target population consisted of household product shoppers aged 18 and older, with a gender distribution of 50% Male and 50% Female. Subsequent analysis revealed that sociodemographic profiles of the respondents in terms of gender and age closely resembled those of the studied population.

Participants were requested to complete a survey consisting of ten sociodemographic questions and the 22 items identified in Study 1, each rated on a 5-point Likert scale. Pre-testing was conducted with about 10 percent of the total sample (N=30) to confirm that the questionnaire effectively captured participants' responses. No issues were identified with the questionnaire. Table 2 presents respondents' sociodemographic profiles.

5.2. Common method bias:

The study utilized various procedures and ex-post statistical testing methods to address common method bias (CMB) and reduce potential biases (Podsakoff et al., 2003). First, complete anonymity was ensured for all respondents to avoid any bias associated with social desirability. This approach helped ensure that participants felt at ease providing unbiased answers. Second, reverse-coded items were incorporated to counteract potential response biases. Third, we applied Harman's (1976) single-factor test to check other CMB biases. For this purpose, all variables were entered into a principal component factor analysis. An un-rotated factor analysis pointed to cumulative variance values extracted by the first variable below the 50% cutoff value (34.91%) (Bradley & Wang, 2022). Taken together, the results indicate that CMB was not an issue in the study.

Table 1
Exploratory factor analysis (Study 2)

Clean food constructs and items	Mean (Std.)	Factor loading	Eigen-value	Variance (%)	Reliability coeff. (α)
D1: Perceived health benefits	*3.58* (0.63)		*6.68*	*18.65*	*0.86*
1. Clean food contains a lot of vitamins and minerals.		0.68			
2. Clean food is healthier than other foods.		0.63			
3. The quality of clean food resembles that of organic food.		0.68			
4. Clean food is rich in fiber and roughage.		0.80			
5. Clean food is not genetically modified.		0.51			
6. Clean food contains no additives.		0.75			
7. Clean food contains natural ingredients only.		0.73			
8. Clean food contains no artificial ingredients.		0.84			
9. Clean food contains no chemical ingredients.		0.75			
D2: Perceived ease of use	*3.14* (0.73)		*3.56*	*14.87*	*0.83*
10. Clean food is easy to prepare.		*0.80*			
11. Clean food can be cooked very simply.		*0.80*			
12. Clean food takes less time to prepare.		*0.76*			
13. Clean food is minimally processed		*0.67*			
D3: Familiarity	*2.57* (0.86)		*1.46*	*13.54*	*0.84*
14. Clean food is what I usually eat.		0.84			
15. I am very familiar with clean food.		0.87			
16. Clean food reminds me of what I used to eat during my childhood.		0.73			
D4: Authenticity	*3.05* (080)		*1.19*	*11.84*	*0.81*
17. Clean food is authentic.		0.71			
18. Clean food has traditional characteristics.		0.72			
19. Clean food is associated with my ethnic background.		0.82			
D5: Production process transparency	*3.54* (0.78)		*1.12*	*9.44*	*0.80*
20. Packaging contains extensive information		0.68			

(*continued on next page*)

Table 1 (*continued*)

Clean food constructs and items	Mean (Std.)	Factor loading	Eigen-value	Variance (%)	Reliability coeff. (α)
regarding ingredients and the production process.					
21. Food that is considered clean is often linked to a high level of transparency regarding where its components originate.		0.79			
22. The production process of clean food is entirely transparent.		0.77			
Total Variance Extracted				*68.34*	

Table 2
Socio-economic characteristics (%)

	Study 2 Israel	Study 3 Israeli Arabs	Study 4 UK
N	327	239	304
Country			
England			84.2
Scotland			8.4
Wales			5
N. Ireland			3
Gender			
Male	48.7	50.9	48.1
Female	51.3	49.1	51.9
Age			
18-24 years	11.0	12.4	11.9
25- 39 years	16.4	23.6	21.6
40- 59 years	35.1	36.2	34.8
60 years and above	37.5	27.8	31.6
Annual household income	**($)**	**($)**	**(£)**
0 - 15,000	12.7	15.5	15.2
15001- 30,000	21.1	25.5	25.2
30001- 40,000	28.2	28.0	14.8
40001- 60,000	18.4	13.8	14.2
60,001 and over	19.6	17.2	30.6
Education			
Primary school	3.4	2.1	1.0
Secondary school up to 16 years	30.5	28.2	19.7
Higher or secondary/further education	12.9	18.5	21.0
College or university	39.1	37.0	44.5
Post-graduate degree	14.1	14.0	13.8
Ethnicity/Race			
White or White British			83.8
Asian or Asian British			4.8
Black, African, Caribbean, or Black British			6.8
Mixed or Multiple ethnic groups			2.6
Any other ethnic group			2.0
Religious faith			
Protestant (Evangelical Christianity)			26.8
Roman Catholic			16.1
Orthodox Christian		16.3	6.5
Islamic		65.7	7.7
Others		18.0	8.1
None/ Irreligious			34.8

5.3. Exploratory Factor Analysis

The 22 items (Table 1) were tested using exploratory factor analysis (EFA). The suitability of EFA was assessed using the Kaiser-Meyer-Olkin (KMO) and Bartlett test of sphericity. The KMO value was above 0.5 (KMO = 0.901), pointing to acceptable sampling adequacy, and Bartlett's test of sphericity was significant ($p < 0.001$), indicating adequate correlations among items (Hair et al., 2010). The results revealed that the most interpretable solution comprised five dimensions that explained 68.34% of the total variance, exceeding the 60% threshold (Hinkin, 2005). Eigenvalues ranged from 18.65 for Factor 1 to 9.44 for Factor 5. The substantial size of the eigenvalues suggests that the identified dimensions captured a considerable portion of the variance in the observed factors. After examining the characteristics of the scale's items, we labeled the dimensions as "perceived health benefits" (9 items), "perceived ease of use" (4 items), "familiarity with clean food products" (3 items), "authenticity" of the clean food (3 items), and "transparency" of the manufacturing process (3 items).

5.4. Confirmatory factor analysis

To validate the latent factor structure of the CFC scale and further improve the exploratory factor analysis results, we conducted a confirmatory factor analysis (CFA). The measurement model demonstrated modest overall fit ($\chi 2 = 514.6$; $\chi 2/df = 2.59$; RMSEA = 0.064; CFI = 0.92; IFI = 0.92; NFI = 0.88, and GFI = 0.88), suggesting that improvements are needed. Consequently, four items were removed - three from the first dimension and one from the second dimension - to improve the fit. Thus, the purified second-order measurement model resulted in a final pool of 18 items (Table 3) and demonstrated an excellent fit (Hu & Bentler, 1999); see Table 4. In addition, all dimensions were loaded significantly onto the CFC constructs, with factor loadings ranging from 0.48 to 0.94 and capturing 66.23% of the variance. Table 3 presents factor loadings and mean scores for the scale dimension. This indicates that these five dimensions are part of the same second-order factor of the CFC. All coefficients were significantly above the threshold construct reliability of 0.60 (Bagozzi & Yi, 1988). Additionally, the AVE values exceeded the recommended cutoff (0.45) for newly developed scales (Netemeyer et al., 2003).

6. Step 3: Measurement invariance and validity testing

6.1. Study 3: Method

Study 3 aimed to validate the robustness of the CFC dimensions identified in Study 2. To do this, we conducted a quantitative study with an online panel sample of 239 Israeli-Arab minority participants aged 18 to 80. Arabs in Israel are an ethnic minority representing 20 percent of the total population. The Arab community is unique in that cultural traditions related to food consumption patterns remain more prevalent today compared to the Jewish community in Israel. This is especially evident in food preparation and eating habits; for instance, a great part of Arab households prepare meals at home daily using only fresh ingredients and traditional cooking methods (Hino, 2014).

Participants were requested to complete a four-part questionnaire. Part 1, consisting of 6 questions, investigated respondents' shopping patterns for food products. Part 2 included the 18 CFC scale items from Study 2, which addressed consumers' perceptions of clean food. In the third part, we inquired about additional factors that might influence participants' intentional behavior. These included 3 items about consumers' healthy way of life (Hino & Levy, 2016), food preparation and eating habits (3 items) (Hino, 2014, 2015), and perceived price (3 items). Table 5 lists the items used in the study, each rated on a 5-point Likert scale. The final part of the questionnaire focused on participants' socio-demographics, utilizing the same ten questions as in Study 2. An analysis of the respondents' socio-demographic profile indicates that it closely resembles the target population's (Table 2).

6.2. Configural, metric, and scalar invariance

The measurement model, which included the 18 items of the CFC scale and the intention to purchase clean food as a dependent variable, demonstrated an acceptable fit, exceeding the recommended thresholds

Table 3
Refined CFC scale (18 items)

Clean food constructs and items	Mean (Std.)	Factor loading	Eigen-value	Variance (%)	Reliability coeff. (α)
D1: Perceived health benefits	*3.52* (0.64)		*6.42*	*16.81*	*0.79*
1. Clean food contains a lot of vitamins and minerals.		0.64			
2. Clean food is healthier than other foods.		0.73			
3. The quality of clean food resembles that of organic food.		0.62			
4. Clean food is not genetically modified.		0.60			
5. Clean food contains no additives.		0.62			
6. Clean food contains natural ingredients only.		0.74			
D2: Perceived ease of use	*3.21* (0.73)		*1.96*	*13.02*	*0.83*
7. Clean food is easy to prepare.		0.81			
8. Clean food can be cooked very simply.		0.82			
9. Clean food takes less time to prepare.		0.77			
D3: Familiarity	*2.57* (0.86)		*1.39*	*13.0*	*0.84*
10. Clean food is what I usually eat.		0.86			
11. I am very familiar with clean food.		0.87			
12. Clean food reminds me of what I used to eat during my childhood.		0.75			
D4: Authenticity	*3.05* (080)		*1.12*	*11.72*	*0.81*
13. Clean food is authentic.		0.73			
14. Clean food has traditional characteristics.		0.71			
15. Clean food is associated with my ethnic background.		0.83			
D5: Production process transparency	*3.54* (0.78)		*1.05*	*11.69*	*0.80*
16. Packaging contains extensive information regarding ingredients and the production process.		0.64			
17. Food that is considered clean is often linked to a high level of transparency regarding where its componentsoriginate.		0.82			
18. The production process of clean food is entirely transparent.		0.79			
Total Variance Extracted				***66.24***	

(Hu & Bentler, 1999) (see Table 4). All five scale dimensions were significantly above 0.60, indicating a good internal consistency in terms of construct reliability. This implies that the items within each dimension were satisfactorily related. Additionally, the average variances extracted (AVE) values were above the 0.45 cutoff for newly developed scales (Netemeyer et al., 2003).

Table 4
Model fit results, Study 2 (Israel), Study 3 (Israeli Arabs), and Study 4 (UK)

	Study 2	Study 3	Study 4
χ 2	215.3	504.2	494.3
χ2/df	1.72	1.36	1.33
CFI	0.97	0.97	0.97
NFI	0.93	0.90	0.90
IFI	0.97	0.97	0.97
GFI	0.94	0.91	0.91
RMSEA	0.043	0.039	0.033

Before assessing validity, configural, metric, and scalar invariance were evaluated across the samples from studies 2 and 3. These tests are essential for ensuring valid comparison across distinct populations (i.e., Israeli Jews and the Israeli Arab minority), each of which may have varying perceptions of the similar items included in the scale (Campbell et al., 2008; Steenkamp & Baumgartner, 1998). Configural invariance was evaluated by assessing the goodness-of-fit of the measurement model by comparing the two samples simultaneously. This multi-group analysis approach examines whether the same dimension structure is consistent across the two samples by allowing all parameters to vary freely within each sample. Results confirmed the configural invariance of the model, as shown in Table 6a, indicating that the CFC dimension structure was comparable across the two samples.

To determine whether the same scale items hold the same meaning across the two samples, we tested for metric invariance, thereby constraining all factor loading coefficients to be equal. Results indicate satisfactorily metric invariance. Given that the measurement invariance model is nested within the baseline model, an $\chi 2$ difference test was conducted. The findings revealed that the difference in $\chi 2=15.2$ (df=13) was not significant ($p=0.295$), thus supporting metric invariance. This implies that the CFC model was comparable across the two studies 2 and 3 and that the items measuring the constructs had the same meaning.

Finally, scalar invariance was evaluated to determine whether the item intercepts were equivalent across the populations studied (Israeli Jews and Arabs). The results pointed to overall model fit, which was significantly worse in the scalar model compared to the metric model, suggesting that one item intercept or more differ between the two populations studied. Since the full scalar model did not receive statistical support, a partial scalar model was tested, where all factor loadings and all intercepts were constrained equally except for the intercepts related to two items (3 and 6) in the "health benefits" dimension. The comparison between the partial scalar invariance model and the metric model showed no significant difference between the two models ($\chi 2$ diff.=17.4 (df=11), p=0.097). Table 6a summarizes the results of the various invariance tests, demonstrating that all models had acceptable fit indices. Following the invariance analysis, we pooled the data from both studies (study 2 + study 3) and tested reliability and validity, which showed a good fit.

6.3. Validity assessment

After confirming the robustness of the CFC scale across the two samples from Studies 2 and 3, the next step was to assess its discriminant validity. This was done by correlating the CFC dimensions with intentional behavior ($\alpha=0.91$). The relatively moderate correlation coefficient along with the Cronbach alpha values for the CFC's five dimensions - all above 0.70 - provide sufficient evidence of discriminant validity.

To investigate the relationships among the constructs, we performed path analysis using structural equation modeling (SEM). Figure 1 depicts the path coefficients and R^2 for the endogenous variables in the model, pointing to a relatively high level of variance explained in buying intention ($R^2=67.6\%$). Figure 1 shows that all five CFC dimensions have a significant relationship with intentional behavior. Additionally, there is a significant relationship between a "healthy way of life" and "food

Table 5
Differences between observed means: Study 3 (Israeli Arabs) and Study 4 (UK)

Items and constructs	Israeli Arabs		UK	
	Mean (Std)	α	Mean (Std)	α
D1: Perceived health benefits	**3.77** (0.57)	**0.82**	**3.87** (0.61)	**0.83**
Clean food contains a lot of vitamins and minerals.	3.80 (0.74)		3.82 (0.79)	
Clean food is healthier than other foods.	3.85 (0.73)		3.90 (0.76)	
The quality of clean food resembles that of organic food.	3.72 (0.80)		3.80 (0.79)	
Clean food is not genetically modified. no additives.	3.74 (0.85)		3.77 (0.97)	
Clean food contains	3.68 (0.82)		3.90 (0.85)	
Clean food contains natural ingredients only.	3.85 (0.77)		4.04 (0.78)	
D2: Perceived ease of use	**3.62** (0.68)	**0.79**	**3.74** (0.71)	**0.88**
Clean food is easy to prepare.	3.65 (0.83)		3.77 (0.84)	
Clean food can be cooked very simply.	3.70 (0.78)		3.88 (0.82)	
Clean food takes less time to prepare.	3.52 (0.82)		3.57 (0.87)	
D3: Familiarity	**3.49** (0.72)	**0.84**	**3.31** (1.02)	**0.90**
Clean food is what I usually eat.	3.54 (0.77)		3.32 (1.11)	
I am very familiar with clean food.	3.49 (0.84)		3.15 (1.30)	
Clean food reminds me of what I used to eat during my childhood.	3.45 (0.87)		3.47 (1.13)	
D4: Authenticity	**3.61** (0.65)	**0.80**	**3.63** (0.74)	**0.83**
Clean food is authentic.	3.67 (0.73)		3.89 (0.83)	
Clean food has traditional characteristics.	3.64 (0.75)		3.79 (0.78)	
Clean food is associated with my ethnic background.	3.54 (0.81)		3.35 (1.03)	
D5: Production process transparency	**3.77** (0.69)	**0.82**	**3.84** (0.69)	**0.86**
Packaging contains extensive information regarding ingredients and the production process.	3.72 (0.76)		3.88 (0.80)	
Food considered clean is often linked to a high level of transparency regarding where its components originate.	3.87 (0.86)		3.86 (0.85)	
The production process of clean food is entirely transparent.	3.72 (0.82)		3.79 (0.82)	
Healthy way of life	**3.86** (0.72)	**0.79**	**3.66** (0.80)	**0.85**
I attach higher importance to maintaining a way of life that is based on eating healthy foods	4.03 (0.84)		3.71 (0.93)	
A healthy lifestyle is of major importance to me.	4.04 (0.92)		3.68 (0.87)	
Clean food is a good fit for my way of life.	3.52 (0.93)		3.58 (0.93)	
Food preparation and eating habits	**3.76** (0.71)	**0.78**	**3.64** (0.68)	**0.75**
I use only traditional/ethnic ingredients when preparing meals at home.	3.69 (0.88)		3.79 (0.89)	
I use traditional/ethnic methods when preparing (main) meals at home.	3.77 (0.82)		3.56 (0.83)	
I prepare and eat (main) meals at home daily.	3.82 (0.86)		3.57 (0.85)	
Price	**3.61** (0.87)	**0.83**	**3.73** (0.70)	**0.78**
The price of clean food is expensive.	3.74 (0.96)		3.72 (0.86)	
Clean foods are considered healthier. As such, they tend to be more expensive.	3.61 (1.03)		3.90 (0.85)	
The price of clean foods provides good value for money.	3.49 (0.94)		3.56 (0.88)	
Intention	**3.92** (0.71)	**0.91**	**3.77** (0.87)	**0.89**
I intend to buy clean food products.	3.96 (0.74)		3.77 (0.91)	
I am confident that I will buy a greater amount of clean food in the future.	3.92 (0.79)		3.81 (0.95)	
I am willing to recommend others to buy clean food products.	3.90 (0.76)		3.73 (1.02)	

Note: α = Reliability

preparation and eating habits" with "buying intention". However, "price" was found to have no significant effect on intentional behavior.

7. Step 4: External validity and scale generalizability

7.1. Study 4: Methodology

To evaluate the stability of the CFC, we extended our study to a different country, namely the UK, which is considered distinct in terms of food-eating patterns. For this purpose, a new online survey (Study 4) was conducted with a sample of 304 UK participants. Consistent with the methodology employed in Study 3, participants were requested to complete a 4-section structured questionnaire. The sample was designed to represent the target population, stratified by age, gender, and country. Subsequent analysis indicated that the samples' sociodemographic profiles closely matched those of the studied populations (see Table 2).

To evaluate the measurement model for the CFC scale, we first tested it using the UK data. Results revealed a very good fit (Table 3) and above the minimal thresholds recommended by Hu and Bentler (1999). The five dimensions of the CFC scale demonstrated high reliability. The AVE values significantly exceeded the recommended 0.45 cutoff for newly developed scales (Netemeyer et al., 2003). Table 7 presents a summary of the CFC scale's psychometric properties in the UK study.

The differences between the observed mean in the Israeli Arab sample and the UK sample suggest that Arab consumers attach relatively higher importance to perceived familiarity with clean food, way of life, and food preparation patterns. Results also indicate that Israeli Arabs have a higher buying intention (Table 5). As for UK consumers, health benefits, ease of use, and production process transparency are considered more important when shopping for clean food. These differences are attributed to differences in terms of food-eating habits between the populations studied. Finally, price was identified as having a relatively stronger negative impact on British consumers' intention to adopt the clean eating pattern. This could point to issues in the supply system, resulting in reduced availability of clean food for consumers, as well as broader structural challenges within the UK food market.

After confirming that the CFC scale was sufficiently robust across Studies 3 and 4, we further tested nomological validity by correlating the five dimensions of the proposed scale with established measures of consumer way of life (α = 0.85), food preparation patterns (α = 0.77), price (α = 0.73), and buying intention (α = 0.89). An exploratory factor analysis was performed on all items of the CFC scale dimensions. The analysis revealed the presence of the five expected dimensions. These findings align with those of the structural model discussed later in this section.

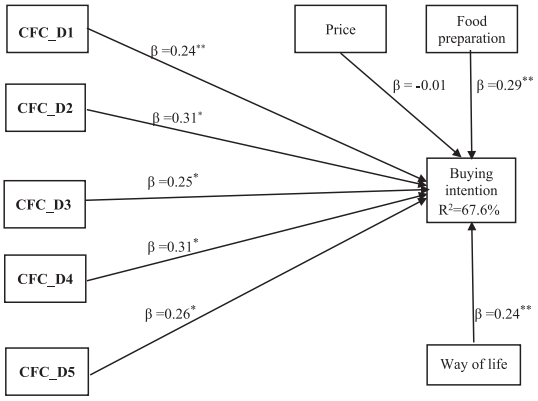
Since consumers' way of life, ethnic, and cultural values related to eating patterns (Hino, 2014, 2015) are expected to positively relate to the five dimensions of the CFC, we also anticipated a positive relationship between consumers' way of life, eating habits, and buying intention. Table 8 shows that all five CFC dimensions positively correlate with

Table 6

(a) Comparative model fit results, Study 2 + Study 3, (N=599

(a) Comparative model fit results, Study 2 + Study 3, (N=599							
	Unconstrained Model (Configural)	Measurement Weights (Metric)	Δ	P-value	Measurement Weights (partial scalar)	Δ	P-value
χ^2	376.8	392/0	15.2	0.295 (p >.05)	409.4	17.4	0.097 (p >.05)
df	250	263	13		274	11	
CFI	0.971	0.970	0.001 (<.01)		0.969	0.001 (<.01)	
NFI	0.920	0.916	-0.004		0.912	-0.004	
IFI	0.971	0.971	0.000		0.969	-0.002	
RMSEA	0.030	0.029			0.029		

(b) Comparative model fit results, Study 3 (Israeli Arabs) + Study 4 (UK), (N=543)							
	Unconstrained Model (Configural)	Measurement Weights (Metric)	Δ	P-value	Measurement Weights (partial scalar)	Δ	P-value
χ^2	1382.2	1405.0	22.8	0.355 (p >.05)	1429.7	24.7	0.213 (p >.05)
df	738	759	21		778	20	
CFI	0.922	0.921	-0.001 (<.01)		0.921	0.000 (<.01)	
NFI	0.908	0.909	0.001		0.905	0.004	
IFI	0.924	0.922	-0.002		0.921	-0.001	
RMSEA	0.040	0.040			0.039		



Notes: * Significant at the p-value ≤ 0.05 level (2-tailed); ** Significant at the p-value ≤ 0.01 level (2-tailed). CFS_D1: Health benefits; CFS_D2: Perceived ease of use; CFS_D3: Familiarity; CFS_D4: Authenticity; CFS_D5: Transparency

Fig. 1. Model Testing (standardized path coefficients) – Israeli Arabs sample
Notes: * Significant at the p-value ≤ 0.05 level (2-tailed); ** Significant at the p-value ≤ 0.01 level (2-tailed).
CFS_D1: Health benefits; CFS_D2: Perceived ease of use; CFS_D3: Familiarity; CFS_D4:
Authenticity; CFS_D5: Transparency

consumers' way of life, eating patterns, and buying intention. Likewise, "way of life" and "eating patterns" also positively correlate with buying intention. These results were as expected, providing further evidence of the CFC robustness. We then tested the influence of the CFC 5 dimensions, together with way of life, price, and eating patterns on buying intention. A path analysis was performed using the SEM procedure. Figure 2 depicts the path coefficients and R^2 values for the endogenous variables in the model. The research model demonstrated a notably significant portion of variance explained in buying intention: R^2=72%. Results show that all five dimensions of the CFC have a significant relationship with buying intention, thus providing statistical validation for the CFC. In addition, results reveal that while food preparation patterns have no significant relationship with clean food consumerism, the constructs of "way of life" (β= 0.49, p< 0.01) and price (β= -0.10, p< 0.05) significantly affect buying intention.

Next, we pooled the data from Study 3 (Israeli Arabs) and Study 4 (UK). Since the combined sample (N=543) encompasses two distinct populations, a multiple-group confirmatory analysis (measurement invariance) was employed to confirm the equivalence of the factorial measurement for each country separately before proceeding with multi-group comparisons. Configural, metric, and scalar invariance tests were performed to ensure valid comparisons of the latent variables within the two populations. Configural invariance was satisfied, and the fit indices were found acceptable when the model was tested separately for each population and both (Table 6b). We tested metric invariance by evaluating whether the relationship between factors and their items was consistent across the UK and Israeli Arab samples. Results indicated acceptable metric invariance. Finally, scalar invariance was examined to ensure that the item intercepts were equivalent across the two studies. The results showed that the overall model fit was significantly poorer in the scalar model compared to the metric model, implying that at least one item intercept differs between the two populations. Hence, the full scalar model was not supported. Consequently, we tested the fit of a partial scalar model, where all factor loadings and all intercepts were constrained to be equal except the intercept related to the measure of one item for the "way-of-life" construct, against the model assuming full scalar invariance. The results indicated that the difference in $\chi 2$ between the partial scalar model and the metric invariance model was not significant ($\chi 2$_diff. 24.7(df=20), P-value =0.213). Following invariance analysis, we tested reliability and validity, which offered a good fit.

7.2. Relationships among constructs (Study 3 and Study 4)

A path analysis using the SEM procedure was performed on the general model to test the relationships among constructs. Figure 3 depicts the path coefficients and R^2 for the endogenous construct (buying intention), while Table 9 summarizes the results of testing relationships among constructs. The research model indicated a relatively high amount of variance explained in buying intention: R^2=79%. Of this, 63% is attributed to the five dimensions of the CFC scale.

Results demonstrate that except for price, all the constructs tested (the five CFC dimensions, "way of life", and "eating habits) are highly significant, with "way of life" emerging as the most impactful factor on purchase intention, followed by perceived authenticity, transparency, ease of use, familiarity, and perceived healthy benefits. Eating habits,

Table 7
Psychometric properties of the Clean Food Scale in the UK (Study 4, N=304)

First-order dimension	Item	Standardized loadings	Corrected item-to -total correlation	CR	AVE
Perceived health benefits				*0.88*	*0.55*
	Clean food contains a lot of vitamins and minerals.	0.68	0.59		
	Clean food is healthier compared to other foods.	0.70	0.61		
	The qualities of clean food resemble those found in organic foods.	0.66	0.59		
		0.61	0.56		
	Clean food is not genetically modified.	0.69	0.63		
	Clean food contains no additives.	0.73	0.67		
	Clean food contains natural ingredients only.				
Perceived ease of use				*0.88*	*0.70*
	Clean food is easy to prepare.	0.78	0.70		
	Clean food can be cooked very simply.	0.79	0.66		
	Clean food takes less time to prepare.	0.67	0.57		
Familiarity				*0.90*	*0.75*
	Clean food is what I usually eat.	0.81	0.71		
	I am very familiar with clean food.	0.87	0.73		
	Clean food reminds me of what I used to eat during my childhood	0.71	0.61		
Authenticity				*0.83*	*0.64*
	Clean food is authentic.	0.70	0.55		
	Clean food has traditional characteristics.	0.66	0.54		
	Clean food is associated with my ethnic background.	0.61	0.55		
Production processtransparency				*0.86*	*0.76*
	Packaging contains extensive information regarding ingredients and the production process.	0.68	0.59		
	Food that is considered clean is often linked to a high level of transparency regarding where its components originate.	0.74	0.61		
	The production process of clean food is entirely transparent.	0.72	0.67		

Table 8
Correlations between CFC dimensions and related constructs

Dimension/construct	D1	D2	D3	D4	D5	C1	C2	C3
D1: Perceived healthy benefits	1							
D2: Perceived ease of use	.07	1						
D3: Perceived familiarity	.42**	.14*	1					
D4: Perceived authenticity	.63**	.13*	.65**	1				
D5: Production process transparency	.07	.56**	.14*	.14*	1			
C1: Food preparation patterns	.47**	.11*	.55**	.52**	.10	1		
C2: Way of life	.09	.53**	.25**	.12*	.51**	.15**	1	
C3: Price	.46**	.02	.32**	.14*	.05	.33**	.09	1
C4: Buying intention	.16**	.67**	.26**	.16**	.63**	.24**	.72**	.06

Note(s): * Significant at the p-value $\leq$ 0.05 level (2-tailed)
** Significant at the p-value $\leq$ 0.01 level (2-tailed)

however, have the least significant impact on buying intention. Highly significant correlations were also found between “food preparation” and the dimensions “health benefits”, “authenticity”, and “familiarity”, and between “way of life” and both “ease of use” and “transparency”. As previously mentioned, “price,” perhaps surprisingly, shows no significant influence on buying behavior, indicating that it is not a major factor in consumers' decisions to purchase clean food.

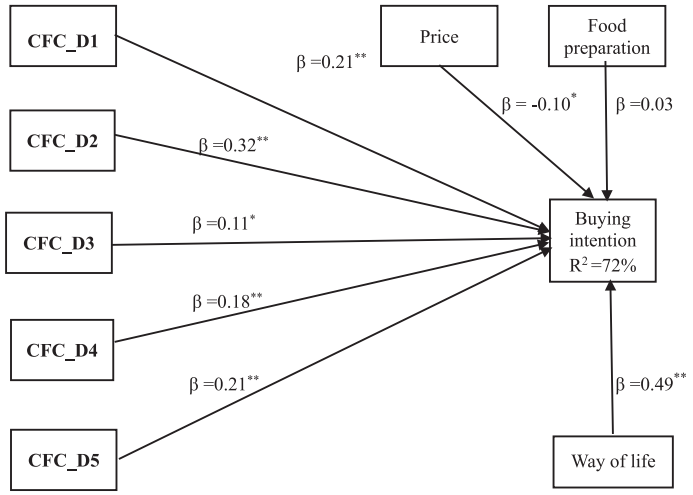
7.3. Differences between populations (Study 3 and Study 4)

To identify possible differences between the UK and Israeli Arab samples, a structural path comparison was performed using multi-group analysis. Two nested models were evaluated: a constrained model and an unconstrained full model where all paths among the variables could vary freely. A $\chi 2$ test points to a significant difference between the two populations ($\Delta\chi 2 = 466.3$; $\Delta df=29$; $p< 0.01$).

Next, the full construction model was tested for each population sample. A series of pairwise comparisons of path coefficients was performed to identify differences at the individual population level (Table 10). Results point to a significant relationship between "health benefits" (CFC_D1) and buying intention in both samples. This difference between the samples was also significant ($t = -2.015$, $p < 0.01$). Additionally, the link between “ease of use” (CFC_D2) and intentional behavior was also significant in both samples. However, the difference between the samples did not win statistical support ($t = -0.087$; $p >0.05$). Similarly, the relationship between “familiarity” (CFC_D3) and buying intention was significant, yet the difference between the samples was not significant ($t= -0.108$; $p>0.05$). Results also point to significant relationships between buying intention and “authenticity” (CFC_D4), “transparency” (CFC_D5), and “way of life”. However, no significant differences were observed between samples (t_ authenticity = -1.815, $p > 0.05$; t_ transparency = -0.863, $p > 0.05$; t_way of life = 0.336, $p > 0.05$). Regarding the relationship between eating habits and buying intention, this link was significant in the Israeli Arab sample but not in the UK sample (UK: $\beta=0.0.1$, $p >0.05$). The difference between the samples was significant ($t=2.274$, $p<0.05$). Finally, results indicated a significant relationship between price and buying intention only in the UK sample. This difference between the samples has also received statistical support ($t=2.337$, $p<0.05$).

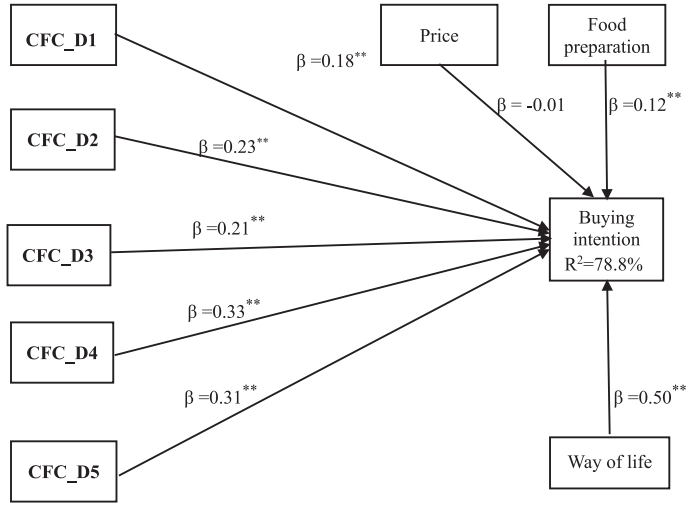
8. Discussion and conclusions

In developing the CFC scale, this study applied a multiple-step approach integrating qualitative and quantitative methods. 28 items were generated and verified by content experts, from which 22 items were tested and validated in the next step. A confirmatory factor analysis



Notes: * Significant at the p-value ≤ 0.05 level (2-tailed); ** Significant at the p-value ≤ 0.01 level (2-tailed).
CFS_D1: Health benefits; CFS_D2: Perceived ease of use; CFS_D3: Familiarity; CFS_D4: Authenticity; CFS_D5: Transparency

Fig. 2. Model Testing (standardized path coefficients), UK sample
Notes: * Significant at the p-value ≤ 0.05 level (2-tailed); ** Significant at the p-value ≤ 0.01 level (2-tailed).
CFS_D1: Health benefits; CFS_D2: Perceived ease of use; CFS_D3: Familiarity; CFS_D4: Authenticity; CFS_D5: Transparency



Notes: * Significant at the p-value ≤ 0.05 level (2-tailed); ** Significant at the p-value ≤ 0.01 level (2-tailed).
CFS-D1: Health benefits; CFS-D2: Perceived ease of use; CFS-D3: Familiarity; CFS-D4: Authenticity; CFS-D5: Transparency

Fig. 3. Model Testing (standardized path coefficients), UK + Israeli Arabs
Notes: * Significant at the p-value ≤ 0.05 level (2-tailed); ** Significant at the p-value ≤ 0.01 level (2-tailed).
CFS-D1: Health benefits; CFS-D2: Perceived ease of use; CFS-D3: Familiarity; CFS-D4: Authenticity; CFS-D5: Transparency

was then conducted to validate the latent factor structure of the CFC scale, resulting in 18 items, encompassing five dimensions reflecting a wide range of factors that affect clean food consumerism. These dimensions include "health benefits" (6 items), "ease of use" (3 items), "product familiarity" (3 items), "product authenticity" (3 items), and "transparency" of the manufacturing process (3 items). Specifically, health benefits are directly linked to health concerns and thus play a significant role in the demand for clean food. Health-conscious consumers are more selective about their diets and, therefore, more likely to seek out products with health claims, such as clean food, perceiving them as healthier than conventional products.

The second dimension, ease of use. The study results suggest that individuals who view food preparation and cooking at home as highly important will be more likely to eat clean food when it is easy to prepare meals, requires simple cooking methods, and involves less time in food preparation. The third CFC dimension, familiarity with clean food products, suggests that as consumers become more experienced with specific products - particularly new ones like clean foods - they are more likely to purchase them. This aligns with previous research that found product familiarity is a crucial factor in explaining consumption

Table 9
Results of testing relationships among constructs (Study 4 and Study 3)

	Path Relationship	Standardized Effect			Regression Weights (direct)		
		Total	Direct	Indirect	Estimate	C.R	P-value
D1	Health benefits ➔ Buying intention	.18	.18	.00	.18	2.77	.01
D2	Ease of use ➔ Buying intention	.23	.23	.00	.23	3.22	.01
D3	Familiarity ➔ Buying intention	.21	.21	.00	.21	2.80	.01
D4	Authenticity ➔ Buying intention	.33	.33	.00	.33	3.02	.01
D5	Transparency ➔ Buying intention	.31	.31	.00	.31	4.20	.01
C1	Way of life ➔ Buying intention	.50	.50	.00	.50	10.24	.01
C2	Food preparation & eating habits ➔ Buying Intention	.12	.12	.00	.12	3.04	.01
C3	Price ➔ Buying intention	-.01	-.01	.00	-.01	-0.11 > .05	
Correlations:							
Food preparation Health benefits: 0.31 (P<.01)							
Food preparation Authenticity: 0.43 (P<.01)							
Food preparation Familiarity: 0.42 P<.01)							
Way of life Ease of use: 0.59 (P<.01)							
Way of life Transparency: 0.57 (P<.01)							

Table 10
Paths comparison: Standardized coefficients and t-values

Relationship	UK sample			Israeli Arabs sample			UK vs. Israeli Arabs
	Standardized effect	S.E	t-value	Standardized effect	S.E	t-value	t-test
D1 ➔ BI	.62	.352	2.76**	.22	.098	2.42*	-2.015*
D2 ➔ BI	.33	.127	3.49**	.31	.137	2.29*	-.687
D3 ➔ BI	.25	.084	2.96**	.25	.10	2.34*	-.108
D4 ➔ BI	.70	.311	2.86**	.26	.142	1.89*	-1.815
D5 ➔ BI	.33	.120	3.23**	.29	.099	2.56*	-.863
Food eating habits ➔ BI	.01	.111	.15	.27	.040	5.55**	2.274*
Way of life ➔ BI	.40	.082	4.86**	.28	.109	3.25*	-.366
Price ➔ BI	-.21	.083	-2.86*	-.01	.037	-.062	2.337*
Goodness of fit statistics:							
$\chi 2$ =1136							
df =726							
CFI =0.95 Authenticity							
TLI =0.94							
IFI =0.95							
NFI =0.88							
RMSEA =0.032							

Notes: * Significant at the p-value ≤0.05 level (2-tailed)
** Significant at the p-value ≤0.01level (2-tailed)
D1: Health benefits; D2: Ease of use; D3: Familiarity
D5: Transparency; BI: Buying intention.

behaviors as it reduces the perceived risk associated with new products (Lin et al., 2009; Sheau-Fen et al., 2012). Authenticity of clean foods (the fourth dimension of the CFC scale) reflects consumers' concern in purchasing food products, and therefore, becomes an evaluation and decision-making criterion that guides consumer choices (Beverland & Farelly, 2010; Ugochukwn & Hobbs, 2015). In this study investigating food consumption patterns of three different populations, authenticity refers to food products that are original, traditional, and authentic. These products use traditional ingredients and are prepared using methods that align with the ethnic-cultural values of consumers. As a result, the study finds that authenticity comprises a critical factor in consumers' intention to purchase clean foods. This suggests that consumers not only want to buy authentic, clean foods, but they also seek to align their food consumption with their ethnic-cultural values.

Finally, the study results emphasize the importance of transparency in the manufacturing process as a crucial factor in shaping consumers' decisions about clean food. Transparency addresses consumer concerns arising from numerous cases of food fraud, highlighting the significance of trust in the quality and safety of food products (Ugochukwn & Hobbs, 2015). This means that in the quest for clean foods that meet their "clean" expectations, consumers delve deeper into product labels, seeking further information about product sourcing, including the origin of ingredients, how the product is made, and the supply chain for maximum transparency (do Nascimento et al., 2018).

The study also expands the understanding of clean food consumerism beyond the dimensions of the CFC scale by investigating additional factors found in studies related to food consumption habits, which, therefore, may influence consumer decisions about purchasing clean food. These factors include consumers' way of life, eating habits, and price. Except for price, which doesn't show a significant correlation with two CFC dimensions (ease of use and transparency), all five dimensions of CFC positively correlate with consumers' way of life, eating patterns, and buying intention, further supporting the robustness of the CFC scale. The study results indicate that testing a full construction model incorporating the five dimensions of the CFC, along with way-of-life, price, and eating patterns on buying intention provides further statistical validation for the CFC scale. The tested model explained a notably high amount of variance in buying intention (R^2=79%), with all five dimensions of the CFC exhibiting a significant relationship with buying intention. However, differences between UK and Israeli Arab samples were observed regarding the influence of perceived health benefits on buying intention (UK consumers relatively attach higher importance than Israeli Arabs), eating habits, which were found to have significant influence only in the Israeli Arab sample, and price which was found to be significant only in the UK sample. This may be due to consumers being more willing to pay premium prices for clean food (Hsu et al., 2023).

The clean food consumerism trend has emerged, driven by factors

such as health concerns and authenticity that are directly linked to clean food products and by general factors including consumers' way of life and food consumption habits. No prior scale has been developed to address clean food consumerism. This paper has developed such a scale, validated through four studies. This CFC scale captures a multi-dimensional construct and has good psychometric properties. The cumulative predicting power of the five dimensions of the CFC scale is relatively high (R^2 = 63%). Of these, "ease of use" in the UK study, together with "authenticity" in the Israeli Arabs study, are the most influential factors in consumers' intention to purchase clean food. Surprisingly, the health benefits dimension does not appear as the most influential factor. While it was the second most important factor in the UK study, health concerns were found to be the least influential factor in the Israeli Arabs study.

9. Implications

9.1. Theoretical Contributions

Research on the extent and potential of clean food consumerism behaviors has been limited, largely due to the lack of validated measurement tools. To address this gap, the study has developed and proposed a reliable scale of 18 items across five distinct dimensions. This scale can be used to effectively explore the role of clean food consumerism within consumers' food consumption systems. The study expands the scope of food consumption research in this area by identifying key variables and demonstrating when and how clean food can emerge as a dominant eating pattern. Secondly, this study contributes to the food marketing literature by providing new insights into the concept of clean food consumerism, offering a comprehensive definition. While numerous definitions exist, none are commonly accepted or grounded in empirical evidence. Drawing on four distinct field studies, this research proposes a five-dimensional definition that covers a variety of key aspects of what makes food "clean", including perceived healthiness, authenticity, transparency, familiarity, and ease of use of food.

The study presents a unique perspective on the link between the dimensions of the CFC scale, the food consumption system involved in consumers' way of life and eating patterns, and their purchasing decisions. Thirdly, this research identifies correlations between constructs, such as the link between eating habits and authenticity, and between way of life and transparency. These correlations can be considered as testable research propositions. Finally, the study presents a conceptual model (Figure 3) for evaluating clean food consumerism within the broader context of food marketing, demonstrating high predicting power. This model contains relevant constructs and shows how these can be utilized to systematically analyze the state of food consumption systems in particular settings.

9.2. Practical contribution

The study results present considerable opportunities for manufacturers, retail managers, and policymakers. First, the five dimensions of the CFC scale - authenticity, transparency, familiarity, ease of use, and health - comprise crucial issues influencing consumers' food eating and consumption systems. Food manufacturers should recognize that the trend of clean food consumerism is fundamentally driven by these motivations and concerns. For instance, clean food should be made from natural ingredients, free of additives, non-genetically modified, authentic, and authentic. This implies that manufacturers should focus not only on offering food that is healthier, familiar, and of high quality to consumers but also on other aspects of their supply chain. In particular, they should emphasize the transparency of the production processes, including detailed information on packaging about ingredients and how the food is made, to maintain a clean and trustworthy image for their brands. Moreover, it is crucial to engage with consumers by acknowledging the ethnic and cultural values linked to the food-eating habits that are important to them. Retailers and other vendors can similarly use such emphases to target consumers.

Secondly, consumers' way of life is one of the biggest challenges to clean food consumerism. This suggests that meeting the criteria of authenticity, familiarity, transparency, ease of use, and healthiness alone may not be sufficient to motivate consumers to choose clean food. Hence, manufacturers should offer food that better aligns with consumers' way of life and eating habits.

Thirdly, this study proposes a framework and measurement approach that can serve as a diagnostic and monitoring device to help identify where gaps exist between the food supply side and consumers' demand for clean food. Understanding the determinants of the supply-needs gaps offers valuable implications for manufacturers, food marketers, and retailers seeking to meet consumers' needs in the food consumption system. For international food companies, this study can help managers design successful marketing strategies that consider culture, especially when catering to different ethnic-cultural consumer groups worldwide. Finally, for policymakers, the study results imply that more regulations are needed. Legislation is accelerating the clean food consumerism trend by forcing substantial changes to the food consumed every day.

10. Limitations

Even though our study provides new insights and extends the literature about clean food consumerism, there are some limitations to consider. First, the CFC scale was developed using data from two countries (Israel and the UK) and via online surveys, which may restrict its generalizability. Replicating this research in other geographic regions, especially in Asia-Pacific countries where ethnic-cultural values significantly influence consumers' food consumption habits, is recommended. Secondly, for many consumers, particularly those in Western countries, clean food might be associated with the adoption of a new way of life. Thus, it is suggested that future research test consumers' motivations to accept and adopt innovations in their food consumption system, as well as other factors related to food consumption by utilizing a research approach such as the unified theory of acceptance and use of technology (UTAUT). This approach incorporates factors, like social factors, facilitating conditions, and hedonic motivations to predict consumer behaviors toward innovations.

While the scale provides manufacturers with important insights into consumers' needs and preferences, additional research is required to bridge the gap between consumers' perceptions and manufacturers' food production practices. For instance, the CFC scale refers to clean food as being made from natural ingredients and free from synthetic or chemical-based additives. However, despite remarkable technological advancements, food preservation remains a major challenge due to the prevalence of artificial and non-biodegradable additives. Consequently, to balance diverse expectations, further research is needed within the food industry to develop cleaner and more sustainable alternatives that align with consumer preferences. This also applies to other aspects of the scale, particularly perceived authenticity, transparency, and healthiness.

Another challenge in defining "clean food" is that the concept would carry a moral dimension that stimulates emotions beyond those linked to the general characteristics of clean products (Hudson & Javaras, 2022). Furthermore, research suggests that "clean" is closely associated with moral concept, such as clean, pure, virtuous, and sacred (Graham et al., 2013; Preston & Ritter, 2012). Therefore, it is recommended that future research explore the extent to which moral emotions are inherently linked to the clean food concept.

CRediT authorship contribution statement

Hayiel Hino: Writing – original draft, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Leigh**

Sparks: Writing – review & editing, Supervision, Resources, Investigation, Conceptualization.

Ethical statement

The study was conducted in compliance with the principles of the Declaration of Helsinki. At the design stage, participants were assured complete anonymity and confidentiality. They were informed that there were no right or wrong answers and were encouraged to respond honestly. Participants were able to withdraw from the survey at any time without providing a reason. Approval for the involvement of human subjects in this research was granted by the Institutional Ethics Committee of Ariel University (AU-SOC-HH-20241223).

Author statement

Authors declare: (a) This paper is not simultaneously under consideration elsewhere, (b) The results reported in this paper have not been published previously, (c) The authors declare no conflicts of interest or personal relationships that could have influenced the work presented in this paper.

Declaration of competing interest

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

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Appendix A. Appendix

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Data availability

Data will be made available on request.

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