UNIVERSITÀ CATTOLICA DEL SACRO CUORE

Sede di Piacenza

Dottorato di ricerca per il Sistema Agro-alimentare

Ph.D. in Agro-Food System

Cycle XXXV

S.S.D. M-PSI/06

FOOD INVOLVEMENT: VALIDATION OF A NEW PSYCHOMETRIC INDICATOR TO PROFILE THE CONSUMERS OF COW MILK, LACTOSE-FREE MILK AND NON-DAIRY BEVERAGES AND PREDICT THEIR CONSUMPTION BEHAVIORS

Coordinator:

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Matriculation n: 4915019

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"l'uomo è ciò che mangia"

Ludwig Feuerbach, 2017

THESIS RATIONALE

1. Introduction

The consumers in last years have changed. They are no longer looking for foods exclusively for quality and their utilitarian value but searching for products that reflect their own values and beliefs (Costa et al., 2019; Gil-Giménez et al., 2021). Indeed, food has become a social agent used by people to establish social connections (Costa et al., 2019). Food choices are now considered an important component of people's identity and self-image (Dyett et al., 2013; Fox & Ward, 2008). Recent research conducted on novel consumption trends (e.g., vegan or "green" consumers) pointed out that for consumers these are more than simply foods. Indeed, these novel consumptions permitted them to have more meaningful social relationships, a stronger sense of control and agency and a connection to the sub-group (Costa et al., 2019). Moreover, also the need to show ones' social status and to belong to a certain group of consumers (Gilal et al., 2020) are variables that strongly influences food purchase (Kushwah et al., 2019). Consequently, to better understand modern food choices, it is necessary to deepen the hidden motivations behind them and what they mean to consumers. In this direction, the consumer psychology could be an important key to understand the psychological and symbolic interpretation of food consumption.

These psychological aspects that impact on food choices are strongly determined by the changes of socio-historical context. Indeed, it is possible to understand the evolution of food consumption in light of the main historical events that occurred over years.

For most of the 19th century consumption behaviour was considered to be closely linked to income and was seen as a mere demand for goods (Sassatelli, 2004). According to this perspective, food consumption was seen in a rational logic, with careful evaluation of costs and benefits (Fritsch, 2017).

The event that is considered a real watershed that marked a clear difference in consumer society is World War II. Indeed, with the advent and end of World War II the economy experienced an important recovery, witnessed by the increase in citizens' income and the spread of a model of a richer society focused on the abundance of goods (Rey, 2000). At this time there was a turnaround in the way citizens consumed, who, having more resources at their disposal, did not limit themselves to rational purchases dictated by physiological needs, but they purchased good and food for personal pleasure and to satisfy their own desires and needs (Mandolfo et al., 2020). The consumer, therefore, began to have a richer and more varied diet similar to the present day.

With the advent of the 1960s, the so-called consumerist society spread. In those years, in fact, in addition to the increasing of large-scale distribution, there is an important growth in

employment opportunities, which means that within the same family more people had a job and received income. This allowed people to have more savings and thus also new and different investment possibilities (Ritzer, 1983). Moreover, in this period the search for exclusive, non-standard, recognizable goods and food products also becomes much more intense. Consumer action was a sign of distinction and social prestige. The purchased goods have the objective of emulating and flaunting their status, so goods and in particular foods products were buy not for what they were but for what they could represent (Veblen, 2017).

The subsequent 2000s were characterized by the appearance and spread of what is called by Lipovetsky (2007) *"the civilization of paradoxical happiness"*, in the sense that the more functional a product is for a consumer, the less it is able to attract his or her attention and interest. This means that the value of a food product is no longer concerned only with the functional and utilitarian characteristics of the product but depends on how well the product succeeds in expressing and reflecting the values, beliefs and identity of the consumer (Dagevos & van Ophem, 2013). Consequently, the value given to food is, at least partly, intangible and based upon consumers' feelings and irrational part and not (necessarily) related to their physiological needs (Liu et al., 2019). As early as the late 1990s, consumers are beginning to express their food preferences by choosing products that are environmentally friendly and healthy in line with their personal value. In fact, companies that differentiate themselves by producing organic products easily attract this niche market during this period. The meaning evolution of food is synthetized in Table 1.

Table 1. The evolution of the meaning given to food consumption from the 19th century to the present

In the 19th century and early 20th century	• Food consumption as a merely rational activity, linked to economic activity (Sassatelli, 2004); • Food consumer behaviour was considered exclusively affected by income, and consumption was seen as a demand for goods and services (Fritsch, 2017).
First half of the 20th century (1900-1950)	• Consumer viewed as autonomous and creative (Mandolfo et al., 2020); • Emergence the individual's ability to choose, differentiate and customize food consumption according to one's own needs (Rey, 2000);
Second half of the 20th century (1960-2000)	• Consumer action is a sign of distinction and social prestige. The purchased goods (such as foods) have the objective of emulating and flaunting their status (Veblen, 2017); • People buy food products not for what they are but for

	what they can represent (Veblen, 2017).
21st century	• The food consumption is characterized by an expressive, identity and social dimensions (Liu et al., 2019); • Search for oneself and one's values in food purchases, especially in food ones: quality is subjective and defined by the similarity between self and product (Dagevos & van Ophem, 2013); • Food as sociality, status, a way to express oneself and one's ideas (Robinson & Getz, 2016).

In line with this evolution of value given to food, many studies declare the need to create and use multidimensional variables and measurement scales that are able to capture these psychological aspects (emotional, identity, symbolic) given and generated by food to better predict and understand contemporary food consumption choices (Conner et al., 2016; Dagevos & van Ophem, 2013; Sheeran & Webb, 2016). One of the most widely used and well-known constructs in the literature on food consumption behaviours is Food involvement. In particular, the construct of Food Involvement (Bezençon & Blili, 2010; Laaksonen, 1994; Ohly et al., 2013; Verbeke & Vackier, 2005) has been proposed to capture the emotional and identity dimension that involve consumers in food in order to explain eating behaviour. This construct is defined by Celsi and Olson (1988, p. 211) as the: "[.....]*subjective consumer feeling characterized by personal relevance. It is a motivational state, which influences the consumer's processes of attention and understanding".* Food Involvement is a paramount personal variable that impacts the consumer food choices, since it influences the interaction between the consumer and the food product (Chen, 2007; Eertmans et al., 2005). Previous research conducted by Lu and Chi (2018) showed how involvement in organic food positively affected the utilitarian and hedonic value ascribed to it, which in turn positively impacted upon its consumption frequency. Other research (Kamrath et al., 2019) implied that strong involvement in dietary supplements positively affected both the intention to search for information about these products and the frequency of consumption. However, despite the ambition to measure the emotional and identity component through the use of the construct of Food Involvement, it was noted that the main measures of it do not seem to fully capture the psychological dimension elicited by this phenomenon (Robinson & Getz, 2016).

A particular modern consumption trend that seems mainly affected by the lack of this variable to be well understood and predicted is that relating to the consumption of milk and in particular of lactose-free milk or vegetable substitutes (McCarthy et al., 2017). Indeed, although lactose free milk and vegetable substitutes were created for intolerant people, most of consumers who buy these products don’t have any intolerances and allergies to lactose or milk proteins (Savarese et al., 2021).

From this evidence it is clear that there are other reasons, mainly of a psychological nature, which lead to choose lactose-free milk and vegetable drinks, decreasing the consumption of cow's milk. Some studies, indeed, claimed that the consumption choices of cow's milk and non-dairy beverages are strongly governed by emotional, identity and psychological aspects linked to emotions and to a need for self-affirmation and self-expression rather than rational and conscious processes (Castellini & Graffigna, 2022b; Haas et al., 2019; Hartmann et al., 2018). Consequently, these types of products are, prototypical to study the paramount role of Food Involvement (Ares et al., 2010).

Finally, it is interesting to study the construct of Food Involvement applied to milk consumption with reference to the Italian context since it is in this nation where the trend related to the increase in consumption of vegetable beverages and lactose-free milk, at the expense of cow's milk with lactose is more widespread. Indeed, in Italy, the consumption of dairy products and milk has been decreasing in a progressive way, from 56.4 L pro capita in 2009 to 50.2 L in 2014 (Zingone et al., 2017). On the other hand, lactose-free dairy market is expected to reach a turnover of 9 billion by 2023 and continues to surpass overall dairy products (7.3% vs. 2.3%) (Dekker et al., 2019). Moreover, there are approximately 12 million of Italians who consume vegetable drinks, as claimed by Coldiretti based on IRI (2019) data.

2. Aims

Given these premises, the aims of this study are:

- to map the current scientific scholarly debate with the aim of critically assessing the currently available measures of Food Involvement, understanding the psychological domains considered by these measures and their psychometric properties.
- To understand from the subjective perspective of individuals, how their psychological involvement in food develops and what subjective dimensions it implies;
- To develop and validate a new psychometric scale aimed at capturing people's psychological experience of Food Involvement, exploring its role as a predictor of non-dairy beverage and cow's milk purchase behaviours in Italian context.

3. Dissertation’s studies

This dissertation consists of four chapter. In the first ones, three studies are described and discussed in depth while the final chapter reports concluding remarks arising from this work. In particular, this dissertation is structured as follows (Figure 1):

CHAPTER 1 reports the results of a study that carried out a systematic review with the aim to map the main scales used in the literature to evaluate the involvement in food. In particular, the study analyses the main psychometric characteristics of these metrics by focusing on the principal psychological domains mapped by them. This study is published in Food Quality and Preference (Castellini & Graffigna, 2022a)

CHAPTER 2 presents the results of a qualitative study that aims to understand the psychological variables activated by Food Involvement in order to define it and find the conceptualization of the new indicator and the formulation of the related items. This study is published in Food Quality and Preference (Castellini & Graffigna, 2022c)

CHAPTER 3 presents a quantitative study carried out through the use of a questionnaire in which the new scale of Psychological Food Involvement (PFIS) is validated by relating it to the consumption of milk and non-dairy beverages focusing on Italian context. This study is under review in Food Quality and Preference.

The last part of this dissertation, CHAPTER 4, reports concluding remarks about the role of Food Involvement in understanding today's food consumption and in particular in understanding the purchase of milk and non-dairy beverages.

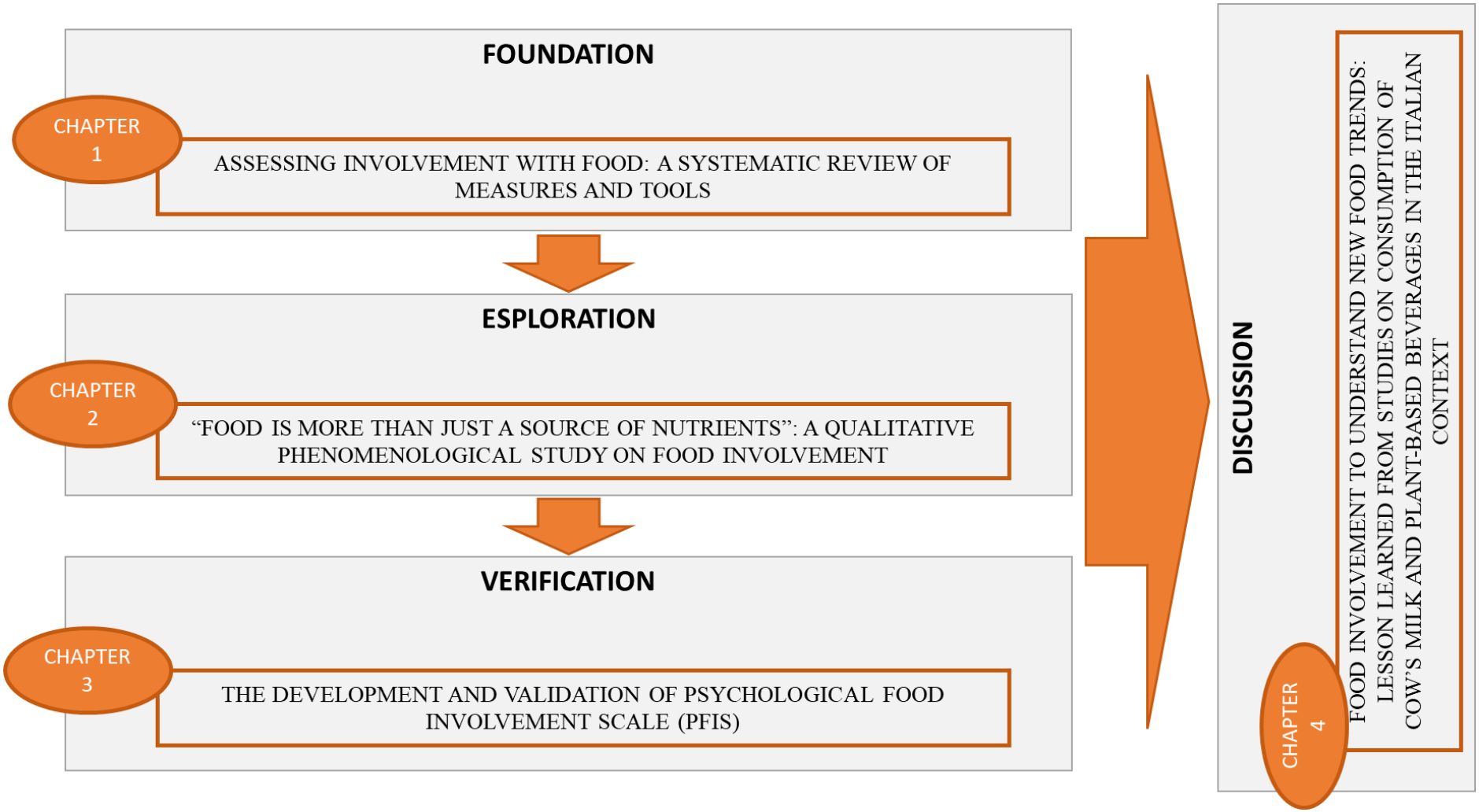

Fig. 1. Thesis structure

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CHAPTER ONE

Assessing Involvement with Food: A Systematic Review of Measures and Tools

ABSTRACT

The construct of involvement has been shown to affect brand loyalty, diffusion of innovations, responses to advertising, and finally, food purchase choices. Despite the recognized importance of this construct in the food market, there is no agreement about the best way to define and measure it. This systematic review provides an overview of currently available involvement in food measures in order to understand the psychological domains covered and to assess their psychometric properties. Comprehensive searches of three electronic databases were conducted in October 2020. Studies were considered that aimed at developing a measure of involvement in food (FI) or that assessed at least one measurement property of involvement in food measures. Methodological quality of studies was assessed with the COnsensus-based Standards for the selection of health Measurement INstruments checklist. The titles and abstracts of 4,160 articles were screened, with 258 full-text articles assessed for eligibility. Of these, 36 studies were identified as meeting the study criteria, 19 of which were measure development studies. A range of FI entries was captured by included measures. These were classified into five psychological domains: affective, self-expressive, situational, cognitive and behavioral. Regarding the psychometric quality of measures, the results highlight that the scientific quality of most instruments is doubtful or inadequate. Future research should focus on reaching a shared definition of FI, oriented by a solid psychological analysis of the phenomenon, in order to develop a comprehensive scale able to generate rigorous, comparable and readable results.

1. INTRODUCTION

Involvement is one of the most used constructs to explain consumer behavior in the context of food products, recognized as an important personal variable that influences consumers' food choices (Borgogno et al., 2015; Sharma & Klein, 2020), and allows researchers to better predict and

understand food purchases (Derinalp Çanakçı & Birdir, 2020; Kamrath et al., 2019). Specifically, a recent systematic review regarding the antecedents of organic food purchases (Kushwah et al., 2019) has shown that FI can moderate the relationship between motives, barriers and consumer behaviors, demonstrating that higher levels of FI lead to healthier (Jezewska-Zychowicz et al., 2020; Lazaroiu et al., 2019) and more sustainable consumption behaviors (Scalvedi et al., 2018; Van Loo et al., 2017). In addition, a recent study showed that higher levels of FI are linked to a greater food self-efficacy level (Davison et al., 2015). In particular, those who have a higher level of FI tend to manage their own consumption choices without being influenced by sources of (mis)information. Helping consumers to be more informed and aware of their food choices is strongly recommended by various international bodies and private companies in the agricultural sector. Indeed, consumers who are better informed and more careful about their consumption choices are also less likely to believe in fake food news (Pennycook & Rand, 2019), a phenomenon that is becoming widespread and dangerous for the health of citizens and agri-food companies (Baccarella et al., 2018; Ramachandran et al., 2018). As a consequence, FI is acquiring an ever-greater pragmatic and scientific relevance, providing the impetus for a growing corpus of research on this phenomenon. However, there is no scientific agreement on the constitutive dimensions of this construct and the best measurements to capture them.

1.1 definition of involvement and conceptual framework of the study

The construct of involvement is generally defined as the individual's level of perceived importance, interest, attachment and arousal towards a product or situation (Laurent & Kapferer, 1985; McQuarrie & Munson, 1992). However, Houston and Rothschild (1978) distinguished two types of involvement: enduring and situational. According to these authors, enduring involvement is characterized by the individual's long-term attachment to a specific product, which could produce brand commitment and extensive information search. In particular, enduring involvement is determined by a high level of subjective connection between an object (e.g. food, brand, an advertisement) and an individual (Hansen et al., 2010) that is related to the degree to which the object/product is perceived as relevant (i.e. in line with individuals' consumption motivation) and coherent with personal values (Celsi & Olson, 1988; Hansen et al., 2010). On the contrary, situational involvement is a short-term phenomenon related to a purchase decision (Mittal, 1989). Intensity, which refers to the level of interest, motivation, or arousal, and the "*goal-directness*" are

the central aspects of these different definitions (Park & Mittal, 1985). Andrews et al. (1990) define involvement as "*an individual, internal state of arousal with intensity, direction, and persistence properties*" (p.28) that can be influenced by some situational (characteristic aspects of situational involvement) or personal (characteristic aspects of enduring involvement) antecedents and can generate various consequences such as different behaviors or information processes. Although this framework was created to capture the involvement construct in advertising research, we decided to take into account it for four main reasons: 1. There is no specific conceptual framework for FI; 2. It is the most complete and detailed in the literature on involvement; 3. It describes the involvement domains and captures the conceptual relationship between them; 4. It has already been used by other studies to analyze FI (Drichoutis et al., 2007; Ogbeide & Bruwer, 2013). In particular, it identified five main domains of involvement (i.e., *"personal needs, goals and characteristics domain"; "situational domain"; "search behavior domain"; "information processing domain"* and *"persuasion domain"*) interconnected by an antecedent-consequent relationship as reported in fig 1.

From these premises, it is clear that involvement implies a specific psychological experience (Slama & Tashchian, 1985) characterized by cognitive, affective and behavioral activation which, in order, leads people to be more reactive towards food information (e.g. higher levels of attention to food information); to experience and perceive strong emotions evoked by food (e.g. enjoy; Pleasure) and finally a greater predisposition to implement and act some food-related behaviors (e.g. efforts to cook) (Hollebeek, 2011b, 2011a; Hollebeek et al., 2014).

However, there is a lack of psychological studies that conceptualize and study the phenomenon of FI as a psychological state that implies the activation of these dimensions widely recognized within food psychology perspective as aspects characterizing the state of "subjective" experience (Lee et al., 2019; Hollebeek, 2011b, 2011a; Hollebeek et al., 2014).

Given the pragmatic relevance of FI and the exponential growth of scientific attention on it, we decided to conduct this systematic review with the aim of critically assessing the currently available measures of FI. Our goal was both to systematize their considered psychological domains and to analyze their psychometric properties. The specific aims of this review are to:

1. identify existing psychometrically tested measures of FI
2. identify the (explicit or implicit) domains used to capture FI and their conceptual relationship and
3. analyze their psychometric properties;

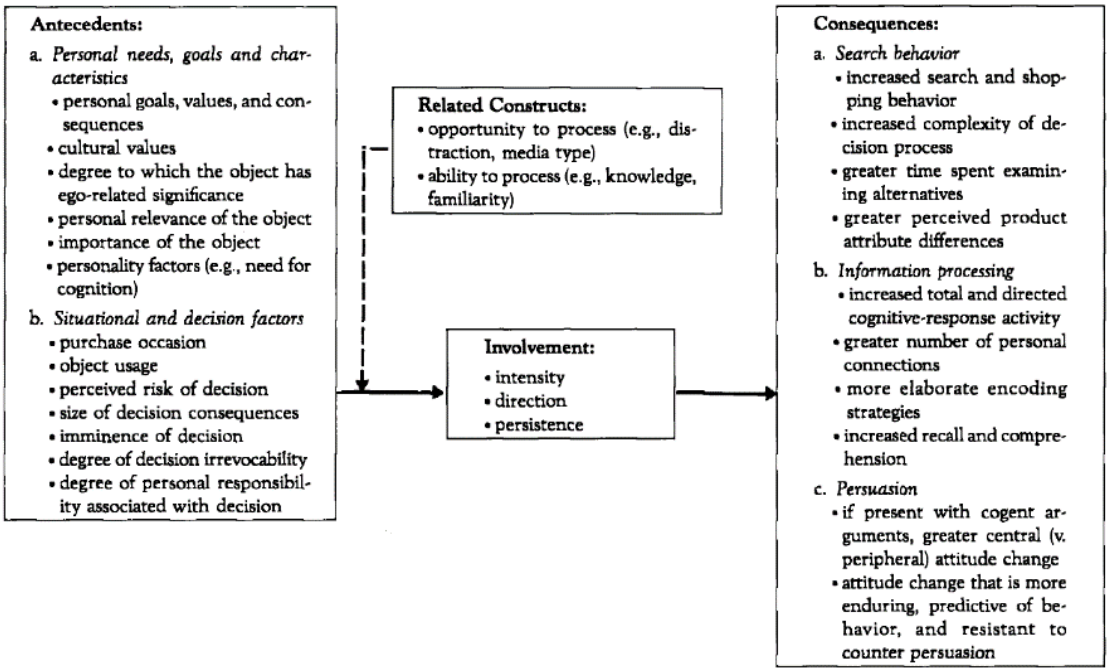

Fig. 1. A framework for the conceptualization of involvement taken from (Andrews et al., 1990)

2. MATERIAL AND METHODS

This systematic review was conducted and reported following the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) guidance (Prinsen et al., 2018) and the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009). Details of the protocol for this systematic review were registered on PROSPERO (CRD42020219817) and can be accessed at: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020219817

2.1 Search Strategy

An extensive search strategy was developed to retrieve peer-reviewed publications on the measurement of FI. The strategy combined title and abstract words (keywords). Four main groups of search terms were generated describing: (I) the construct of interest (involvement), which was searched as a single term excluding closely related concepts to maximize conceptual clarity; (II) the specific field of interest (e.g. food, nutrition, diet, intake); (III) the subjects of interest (e.g. subject,

individual, person, people, participant etc.); (IV) measurement and psychometrics (e.g. questionnaire, scale, inventory, etc.). Specifically, the following string was developed:

("Involvement") AND (food* OR nutrit* OR diet* OR intake) AND (subject* OR individual* OR person* OR people OR participant* OR client* OR user* OR consumer* OR purchaser* OR shopper* OR customer* OR buyer*) AND (questionnaire OR scale OR inventory OR assess* OR test OR measur* Or score OR algorithm).

This search strategy was applied to SCOPUS, PSYCINFO and WEB OF SCIENCE during the third week of October 2020, and was limited to English language and peer-reviewed studies. No time restriction was applied, to be as inclusive as possible. Reference lists of eligible studies and review articles were scanned to identify any missed articles. Authors were contacted to obtain original measurement development studies when they were referenced as unpublished or unavailable.

2.2 Study Selection and Data Extraction

We used a three-phase screening process to select eligible studies. A first screening round was conducted by the first author using the Excel search tool for the title, to eliminate duplicate articles. A further round of screening was applied to the title and abstracts. In particular, studies were excluded that were not carried out on healthy adults (>18 years old) and did not use quantitative instruments (questionnaire, scale, inventory etc.) to assess the construct of FI. The abstracts were distributed equally to two team members (GC, GG) for independent screening. To ensure screening quality and consistency, the first 10% of each reviewer's titles and abstracts were rescreened by the other member of the team with a comparison of included and excluded titles; disagreements were resolved by discussion. This ensured that eligibility criteria were applied consistently for the remaining 90% of titles and abstracts. The two researchers then proceeded with the third and final screening round based on the full text, to exclude articles not in line with the study's objectives, using the same selection process described above. In particular, they excluded studies that captured a construct other than FI, beverages, nutrition or diet; studies that were not aimed at assessing psychometric properties of measurement or reporting them in the study; studies that used the already validated measure but adapted it to new research (modifying items, using just some items, changing the response scale without validating these new versions); studies that measured FI using just one item; studies that considered the construct of FI as a measure to validate

other tools; reviews, conference papers, books, theses, opinion articles, conceptual articles, letters, and peer-reviewed articles that were not full-text retrievable (Figure 2).

The data extraction procedure was completed on all selected articles. In particular, for all selected studies (the measurement development studies and studies that applied the already validated measure in new research), extracted information included study author(s), year of publication, countries where the study was carried out, study population, sample characteristics (including sample size), and study design. Moreover, for the measurement development studies, we also considered the number of items in the measure, the number and names of subscales that compose the measure, type of response scale, languages in which the measure was used, measurement properties (i.e., validity, reliability, or responsiveness), and the specific product of involvement considered by the measure. Following the methodological process used by Barr et al. (2015), details about the subscales used to capture FI were extracted and analyzed. If the article did not report any subscales, we used the information about what the measure was intended to capture in order to provide a maximum inclusive and systematic conceptual analysis of the psychological domains considered by the retrieved measures. The main aspects (here called entries) used by the different scales to measure the construct of FI were synthesized and related to the five psychological domains proposed by the framework of Andrews et al. (1990) that was adapted to this study.

We decided to divide the "*personal needs, goals and characteristics*" domain of the original model into two different domains ("*affective*" and "*self-expressive*") because, as suggested by Broderick & Mueller (1999), they relate to different psychological dimensions. Consequently, the domains mapped in this study are:

Domain 1: the *affective domain* that groups all the entries about consumer's emotions evoked by an object; it is linked to the importance given to the object as a whole and its relevance present in the original model.

Domain 2: the self-*expressive domain* that groups all the entries about the degree to which people feel their identity is defined by their food choices; it is related to personal goals, cultural values and the degree to which an object has ego-related significance that are present in the original model. This domain can be considered a typical requisite of enduring involvement because it considers the connection between an object and some identity characteristics of people to be a unique aspect of enduring involvement (Huang, 2006).

Domain 3: the *situational domain* that identifies all the entries about consumer's emotions evoked by a specific situation of purchase in which a consumer can feel involved that presents in the original model. This domain can be considered a typical requisite of situational involvement because it considers the situational factors that are unique aspects of it (Huang, 2006).
Domain 4: the *behavioral domain* that groups all the entries linked to the consumers' actions and behaviors related to food, identified in the original model as "search behavior".
Domain 5: the *cognitive domain* that groups all the entries related to the level of consumers' information processing activities. It can be superimposed on the domain called "information processing" presents in the original model.

We have analyzed the roles of these five domains in the conceptualization of the different scales included in this review (i.e., direct indicator of the individual's level of FI or as its possible antecedents-consequents). The domain of persuasion was not taken into consideration in this study as it is specific for the process of advertising and not applicable to food consumption.

The data extraction was carried out by the first author (GC); the second reviewer (GG) independently confirmed the completeness and correctness of data extraction. Discrepancies were resolved by consensus.

2.3 Study Quality and Risk of Bias Appraisal

The Center for Reviews and Dissemination (CRD) recommends the use of checklists to assess studies' quality (Kennedy et al., 2007). In order to assess the risk of bias, the quality of each measurement property was individually assessed using the COSMIN Risk of Bias checklist (Mokkink et al., 2018), the only one that has been validated and standardized. Nine psychometric properties are assessed by the COSMIN checklist (internal consistency, reliability, measurement error, content validity, structural validity, construct validity, cross-cultural validity, criterion validity and responsiveness). However, criterion validity was not assessed in this research because there is no gold standard comparison for measures of FI. Exceptions were made only when a shortened instrument was compared to the original long version. In that case, the original long version was considered the gold standard (Mokkink et al., 2018). Each study was assessed using items that evaluated some methodological quality, such as suitability of sample size and the psychometric statistics generated.

To apply the COSMIN criteria, three steps were followed: 1. identify what properties were assessed by studies and select the parts of the checklist that should be evaluated; 2. assess the methodological quality of studies identified in the first step; 3. evaluate the psychometric quality of each single measure, creating a final overall rating for each tool. Further details of how the COSMIN criteria are applied are available online at http://www.cosmin.nl/. In particular, the methodological quality of studies (second step) was assessed according to their specific methods, based on a four-point rating scale defined as "very good," "adequate," "doubtful," or "inadequate" (Mokkink et al., 2018). An overall score for measurement properties was then obtained by taking into account the lowest score among items for that attribute (i.e., the "worst score counts" principle; (Terwee et al., 2012). Therefore, when most items are considered adequate, but one item is assessed as inadequate, the overall quality of that attribute related to the measures is considered inadequate. The psychometric qualities of each single measure (third step) were assessed following two further steps (Mokkink et al., 2010, 2018; Prinsen et al., 2018; Terwee et al., 2018): First, the result of every single study on a psychometric property was rated against the updated criteria for good psychometric properties. Each result is rated as either sufficient (+), insufficient (–) or indeterminate (?). Second, we synthesized the results and reached an overall conclusion regarding the quality of the measures as a whole. If ≥ 75% of the studies were consistent, that is, all studies indicated a sufficient (or insufficient) rating on a particular measurement property, the results from different studies on one psychometric property were qualitatively summarized, and the overall rating was either sufficient (+) or insufficient (–); whereas if < 75% of studies displayed the same scoring (some sufficient and some insufficient), the overall rating was rated as inconsistent (±) (Prinsen et al., 2018). If the ratings were inconsistent, we have: (1) found explanations and summarized for each subgroup; (2) not summarized the results or graded the evidence; or (3) downgraded for inconsistency based the on the majority of consistent results. Which strategy is most appropriate depends on the specific situation. Moreover, if the results for each study were all indeterminate (?), the overall rating was marked as indeterminate (?). All ratings were completed by two reviewers (GG and GC), independently (For more details see Appendix_A).

2.4 Data Analysis and Synthesis of Results

The characteristics of the studies and the psychometric quality were combined in a descriptive summary and tabulated. Moreover, the key variables (subscales, or definitions when

subscales were not reported) used by each development measure were reported and analyzed to identify general domains that were used to capture the construct of FI, based on the adapted framework proposed by Andrews et al. (1990).

2.5 Grading the Quality of Evidence

The quality of the evidence refers to the level of confidence that the summarized results are trustworthy. In particular, according to the COSMIN standards, the quality of the evidence is graded as high, moderate, low, or very low (Prinsen et al., 2018; Terwee et al., 2018). To assess the quality of the evidence, four factors are taken into account: (1) risk of bias (i.e., the methodological quality of the studies), (2) inconsistency (i.e., unexplained inconsistency of results across studies), (3) imprecision (i.e., insufficient total sample size of the available studies), and (4) indirectness (i.e., evidence from populations different from the population of interest in the review) (Prinsen et al., 2018; Schünemann et al., 2013). Further details regarding how the quality of evidence is graded are available online at http://www.cosmin.nl/ and in Appendix B.

3. RESULTS

3.1 Search Results

A total of 5981 papers were retrieved. A first screening round was conducted eliminating 1821duplicate articles. A further round of screening was applied to the title and abstracts on the remaining 4160 papers. After applying the eligibility criteria, 258 articles were judged as potentially relevant. Another screening phase was implemented based on the full-text to exclude articles not in line with the study's objectives. Moreover, review articles found during these screening processes were scanned to identify any missed articles. The researchers found nine more pertinent studies that were added to the pull of articles. Using the decided eligibility criteria, 36 studies were identified that evaluated the measurement properties of 19 FI instruments; the remaining 17 studies used the measurement development scales, examining at least one of their psychometric properties (Figure 2). Another 52 studies were excluded as they used an FI instrument but adapted it to the aim of the study, modifying the wording of items, using just some items or changing the response scale. In aggregate, these 52 excluded studies used the 19 measures of the FI included in this review in about 36 different ways.

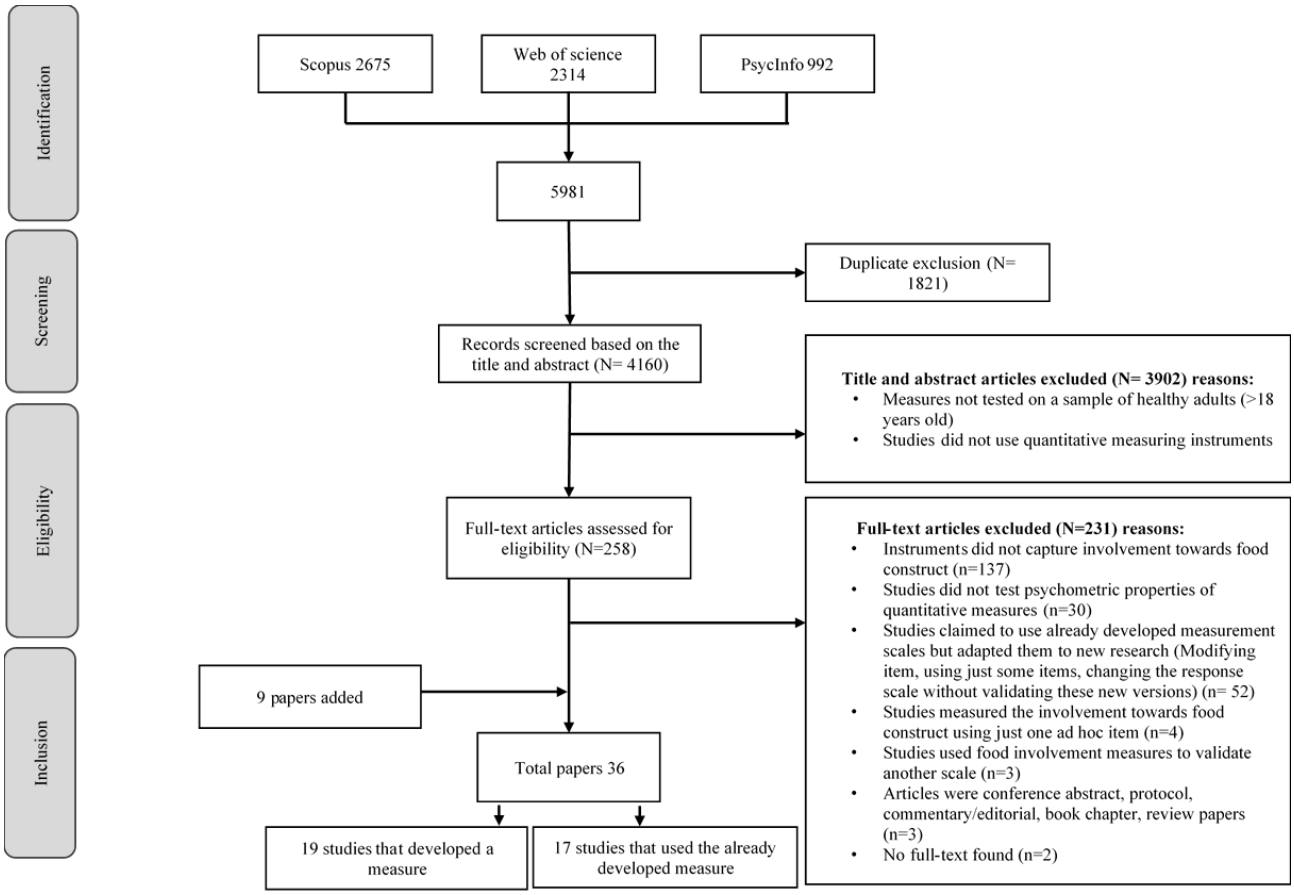

Fig. 2. PRISMA flow diagram of study selection.

3.2 Overview of Studies and Measures

Table 1 gives an overview of included studies and Table 2 provides an overview of included measures. In total, 36 studies were included in the review, reporting on 19 measures, and the remaining 17 studies used the measurement development scales, examining at least one of their psychometric properties.

Table 1. General features of included studies

Authors (years) measurement (target food)	countries	Study population	Sample size (n)	Age range (mean years, SD)	Gender (% female)	Study Design
Lee et al. (2019) food involvement inventory (FII) (food in general)	South Korea	study 1 and 2: adults	study 1=206 study 2=516	study 1=20-49 (NR, NR) study 2=20-49 (NR, NR)	study 1=70,3% study 2=61%	study 1= qualitative study/ interviews study 2=cross-sectional
Roe & Bruwer (2017) fine wine involvement scale (Fine wine)	Australia	customers of a well-known wine and spirits retail store specialising in fine wines, situated in an inner city suburb of Sydney, Australia	213	18-70 (NR, NR)	29,20%	cross-sectional
Quee-Ling et al. (2017) Gastronomy involvement (local food)	Malaysia	international tourist; not a citizen or permanent resident in Malaysia; have stayed in Malacca or Penang for at least 24 hours; have tasted local food in the destination prior to the survey.	868	20-60 (NR, NR)	44%	cross-sectional
Robinson & Getz (2016) food involvement (for food enthusiasts) scale (food in general)	Australia	self-declared food lovers	541	18-70 (NR, NR)	80%	cross-sectional
Bruwer et al. (2014) wine involvement profile scale (WIP) (Wine)	UK	clientele of an independent specialist wine retail shop in west Yorkshire, who were over the legal drinking	102	more than 79% of the respondents were between the ages of 35 and 65 years and few	36,30%	cross-sectional

		age of 18 years		respondents (11%) were under the age of 35.		
Hirche & Bruwer (2014) wine product involvement (wine)	Australia	wine buyers of legal drinking age, purchasing wine in a retail store in a central business district of a metropolitan area.	117	>18 years old	0,504	cross-sectional
Bruwer & Huang (2012) wine product involvement (wine)	Australia	wine consumers in Adelaide additionally, the sample population had to have at least one byob experience	101	more than 60 per cent of the respondents were aged between 29 and 54 years old	46,50%	cross-sectional
Hansen et al. (2010) General food health involvement (healthy food)	Denmark	study 1= undergraduate and graduate students and members of a consumer research community, all associated with a large Scandinavian business school main study study 2= representative sample of danish consumers	study 1=89 study 2=504	study 1= NR study 2= 18-77 (44.6, NR)	study 1 =NR study 2= 50,6%	cross-sectional
Hansen et al. (2013) General food health involvement (healthy food)	Denmark	study 1= undergraduate and graduate students and members of a consumer research community, all associated with a large Scandinavian business school main	study 1=89 study 2=504	study 1 =NR study 2=18-77 (44.6, NR)	study 1 =NR study 2= 50,6%	cross-sectional

		study 2= representative sample of danish consumers				
Brown et al. (2007) Wine Involvement Scale (WIS) (Wine)	Canada	wine consumers in Calgary, ab, Canada. the respondents all belonged to one of several social wine clubs or attended a wine tasting event held at a retail outlet.	161	NR (49,15; 11,2)	55,40%	cross-sectional
Chandon & Wansink (2007) nutrition involvement (Nutrition)	USA	study 1=students study 2= university students study 3= fast food consumers study 4= certified dieticians	study 1=55 study 2=156 study 3=147 study 4=405	NR	NR	study 1= experimental design study 2=experimental design study 3= cross-sectional study 4=experimental design
Van Esch & Gadsby (2019) Lynn nutrition involvement (Nutrition)	Australia	study 1= adult consumers study 2= adult consumers	study 1=320 study 2=348	study 1= more than 41% of the respondents were between the ages of 35 and 44. study 2= more than 49% of the respondents were between the ages of 25 and 34.	sstudy 1=46,3% study 2=47,4%	cross-sectional
de Boer et al. (2007) the Food Involvement and Focus Questionnaire, FIFQ (food in general)	Netherlands	adult Dutch consumers	1530	18-89 (NR, NR)	51%	cross-sectional
De Boer & Schösler (2016) the	Netherlands	representative sample of Dutch consumers that	742	18-80 (NR, NR)	72,90%	cross-sectional

Food Involvement and Focus Questionnaire, FIFQ (food in general)		were involved in food purchasing and/or cooking				
Bell & Marshall (2003) Food involvement scale (all food, generic)	UK	study 1 and 2= male and female lab employees, graduate students enrolled in a public health program, and undergraduates in a military academy	study 1= 894 study 2= 73	study 1= 19-64 (27, NR) study 2=19-64 (24 , NR)	study 1=29,64% study 2= NR	cross-sectional
Cliceri et al. (2018) Food involvement scale (food in general)	Italy	adult Italian consumers	125	18-50 (28.6, NR)	72.8%	experimental design
Piqueras-Fiszman & Jaeger (2015) Food involvement scale (food in general)	UK	consumers registered in a database maintained by a market research agency (one poll, UK)	study 1= 487 study 2=399	19-70 with a majority of adult (35-49 y.o) 19-70 with a majority of older adult (50-70 y.o)	study 1= 59% study 2= 52%	cross-sectional
Somers et al. (2014) Food involvement scale (food in general)	Australia	older adults representative of Australian population for age, gender and state of residence of the respondents	1,041	55-88 (66, 6.99)	50%	cross-sectional
Lawrence et al. (2011) Food involvement scale (food in general)	UK	women attending sure start children's centres and baby clinics in Southampton, UK	378	NR	100%	cross-sectional
Marshall & Bell (2004) Food involvement scale (food in general)	Multi-country	study 1: undergraduates' students; study 2: sample of military personnel	study 1= 109 study 2= 2068	study 1=18-24 (20, NR) study 2=18-31 (19,4, NR)	study 1= 56,9% study 2=6,3%	cross-sectional
Zaichkowsky	Canada	study 1=senior	study 1=54	NR	NR	cross-sectional

(1994) Short Personal Involvement Inventory (PII) (Pepsi cola , Ice cream)		undergraduates business students study 2=business students	study 2=52			
Taylor et al. (2018)Short Personal Involvement Inventory (PII) (Wine)	USA	attendees of the 2012 national restaurant association show in Chicago.	235	21-74 (35, NR)	58%	cross-sectional
Foxall et al. (1998) Short Personal Involvement Inventory (PII) (Healthy food)	UK	responsible for the household's food shopping representative of the UK. in terms of age, socio-economic class, employment status and region	311	NR	NR	cross-sectional
Foxall & Bhate (1993) ** Short Personal Involvement Inventory (PII) (healthy food)	UK	adult females food consumers	151	NR	100%	cross-sectional
McQuarrie & Munson, (1992) Revised Personal Involvement Inventory (RPII) (red wine)	USA	students and nonstudent adults.	249	NR	49%	cross-sectional
Kähkönen & Tuorila (1999)The Revised Product Involvement Inventory (Sausage Yogurt Spread Chocolate)	Finland	Finnish adult consumers	253	19-60 (NR, NR)	53%	cross-sectional

Mittal (1989) Purchase-decision involvement scale (PDI)(beer, wine, salt)	USA	students and nonstudent adults.	study 1=256 study 2=138	>18 years old	study 1=41% study 2= NR	cross-sectional
Choi (2019) Purchase-Decision Involvement Scale (PDI) (Dietary Supplement)	South Korea	university students in South Korea	285	the majority of the respondents were aged 20 (28.4%) and 21 (28.8%) years.	57,50%	cross-sectional
Kamrath et al. (2019) (Dietary Supplement).	Germany	German consumers	350	18-83 (43, 13,48)	63,10%	cross-sectional
Crandall (1987) Ego involvement (Food in general)	USA	undergraduates students from introductory psychology classes at the university of Michigan	104	18-27 (NR, NR)	55,00%	cross-sectional
Zaichkowsky (1985) Personal Involvement Inventory (PII) (instant coffee, breakfast cereal, red wine)	Canada	study 1=undergraduate psychology students study 2= psychology students initially and MBA students study 3= MBA students	study 1= 152 study 2= 123 study 3=45	NR	NR	cross-sectional
Lu & Chi (2018) Personal Involvement Inventory (Pll) (Organic food)	USA	US consumers who had recently visited a quick-service or upscale restaurant to consume organic menu items.	387 (group1=202; group2= 185).	NR	group 1=59,7% group 2=60,9%	cross-sectional
Pambo et al. (2018) Personal Involvement Inventory (Pll) (cricket-flour buns)	Kenya	households of three villages in Kenya	432	NR (43,11, 13,48)	53	experimental design
Lagerkvist et	Kenya	Nairobi adult	40	NR (34.1,	93%	experimental

al. (2015) Personal Involvement Inventory (Pll) (fresh vegetables)		consumers recruited in kkwaenggwari, waging and ngong markets.		10.4)		design
Laurent & Kapferer (1985) Consumer involvement profile (CIP) (oil, yogurt, chocolate, and champagne)	France	housewives	207	NR	NR	cross-sectional
Traylor & Joseph (1984) consumer involvement in product (Potato, Cola, Chips, Cereal Milk)	USA	study 1= adult consumers study 2= undergraduate and graduate students	study 1=200 study 2=280	study 1 =NR study 2= 19-40 (22, NR)	study 1 =NR study 2=38%	study 1= qualitative study/ focus group study 2=cross-sectional

Note: NR=Not Reported; ▢ Measures development studies; **This study predates the scale validation study because the author of the validated scale had already presented the results in a discussion paper presented in 1987 (Zaichkowsky, 1987).

Table 2. General features of included measures

Measurement (author)	Food-involvement in a non-food-specific manner	Food-involvement in a food-specific manner	Food-involvement measured in general	Object of involvement	Number of items	Subscales	Response scale	Language
Food Involvement Inventory (FII) (Lee et al., 2019)			**X**	food in general	25	4 subscales: behavioural-cooking; affective; behavioural-purchase; cognitive	9-point Likert scales from 1 strongly disagree, to 9 strongly agree	Korean, English
Fine Wine Involvement Scale (Roe & Bruwer, 2017)		**X**		fine wine	26	no subscales reported	7-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (7).	English
Gastronomy Involvement (Quee-Ling et al., 2017)		**X**		local food	8	no subscales reported	5-point Likert scale from 1 strongly disagree to 5 strongly agree.	English
Food Involvement (For Food Enthusiasts) Scale (Robinson & Getz, 2016)			**X**	food in general	17	4 subscales: food-related identity, food quality, social bonding and food consciousness	7-point Likert scale from 1 = strongly disagree, 4 = neutral, to 7 = strongly agree	English
Wine Involvement Profile Scale (WIP)		**X**		wine	13	no subscales reported	7-point Likert scale from 1 strongly disagree to	English

(Bruwer et al., 2014)						7 strongly agree.	
Wine Product Involvement (Hirche & Bruwer, 2014)	**X**		wine	10	3 subscales: knowledge; pleasure; activity	7-point Likert scales from 1 strongly disagree to 7 strongly agree.	English
Wine Product Involvement (Bruwer & Huang, 2012)	**X**		wine	24	5 subscales: interest, behaviour, ritual, pleasure and risk	7-point Likert scale from 1 strongly disagree, to 7 strongly agree	English
General Food Health Involvement (Hansen et al., 2010)		**X**	healthy food	3	no subscales reported	7-point Likert scales from 1=disagree totally to 7=agree totally	Danish, English
Wine Involvement Scale (WIS) (Brown et al., 2007)	**X**		wine	15	3-subscales: expertise, enjoyment and symbolic centrality	5-point Likert-type scale from 1 strongly disagree to 5 strongly agree	English
Nutrition Involvement (Chandon & Wansink, 2007)		**X**	nutrition	8	no subscales reported	5 rating scale and three binary questions	English
The Food Involvement And Focus Questionnaire, FIFQ (de Boer et al., 2007)		**X**	food in general	6	no subscales reported	7-point Likert scale from 1 not like me at all to 7 very much like me	English
Food Involveme		**X**	food in general	12	2 subscales:	7-point Likert	English Italian

nt Scale (FIS) (Bell & Marshall, 2003)					the preparation and eating; the set and disposal	scale running from ‘strongly disagree’ to ‘strongly agree’.	
Short Personal Involvement Inventory (PII) (Zaichkowsky, 1994)	**X**		healthy food, cola, ice cream, wine	10	no subscales reported	semantic differential items on a 7-point Likert	English
Revised Personal Involvement Inventory (PII) (McQuarrie & Munson, 1992)	**X**		red wine, sausage, yogurt, chocolate	10	no subscales reported	semantic differential items on a 7-point Likert	English, Finnish
Purchase-Decision Involvement Scale (PDI) (Mittal, 1989)	**X**		beer, wine, salt, dietary supplementary	4	no subscales reported	semantic differential items on a 7-point Likert	Korean, English, German
Ego Involvement (Crandall, 1987)		**X**	food in general	2	no subscales reported	7-point Likert "agree/disagree" scale.	English
Personal Involvement Inventory (PII) (Zaichkowsky, 1985)	**X**		instant coffee breakfast cereal red wine, organic food, fresh vegetables, cricket-flour buns	20	no subscales reported	semantic differential items on a 7-point Likert	English, Kiswahili
Consumer Involveme	**X**		oil, yogurt, chocolate,	19	4 subscales:	5-point Likert-type	English

nt Profile (CIP) (Laurent & Kapferer, 1985)		and champagne		imporisk; risk probability; pleasure; sign.	scale from fully disagree to fully agree	
Consumer Involvement In Product (Traylor & Joseph, 1984)	**X**	potato chips; cola, dry cereal; milk	6	no subscales reported	7-point Likert agree-disagree format.	English

The years of publication of the 36 studies ranged from 1984 to 2019 and they were carried out in various countries (See Figure 3 and 4). Most of the studies were cross-sectional (n = 30; 84%), three used an experimental design (8%) and the other three were mixed methods (8%). One study implemented an experimental and cross-sectional design and two a qualitative-quantitative (cross-sectional) design. Sample sizes of the studies vary from n = 40 to n = 2068 healthy adult individuals.

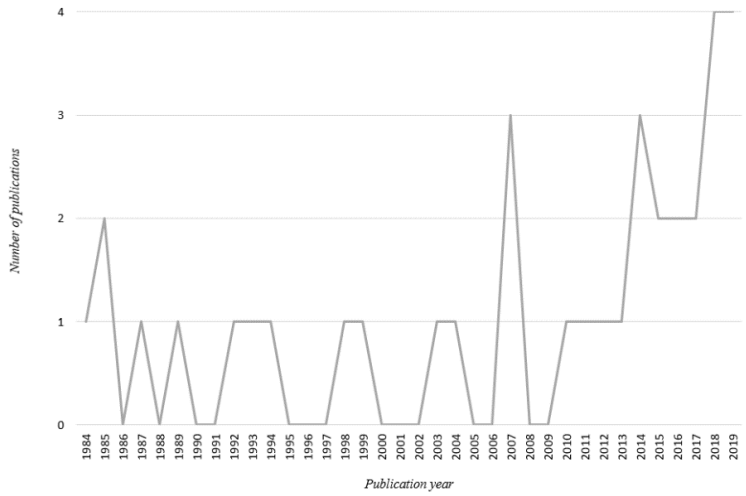

Fig. 3. Time distribution of papers on involvement with food

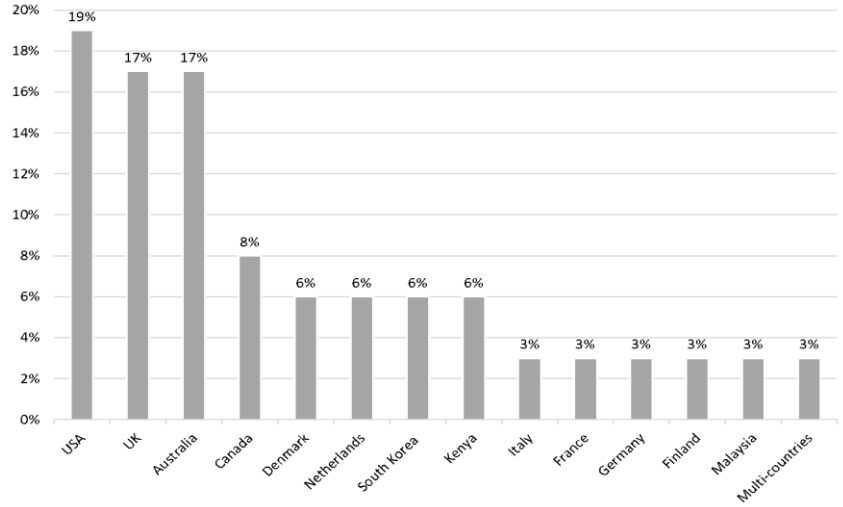

Fig. 4. Geographical distribution of papers on involvement with food

The 19 measure development studies were published between 1984 and 2019. Regarding the measurement of FI, six measures (32%) assessed this construct in a non-food specific manner; that is, these measures were created to be applied to different kind of products, not necessarily food. Six measures (32%) evaluated FI in a food-specific manner, creating scales for specific types of food (e.g., wine, local food), and the remaining seven measures (37%) assessed the level of FI in general. The measures that can be used for different types of products were the oldest scales, published between 1984 and 1991, while the most recent measures were developed to assess the level of FI in general. The number of items in the included measures ranged from 2 to 26 items. Regarding the 19 measures, 14 (74%) used a seven-point scale for response categories of which four used a semantic differential and 10 used Likert scales; four measures (21%) used a 5-point Likert scale and one measure (5%) used a 9-point Likert scale. With regard to the languages in which the measures were available, all had an English version and some of them had also been translated into other languages (e.g., Italian, German, Korean, French). The Purchase-Decision Involvement scale (PDI) (Mittal, 1989) is available in three languages: Korean, English and German. Finally, considering the subscales used to capture FI, 12 measures (63%) did not have subscales while the remaining seven measures had at least two subscales (37%).

3.3 Psychological Domains Captured by Included Measures

Considering the definitions used to describe FI and the subscales used to measure it, we have identified the main entries (in total 30) used to capture FI and have grouped them into the five psychological domains proposed by the Andrews et al. (1990) framework, adapted for this study purpose (Table 3):

Domain 1: the *affective domain* that groups eight entries; Domain 2: the *self-expressive domain* that groups five entries; Domain 3: The *situational domain* that groups three entries; Domain 4: the *behavioral domain* that groups 10 entries and Domain 5: the *cognitive domain* that groups four entries

3.3.1 The Role of the Different Domains in the Included Measures

Table 3 shows that all studies (100%) took into account the "*behavioral domain*" of FI. In particular, 6 (32%) scales directly measured this domain while 13 (68%) studies considered it as a

consequence of a high level of involvement. Moreover, 17 (90%) scales took into account the affective domain by directly measuring it.

Furthermore, the "*cognitive domain*", relating to the search for information and related cognitive processes (such as evaluation of alternatives and of retrieved information), was considered by 15 (79%) scales; of those, six (32%) directly considered this domain to assess the level of FI while the remaining nine (47%) considered it as a consequence of the high levels of food involvement.

The "*self-expressive domain*" was targeted by most of the scales retrieved (13 out of 19); of those, seven (37%) directly measured it as an indicator of the levels of FI whereas six (32%) considered it as an antecedent of the high levels of food involvement.

Finally, the "*situational domain*" was the least considered in the retrieved measures (by nine scales) and it was directly assessed by four scales (21%) while the other five (26%) considered it as an antecedent of the high levels of FI, by theorizing that FI can change according to the purchasing situation.

Table 3. Psychological domains used to capture the involvement with food

Measurement (author)	Subscales	Affective Domain	Self-expressive Domain	Situational Domain	Behavioural Domain	Cognitive Domain
Food Involvement Inventory (FII) (Lee et al., 2019)	4 subscales: behavioural-cooking (behaviours related to efforts for cooking); affective (interest and importance in foods); behavioural-purchase (relevant to choose and purchase of foods); cognitive (relevant to knowledge and informative about foods)	**X**			**X**	**X**
*Fine Wine Involvement Scale (Roe & Bruwer, 2017)	no subscales reported: aim to capture different aspect such as interest, self-concept, ritual, fine wine purchaser, hedonic/aesthetic, loyalty, situational brand choice and, purchasing involvement	**X**	**X**	**X**	**X**	
*Gastronomy Involvement (Quee-Ling et al., 2017)	no subscale reported: aim to capture the gastronomy affection intensity	**X**			▲	▲
Food Involvement (For Food Enthusiasts) Scale (Robinson & Getz, 2016)	4 subscales: food-related identity (scale, predominantly including identity affirmation and identity expression items), food quality (this dimension reflects the importance give to quality of food), social bonding (explained largely in terms of eating, more specifically, dining out) , and food consciousness (dimension is clearly reflective of the after-meal experience and post preparation phase)	**X**	**X**		**X**	
*Wine Involvement Profile Scale (WIP) (Bruwer et al., 2014)	no subscales reported: aim was to capture the pleasure/interest, importance, knowledge and personal expression that people perceived towards wine	**X**	**X**	▼	▲	**X**
Wine Product Involvement (Hirche & Bruwer, 2014)	3 subscales: knowledge (literacy about wine); pleasure (pleasure was defined as "the hedonic value of the product, its ability to provide pleasure and enjoyment"); activity (participation to events/festival	**X**		▼	**X**	**X**

	related to wine)					
Wine Product Involvement (Bruwer & Huang, 2012)	5 subscales: interest (personal interest in wine), behaviour (wine purchasing), ritual (including its storage and preparation for drinking it), pleasure (the hedonic value of the product, its ability to provide pleasure and enjoyment) and risk (the perceived importance of the potential negative consequences associated with a poor choice of the product)	X	▼	X	X	▲
*General Food Health Involvement (Hansen et al., 2010)	no subscales reported: aim was to capture the degree of personal importance and relevance that a consumer perceive towards healthy food intakes.	X			▲	▲
Wine Involvement Scale (WIS) (Brown et al., 2007)	3 subscales: expertise knowledge and level of experience in wine) enjoyment (wine as a pleasure experience/consumption) and symbolic centrality (wine as a self-expression that have a centrality in a person's life)	X	X		▲	X
*Nutrition Involvement (Chandon & Wansink, 2007)	no subscales reported: aim was to capture not only the degree of importance a person places on eating healthy but also the amount of attention devoted to nutritional information of a particular product	X			▲	X
*The Food Involvement And Focus Questionnaire, FIFQ (de Boer et al., 2007)	no subscales reported: aim was to capture the pleasure, importance of meals and the curiosity towards new food.	X	▼		▲	X
Food Involvement Scale (FIS) (Bell & Marshall, 2003)	2 subscales: the preparation and eating (defined as actions related to thinking about, preparing and consuming food, actions that generate enjoyment and pleasure); the set and disposal (defined as a set of actions related to setting the table and disposing of food after consumption)	X	▼		X	▲
*Short Personal Involvement	no subscales reported: aim was to capture a person's perceived	X	▼	▼	▲	▲

Inventory (PII) (Zaichkowsky, 1994)	relevance of the object based on inherent needs, values, and interests.					
*Revised Personal Involvement Inventory (PII) (McQuarrie & Munson, 1992)	no subscales reported: aim was to capture person's perceived relevance of the object based on inherent needs, values, and interests.	**X**	▼	▼	▲	▲
*Purchase-Decision Involvement Scale (PDI) (Mittal, 1989)	no subscales reported: aim was to capture the level of interest and concern that a consumer brings to product upon a purchase-decision task.	**X**		**X**	▲	▲
*Ego Involvement (Crandall, 1987)	no subscales reported: aim was to capture the degree to which a person feels his or her identity is defined by his or her food.		**X**		▲	
*Personal Involvement Inventory (PII) (Zaichkowsky, 1985)	no subscales reported: aim was to capture a person's perceived relevance of the object based on inherent needs, values, and interests.	**X**	▼	▼	▲	▲
Consumer Involvement Profile (CIP) (Laurent & Kapferer, 1985)	4 subscales: impo & risk (the personal interest in a product category, the perceived importance of the potential negative consequences associated with a poor choice); the hedonic value of the product: its ability to provide pleasure and enjoyment (pleasure) ; the sign value of the product: the degree to which it expresses the person's self (sign).	**X**	**X**	**X**	▲	▲
*Consumer Involvement In Product (Traylor & Joseph, 1984)	no subscales reported: aim was to capture the individual's sense of self or identity related to food		**X**		▲	
Domains captured by the involvement measure itself %		90%	37%	21%	32%	32%
Domains identified as antecedents/consequences of the involvement measure		-	32%	26%	68%	47%

Note: *twelve measures had no subscales. For these measures, the domain(s) captured were inferred by examining the definition of the involvement towards food that the authors claimed to capture.

Entries of affective domain : enjoyment; pleasure; relevance; interest; importance; hedonic/aesthetic; loyalty; affection intensity; **Entries of self-expressive domain:** The sign value of the product; identity affirmation; identity expression; self-concept; centrality of food in peoples' lives; **Entries of situational domain :** importance of purchase decision, importance of purchase occasion, risk/concern; **Entries of behavioral domain:** consume/consume healthy; set the table; dispose of food after consumption; dining out; efforts for cooking; purchase of food; choice of food; choice of brand; storage of food; participation to festival of food; **Entries of cognitive domain :** knowledge/literacy/information about foods; experience about food; level of attention towards food information; curiosity towards food; **X** domains captured by the involvement measure itself; ▼ domains identified as antecedents of the involvement measure; ▲ domains identified as consequence of the involvement measure

3.4 Measurement Properties

The overall level of evidence for the measurement properties of each FI measurement instrument is summarized in Table 4 and detailed in Supplementary materials A. This combines the rating of the reported measurement property using the consensus criteria with the COSMIN scoring and the methodological quality of studies as reported in Supplementary materials B.

3.4.1 Measure Development and Content Validity

Only four measures (out of 19) demonstrated at least an adequate concept elicitation (provided information on the relevance and comprehensiveness of the items in the measure development), while the remaining 15 measure development studies were rated doubtful or inadequate (Supplementary materials C). Only 14 studies implemented a cognitive interview or other pilot tests on the measures, calling into question the comprehensibility of 19 measures that were rated as doubtful (64%) or inadequate (36%). The comprehensiveness of all measure development was rated doubtful. Overall measure development was rated inadequate in the majority (58% of studies) and doubtful in the remainder (42% of studies). These results are mainly because individuals were not involved in the process of validating the measures using qualitative tools. The Food Involvement Scales (FIS) (Bell & Marshall, 2003), Personal Involvement Inventory (PII) (Zaichkowsky, 1985) and General Food Health Involvement scale (Hansen et al., 2010) each had one content validity study conducted on them that deepened the comprehensibility, comprehensiveness and relevance of the measures. Based on these results, the overall content validity of seven out of 19 measures was sufficient with low or very low-quality evidence and the remaining 12 measures were inconsistent with low or very low-quality evidence (Table 4).

3.4.2 Other Measurement Properties

Considering the different psychometric properties, we note that none of the 19 measures assessed measurement errors or responsiveness. Most of the scales evaluated construct validity (16/19) and structural validity (14/19), and all studies evaluated internal consistency. Reliability was assessed in four out of 19 studies and measurement invariance/cross cultural validity was measured in eight out of 19 studies (Table 4).

3.4.2.1 Structural Validity

Regarding structural validity, 21 of 36 studies verified the structure and dimensionality of the scale using exploratory factor analysis (EFA), while just six studies used confirmatory factor analysis (CFA), the only analysis that should be used to assess and confirm the factorial structure of measures (see Supplementary material B). Furthermore, it is important to clarify that the number of dimensions present in the measurement scales should be consistent with the reference theory. That is, if a scale claims to cover more than one dimension, the factorial structure cannot be one-dimensional but must reflect the quantity of dimensions hypothesized on a theoretical level. Therefore, the number of dimensions present in a scale is also a theoretical issue and not just a statistical one. Based on these aspects, after combining the methodological quality of all studies assessing the structural validity of each FI measure, we found that most of the measures (10/14) had an indeterminate (?) overall rating regarding the structural validity, and the remaining four measures showed insufficient (-) results to confirm the factorial structure (Table 4). Given these results, it is quite impossible to determine with certainty (high evidence) the factorial structure of these 19 measures but despite this, the results seem to suggest a heterogeneity of structure ranging from one-dimensional to four-factor measures. Moreover, the quality of evidence for most of the studies that assessed structural validity is moderate (Table 4). Regarding the Short Personal Involvement Inventory, two studies reported two different factorial structures (one unidimensional and one with two factors), but the study carried out by Taylor et al. (2018) had a higher level of methodological quality (very good) than the Zaichkowsky (1994) (doubtful) study and the first one was also much more recent (see Supplementary material B). Given these considerations, we decided to consider only the study carried out by Taylor et al. (2018) for the overall rating of the structural validity of the scale. Furthermore, the factorial structure of the Revised Product Involvement Inventory (RPII) was two-factor in the study carried out by McQuarrie & Munson (1992), while it was assessed as unidimensional in the study carried out by Kähkönen & Tuorila (1999) (see Supplementary material B). This different factorial structure can be explained by the fact that the scales were administered in two different languages: the first in English and the second in Finnish. In this case, we found an explanation for this inconsistency relating to the factorial structure of the scale, and for this reason, we evaluated the two scales separately, attributing two different scores for the overall rating and the quality of evidence. In particular, both studies reported indeterminate results (since they did not report CFA values but tested the factorial structure using only EFA) with moderate quality of evidence because the methodological quality of the studies was considered adequate (see Table 4).

3.4.2.2 Internal Consistency

According to the COSMIN guidelines, it is possible to evaluate the goodness of the measurement properties, in terms of internal consistency, only if the criterion for "At least low evidence for sufficient structural validity" is met. As previously explained, none of the 19 measures presented data that supported sufficient structural validity, and for this reason, all the evidence regarding this aspect of validity was rated as indeterminate even if the indicators used to assess the internal consistency of measures were correct and showed good values (see Supplementary material B). In particular, for the Revised Product Involvement Inventory (RPII), the internal consistency was assessed separately for the two scales with different factorial structures (Table 4).

3.4.2.3 Measurement Invariance/ Cross-Cultural Validity

Concerning measurement invariance, 10 of 36 studies tested this psychometric property and none of them showed adequate methodological quality due to the inadequate or doubtful approach used to analyze the data (most studies used EFA to test measurement invariance) (see Supplementary material B). Consequently, the quality of evidence of measures was rated as very low for six measures and low for two measures. In particular, there seemed to be some issues about measurement invariance (insufficient results) with the scales that measure FI in a nonfood-specific manner (measures that can be used for different types of products, not just food), which showed a different factorial structure based on the product considered. For example, the Short Personal Involvement Inventory, despite its low methodological quality, seemed to show a unidimensional structure if it measured involvement in soft drinks, while it appeared to be two-factor for involvement in ice cream, resulting in an insufficient overall rating (see Supplementary material B). Moreover, the Revised Product Involvement Inventory (RPII) showed similar results: a couple of studies have shown that some products (frankfurters, yoghurt, margarine, and chocolate) exhibited a unidimensional structure, while others showed a two-factor structure. For this scale, the results should be rated as inconsistent because one study (Kähkönen & Tuorila, 1999) confirmed the factorial structure invariance tested on different food products while the other one (McQuarrie & Munson, 1992) showed opposite results (see Supplementary material B). In this case, as previously mentioned, the two studies administered the scale in different languages (English and Finnish) with a factorial structure that proved to be different. For a more correct and precise analysis, we decided to evaluate the overall rating and the quality of evidence of measurement invariance separately for

the two measures (in English and Finnish). In particular, we see that the one-dimensional factorial structure demonstrated for the scale translated into Finnish does not vary with the variation of some food products considered, showing sufficient invariance of measurement; while the two-factor structure of the scale used in English varies (from 1 to 2 factors) depending on the food products considered, showing insufficient measurement invariance. In this case, the quality of evidence for both studies is very low because they used EFA to test measurement invariance and not the regression model or CFA as suggested by COSMIN (see Table 4).

3.4.2.4 Reliability

The reliability of four measures was sufficient, but it was assessed in studies rated as doubtful or inadequate overall (see Supplementary material B), resulting in low and very low quality of evidence (see Table 4). In particular, the methodological quality of these studies was rated as doubtful or inadequate because the research provided Pearson or Spearman correlation coefficients without evidence, if no systematic change had occurred.

3.4.2.5 Construct Validity

Evidence supporting construct validity was available for 16 measures of 19 (see Supplementary material D). The analysis of the combined methodological quality of the studies showed that a sufficient overall rating with a high quality of evidence was only available for the Short Personal Involvement Inventory (PII) (Zaichkowsky, 1994) measure. In particular, the studies that tested the construct validity of this measure showed incoherent results that would have resulted in an inconsistent overall rating. After careful discussion, we hypothesized that this inconsistency could be due to the (doubtful) methodological quality of some studies, and for this reason, we decided to consider only studies that had at least an adequate methodological level. Regarding the General Food Health Involvement scale (Hansen et al., 2010), Fine Wine Involvement scale (Roe & Bruwer, 2017), Consumer Involvement in Product scale (Traylor & Joseph, 1984), and Revised Product Involvement Inventory (RPII) English version (McQuarrie & Munson, 1992) measures, the inconsistency was not explained by the authors, the overall rating was assessed as inconsistent, and the quality of evidence was not reported. In particular, some studies were assessed as doubtful or methodologically inadequate because when they tested convergent validity, they often did not use scales with sufficient psychometric quality, and this makes it difficult to understand the correlations

between the measures. Regarding known-groups validity, the methodological quality was often doubtful or only adequate because the characteristics were not clear of the groups on which the hypotheses were tested. Many studies, for example, made a comparison between young and older subjects without reporting the age cut-off, and this affects the final evaluation.

Table 4. Quality of the evidence for measurement properties of the measure development studies

	Food Involvement Scale (FIS) (Bell & Marshall, 2003)		**Personal Involvement Inventory (PII)** (Zaichkowsky, 1985)		**Consumer Involvement Profile (CIP)** (Laurent & Kapferer, 1985)		**Short Personal Involvement Inventory (PII)** (Zaichkowsky, 1994)		**Revised Personal Involvement Inventory (RPII)** (Mcquarrie & Munson, 1992)		**Purchase-Decision Involvement Scale (PDI)** (Mittal, 1989)	
	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE
	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low
Content validity	±	low	±	low	+	low	+	low	±	very low	±	low
Relevance	+	low	+	high	+	low	+	moderate	+	low	+	low
Comprehensiveness	+	low	+	low	+	low	+	low	-	very low	-	low
Comprehensibility	±	low	+	low	+	low	+	low	+	very low	+	low
Structural validity	?	moderate	?	moderate	?	moderate	-	high	?*	moderate	?	moderate
									?°	moderate		
Internal consistency	?	moderate	?	high	?	high	?	moderate	?*	low	?	high
									? °	high		
Cross-cultural validity/Measurement invariance			+	low	?	very low	-	very low	-*	very low	+	very low
									+°	very low		
Reliability (Test-retest)	+	very low	+	low			+	low			+	very low
Measurement error												
Construct validity	+	moderate	+	moderate	-	low	-	high	±*		+	moderate
									-°	moderate		
Responsiveness												

*English version; °Finnish versio

	General Food Health Involvement (Hansen Et Al., 2010)		**Food Involvement (For Food Enthusiasts) Scale** (Robinson & Getz, 2016)		**Food Involvement Inventory (FII)** (Lee Et Al., 2019)		**Fine Wine Involvement Scale** (Roe & Bruwer, 2017)		**Wine Product Involvement** (Bruwer & Huang, 2012)		**Ego Involvement** (Crandall, 1987)	
	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE
	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low
Content validity	±	very low	+	low	+	low	±	very low	±	low	±	very low
Relevance	±	very low	+	low	+	moderate	±	very low	+	low	+	low
Comprehensiveness	±	very low	+	low	+	low	-	low	-	low	-	very low
Comprehensibility	+	moderate	+	low	+	low	+	low	+	low	±	very low
Structural validity	-	high	?	moderate	-	high						
Internal consistency	?	moderate	?	high	?	very low	?	low	?	high	?	low
Cross-cultural validity/Measurement invariance	+	low									-	very low
Reliability (Test-retest)												
Measurement error												
Construct validity	±		+	low			±		+	low	-	low
Responsiveness												

	Consumer Involvement In Product (Traylor & Joseph, 1984)		**Wine Involvement Scale (WIS)** (Brown Et Al., 2007)		**Wine Involvement Profile Scale (WIP)** (Bruwer Et Al., 2014)		**Nutrition Involvement** (Chandon & Wansink, 2007)		**The Food Involvement And Focus Questionnaire, FIFQ** (De Boer Et Al., 2007)		**Wine Product Involvement** (Hirche & Bruwer, 2014)		**Gastronomy Involvement** (Quee-Ling Et Al., 2017)	
	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE	OVERALL RATING	QUALITY OF EVIDENCE
	+ / - / ± /?	High, moderate, low, very low	+ / - / ?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low	+ / - / ± /?	High, moderate, low, very low
Content validity	+	low	±	very low	±	very low	±	very low	+	low	±	very low	+	low
Relevance	+	moderate	+	low	+	low	±	very low	+	low	+	low	+	low
Comprehensiveness	+	low	+	very low	-	low	-	low	+	low	-	very low	+	low
Comprehensibility	+	low	±	very low	±	very low	+	low	+	low	-	very low	+	low
Structural validity	?	low	?	low			?	low	?	moderate	-	high		
Internal consistency	?	low	?	high	?	low	?	moderate	?	high	?	very low	?	low
Cross-cultural validity/Measurement invariance	+	very low												
Reliability (Test-retest)														
Measurement error														
Construct validity	±				+	low	+	moderate	+	moderate	-	high		
Responsiveness														

4 DISCUSSION

Food has different roles in people's lives (Bell & Marshall, 2003; Brunsø et al., 2021). Some individuals do not attach much importance to food choices, considering food as simply a need to be met, while for others, food is extremely important, and they spend a large amount of time and money on purchasing food and preparing meals. In light of this, the pragmatic relevance of this construct has increased drastically in recent years. These phenomena are often related to the extent of food involvement. Many researchers have claimed the importance of understanding the level of individuals' food involvement in order to better predict and understand modern food consumption (Nam, 2020). However, there is no commonly accepted definition of this phenomenon. Moreover, despite the clearly evident subjective nature of the food involvement phenomenon, there is not a clear psychological foundation for this construct and, as a consequence, we rely on a proliferation of scales to measure it without a consensus on guidelines for their adoption and use. In the literature, in fact, only four scales have been created expressly to measure the construct of FI (Bell & Marshall, 2003; De Boer & Schösler, 2016; Lee et al., 2019; Robinson & Getz, 2016), while in the majority of the studies dedicated to assessing individuals' food involvement, more inclusive or specific scales have been used (Roe & Bruwer, 2017; Zaichkowsky, 1985). This phenomenon appears to limit the heuristic value of currently available measures of FI, due to the psychological distinctiveness and peculiarity of food consumption subjective experience (Bell & Marshall, 2003).

Given these premises, our systematic review seeks to critically assess the currently available measures of FI in order to both 1) systematize the analysis of the psychological domains implied in the assessment of this phenomenon (and their conceptual relationships) and 2) analyze the psychometric properties of the different scales.

If we consider the "direction" of involvement, defined as the target of involvement intensity level, this review confirmed the presence of a limited number of scales (seven out of 19) that measure FI in general. Most of the scales, in fact, are not specific to a product and the ones which measure the involvement with a specific product mostly consider wine. However, although addressing different food products, the retrieved scales show some partially common theoretical roots and can be compared on the basis of the psychological domains included in their assessment.

In particular, this study – by adopting Andrews et al. (1990) descriptive framework - shows that the "*behavioral domain*" is the most targeted by the retrieved scales (100%) to measure individuals' FI, followed by the "*affective domain*" (90%), the "*cognitive domain*" (79%), the "*self-*

expressive domain" (68%) and finally by the "*situational domain*" (47%). These results become more complex if we consider them in light of the conceptual relationships that govern these domains. In particular, it is possible to note that the "*self-expressive*" and the "*situational domain*" are mainly identified as antecedents of FI, which can – in turn - influence the "*affective*" domain that seems to be the core domain often used to assess the construct of involvement. Moreover, the "*affective domain*" (related to the subjective relevance attributed to the product and the individual's interest towards it), influence the "*behaviors*" and the "*cognitive*" domains. However, although it is possible to abstract globally this conceptual map of the psychological domains implied in the food consumption phenomenon, according to our analysis, none of the currently available scales is able to simultaneously assess all these domains of the construct. However, Food Involvement is described in the literature as a "subjective" experience (Zaichkowsky 1985; 1994; Crandall, 1987; McQuarrie & Munson, 1992). From the perspective of food psychology, this implies the synergic arousal of different individuals' dimensions such as the behavioral, cognitive and affective ones (Lee at al., 2019; Hollebeek, 2011b, 2011a; Hollebeek et al., 2014). Since some authors defined FI as a psychological construct (Slama & Tashchian, 1985) we would expect, thus, that it would be studied and operationalized taking into consideration these different psychological dimensions. Furthermore, today more than ever, FI can no longer be considered as a mere pleasure or importance given to food (used in most studies on FI) but as a phenomenon that involves the consumer at 360 degrees, determining the activation of the behavioral, cognitive, affective and also identity psychological dimensions (Lee et al., 2019; Robinson & Getz, 2016). However, this complication in measuring and operationalizing the construct could lead to some issues. In particular, some consequent / antecedents of the FI could be disguised as indicators of the same, creating confusion between the roles of the different dimensions of the involvement. However, we believe, as reiterated by various researches on involvement (Lee et al., 2019; O'Brien & Toms, 2010), that there are aspects related to the cognitive, behavioral, affective and identity dimensions that are characteristic of this construct and that should not be confused with the antecedents or consequences of the construct but should be treated as indicators of it. For example, research by Lee et al. (2019) stated that pay attention to food choices or taking pleasure in cooking are characteristic aspects (indicator) of FI but for example eating particular foods (such as organic ones) are often consequents of high levels of involvement in food but not behaviors characteristic (indicators) of FI (Kushwah et al., 2019; Teng & Lu, 2016).

Moreover, the scales that are not specific to measure the FI (which are also the oldest ones) used fewer domains to measure it than the other scales (Table 5). Indeed, they focused mainly on the "*affective*" and the "*self-expressive*" domains, treating the relationships between other domains as antecedent-consequences. On the other hand, the scales that measure involvement with a specific product or food in general (which are also the most recent scales) are more complex because they have used more domains to measure FI, paying little attention to the relationships between them.

Moreover, as mentioned in the introduction, two different types of involvement have been widely discussed in the literature: enduring and situational. In the "*self-expressive*" domain, we grouped entries that are characteristic of enduring involvement while the entries grouped under the situational domain are relevant in capturing situational involvement (Huang, 2006). Our results show that there are five (26%) scales (that targeted only the self-expressive domain) that measure enduring involvement, two scales (11%) (that targeted only the situational domain), two scales (11%) (that targeted both the situational and enduring domains) and 10 scales (53%) that cannot be classified as they do not specifically measure either domain (Huang, 2006).

Furthermore, we note a difference between the types of involvement assessed and the scales used to measure FI (Table 5). The scales that measure FI in a non-food-specific manner or with food in general are difficult to classify as enduring or situational since they tend to measure the importance that a specific product or food has in general without grasping the determinants of this importance (situation or self-expressive domains). Conversely, scales that measure involvement with a specific food product consider both the self-expressive and situational factors. These results highlight that not all scales have considered the self-expressive dimensions to measure FI and this could be a very important limitation of these measurements. For some people, indeed, food has a paramount role in achieving their life values and expressing their identity, and it is also used to create stability and safety, whereas for others, it is a means to achieve self-fulfillment and express creativity. Hence, the self-expressive dimension is a key variable to understand and predict modern food consumption (Nam, 2020).

Regarding the psychometric quality of measures, the results highlight that the scientific quality of most instruments is doubtful or inadequate. In particular, this review identified 36 studies assessing the measurement properties of 19 instruments. Considering the measurement properties related to the dimension of validity (defined as the ability of the instrument to measure what it intends to measure), we can observe that the scales of FI should deepen and improve their

measurement invariance and structural validity. The low methodological quality of measurement invariance, shown in the results, is due to the inadequate or dubious approach used to analyze the data. Indeed, most studies used an EFA to test measurement invariance instead of carrying out a regression or a CFA (as suggested by COSMIN). The same problem can be found in the analysis of the structural validity. Indeed, 15 out of 21 studies verified the structure and dimensionality of the scale using exploratory factor analysis (EFA) and only six studies used confirmatory factor analysis (CFA), the only analysis that should be used to assess and confirm the factorial structure of measures (Mokkink et al., 2018, p. 29) Moreover, the scales that are not specific to measure FI have greater problems of validity than the others (Table 5). In particular, they have some issues with measurement invariance (insufficient overall rating) since they showed a different factorial structure based on the product considered. Therefore, measures that have been created to assess the level of involvement without considering a target product are highly unstable structurally; to use these in the correct way in new studies and on new products, their internal factor structure should always be evaluated and tested.

If we consider the reliability of the measurement instrument (defined as the extent to which scores for individuals who have not changed are the same in repeated measurement under several conditions), we note that scales that are not specific to measure FI show sufficient reliability even if unsupported by scientific evidence (Table 5). However, it is impossible to judge the reliability of instruments that measure FI in general or a specific product since the data reported by the studies are difficult to interpret. This tough evaluation is due to the fact that none of the 19 scales have evaluated the measurement error and their internal consistency was assessed as indeterminate due to a lack of clarity in their structure validity.

Finally, none of the 19 measures assessed the responsiveness of the scales (Table 5). Without a complete evaluation of psychometric properties, the reliability and validity of results produced using these measures of FI are uncertain and it is difficult to draw a conclusion regarding their quality.

However, considering the quality of evidence and the overall rating given to measurement properties of the measure development studies (Mokkink et al., 2018), it appears that although no scales can be recommended for use, most of them (15 out of 19) have the potential to be recommended but require further research to assess their quality. The other four measures (Hansen et al., 2010; Lee et al., 2019; Zaichkowsky, 1994; Hirche & Bruwer, 2014) cannot be recommended,

as these are scales for which there is high-quality evidence of, at least, an insufficient measurement property.

Table 5. Characteristics of the different types of involvement scales

	Conceptual Analysis		**Type of involvement**			**Methodology Assessment**		
Type of scale	Consideration of more than one domain in the measurement of involvement	Relations between domains (antecedent-consequent)	Enduring	Situational	Not classifiable	Validity	Reliability	Responsiveness
Not specific for food (n=6)	-	+	-	-	+	-	+	**NR**
Specific for certain food products (n=6)	+	-	+	+	-	+	**?**	**NR**
Specific to measure food in general (n=7)	+	-	-	-	+	+	**?**	**NR**

Note: Validity= content validity; structural validity, cross-cultural validity/measure invariance, construct validity; Reliability= internal consistency, reliability, measurement errors; NR= not reported; ?=indeterminate; – absence/low methodological evaluation; + presence/good methodological evaluation

5. IMPLICATIONS FOR FUTURE RESEARCH

This systematic review has demonstrated how the currently available measures of FI do not share a clear and common conceptual framework able to articulate the main psychological domains implied in this phenomenon and their conceptual relationships. This fact is the basis of confusion in the factorial structure of the correctly available measures and their methodological fragility. We claim the importance of reaching a shared definition of FI, oriented by a solid psychological analysis of the phenomenon, in order to develop a comprehensive scale able to generate rigorous, comparable and readable results. Indeed, our analysis cast light on the absence of psychological studies on the topic, and this could be one reason for the still theoretical and conceptual opacity of the FI phenomenon.

Future research should further contribute to the development of reliable and valid psychometric measures of FI, which employ a better comprehensive theoretical analysis of this phenomenon and are sensitive to track comparative levels of involvement across individuals, situations and cultures. Furthermore, a deeper analysis of the cross-cultural implications of the measurement of food involvement deserves further attention.

6. CONCLUSION

Nowadays, the construct of FI could be a key variable that permits better prediction and understanding of food consumption choices, overcoming the use of cognitive-behavioral variables (e.g. intention, knowledge, and attitudes). This construct relates to a pure psychological experience related to the extent to which individuals are subjectively activated at the affective, cognitive and behavioral level. Due to this psychological pervasive nature, the construct of FI requires a comprehensive approach to its measurement, able to grasp the experiential shades of the different psychological domains implied in this experience, together with their logical relationships.

However, currently available measurements, according to our study, fail to achieve either theoretical robustness or methodological rigor. We are convinced that one important cause of the poor methodological strength of the currently available scales is, indeed, due to this theoretical opacity of the construct and to the lack of a psychological perspective in depicting its subjective roots.

With the aim of overcoming these methodological and conceptual shortcomings and on the basis of the literature analyzed, we propose a conceptual framework that summarizes both the main psychological domains involved in the experience of FI and their logical relationships (Figure 5).

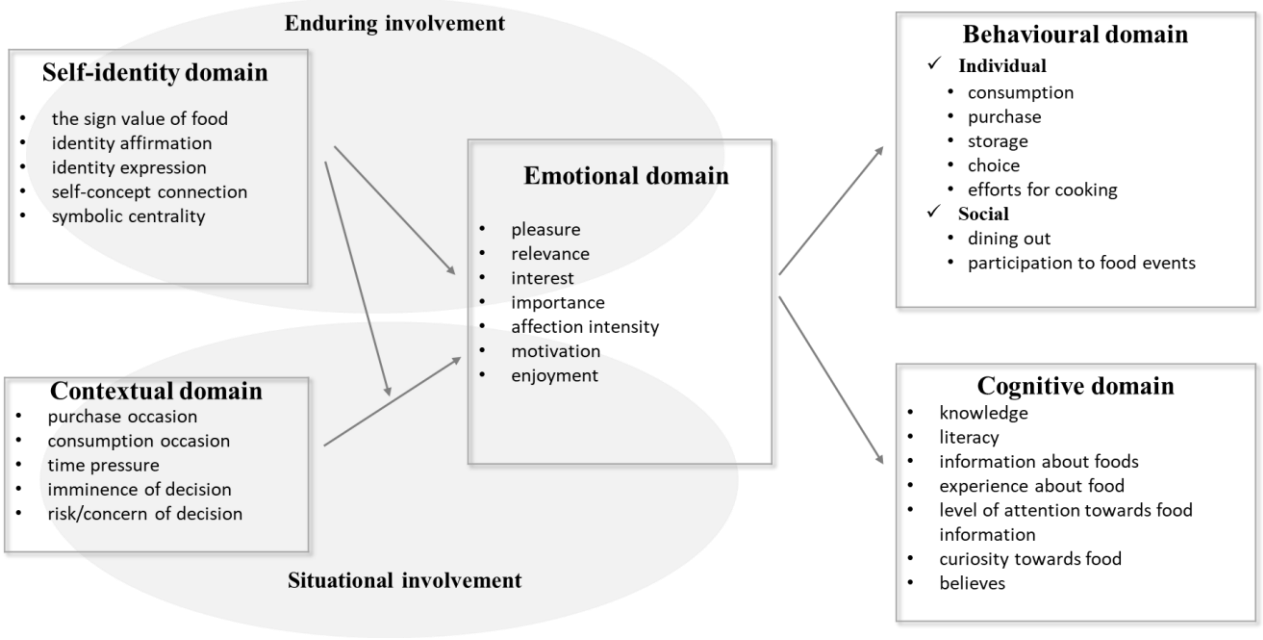

Fig. 5. A framework for the conceptualization and measurement of food involvement

In particular, we hypothesize that this subjective phenomenon is characterized by five psychological domains:

Domain 1: *The self-identity domain* that groups all the aspects about the degree to which people feel their identity defined by their food choices, which is related to personal goals, cultural values and the degree to which an object has ego-related significance. This domain can be considered a typical requisite of enduring involvement because it considers the connection between an object and personal identity.

Domain 2: *The contextual domain* that identifies all the aspects about the specific situation/occasion of purchase/consumption. This domain can be considered a typical requisite of situational involvement because it considers its unique situational factors.

Domain 3: *The emotional domain* that groups all the aspects about consumer's emotions evoked by an object, which is linked to the importance given to the object as a whole.

Domain 4: *The behavioral domain* that groups all the aspects linked to the consumers' actions and behaviors related to food. In particular, we can make a distinction between these types of behaviors: some are linked to individual actions (e.g., buying, consuming, making choices, etc.) and others are connected to the social dimension of food (e.g., eating out, participation in a festival of food).

Domain 5: *The cognitive domain* that groups all the aspects related to the level of consumers' information processing activities (e.g. knowledge, literacy, information about food).

Based on the current FI measurement practices systematized in this study, we also assume that there is a conceptual relationship between these domains. In particular, we claim that the "*self-identity*" and the "*contextual domain*" are the main antecedents of FI that can – in turn - influence the "*emotional*". In particular, if these emotions are determined by situational factors, we are capturing the situational involvement; while if they are activated by self-identity factors, we are considering the enduring involvement. Finally, this *"emotional"* domain can influence the "*behaviors*" and the "*cognitive*" domains that are considered the main consequences of FI. Furthermore, we believe that the "*self-identity domain*" can affect (moderate) the strength of the relationship between the contextual factors and the interest in food ("*emotion domain"*). Basically, we believe that certain events (e.g., food scandal or time pressure during the shopping situation) can affect the importance and the relevance given to food; but this relationship may be different between people who have low versus high levels of enduring involvement. This further consideration leads to strongly emphasizing the role of the *self-identity domain* in the conceptualization and measurement of FI. This relevance of this domain is also confirmed by some studies that claim that nowadays, many people use food as a means through which to satisfy their needs, express their identity or feel part of a certain group of consumers (e.g. vegans, vegetarians) (Brunsø et al., 2021). This evidence highlights how the identity dimension is necessary and fundamental to predict some types of modern consumption that are often not completely linked to situational factors (Carfora et al., 2017; Nam, 2020; Qasim et al., 2019). This conceptual framework – derived from an interpretative synthesis of the literature analyzed - tries to summarize the psychological domains that may characterize FI and should be empirically validated. However, based on this conceptual framework, we believe it would more effectively allow the future validation of FI dedicated measures. Furthermore, this framework can be the basis for the choice to combine different scales of FI in order to reach a full comprehension of the phenomenon. Finally, this framework could be the basic compass to orient specific declination or adaptation of the FI measurement process to specific food products, targets or consumption cultures. We are convinced that reaching a consensus about a common theoretical framework that depicts the core domains of FI should be the basis for future research in this field, in order to make results more comparable and robust.

7. LIMITATIONS

There are a number of limitations of this review. In particular, this systematic review has considered and compared measures related to different type of foods without taking into account a specific product. However, this was a research choice to map the domains that characterize the phenomenon of FI as a whole. Moreover, this study proposed a framework for the conceptualization and measurement of FI without suggesting which is the best methodology for such evaluation. However, some studies pointed out (Müller & Hamm, 2014) that measuring the stability of FI (the enduring involvement) through statements and rating scales (most often Likert) is often controversial. Nevertheless, Likert scales are typically used in psychometric instruments aimed at assessing psychological phenomena such as FI. Furthermore, in this study, we adopted the COSMIN checklist which – as its authors underline - is a tool born a few years ago that, like any checklist, presents limitations and can be improved. In this regard, we can highlight a possible improvement regarding the sample size used to validate the scale: this checklist claims that a sample of at least 100 subjects is required to attest to the validity of a study but, actually, the adequacy of a study sample size depends also on other variables (such as the expected variance of the phenomenon in a population and the significance level). Moreover, the evaluation of studies through a checklist such as COSMIN does not distinguish between the low quality of the study and a lack of details reported in the article, and therefore, it is not always clear if the overall study rating represents the real methodological value of the scales. Moreover, COSMIN was created for the evaluation of PROMs (Patient-Reported Outcome Measures) while in this systematic review it was used to evaluate scales aimed at assessing the food experience of healthy individuals. Despite this, the COSMIN checklist has been recently applied to evaluate studies carried out on healthy populations, proving to be suitable and applicable (Rezai et al., 2020; Williams & Beovich, 2020). Finally, the conceptual framework suggested in this work as resulting from the literature retrieved and analyzed requires further empirical validation.

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APPENDIX A

Nine psychometric properties are assessed by the COSMIN checklist. Definitions of these properties are reported in the table below that was taken from Mokkink et al., (2018, p. 12.)

Table A1. Definitions of measurements properties of instruments assessed by COSMIN checklist

Measurement property	Definition
Internal consistency	The degree of interrelatedness among the items
Reliability	The proportion of the total variance in the measurements which is due to "true" differences between subjects
Measurement error	The systematic and random error of a subject's score that is not attributed to true changes in the construct to be measured
Content validity	The degree to which the content of a measure is an adequate reflection of the construct to be measured
Structural validity	The degree to which the scores of a measure are an adequate reflection of the dimensionality of the construct to be measured
Hypotheses testing for construct validity	The degree to which the scores of a measure are consistent with hypotheses (for instance with regard to internal relationships, relationships to scores of other instruments, or differences between relevant groups) based on the assumption that the measure validly measures the construct to be measured
Cross-cultural validity	The degree to which the performance of the items on a translated or culturally adapted measure are an adequate reflection of the performance of the items of the original version of the measure
Criterion validity	The degree to which the scores of a measure are an adequate reflection of a "gold standard"
Responsiveness	The ability of a measure to detect change over time in the construct to be measured

In particular, the content validity of the measure development studies was independently rated by two reviewers (GG and GC) as sufficient (+), insufficient (−), or indeterminate (?) according to 10 established criteria: five on relevance, one on comprehensiveness, and four on comprehensibility (Terwee et al., 2018). For each measure, an overall sufficient (+), insufficient (−), or inconsistent (±) rating was determined for relevance, comprehensiveness, and comprehensibility considering the COSMIN assessments and reviewers' ratings (Terwee et al., 2018). If the ratings per study are inconsistent, the authors tried to explain the inconsistency by assigning overall ratings for relevant

subgroups of studies with similar results. If no explanation was found, the overall ratings were marked as inconsistent (±) and the quality of evidence was downgraded for inconsistency. Any discrepancies were resolved between reviewers. A detailed description of this combined rating and its qualifiers, as well as the consensus-based criteria for evaluating other measurement properties, can be found in the respective COSMIN user manuals (Mokkink et al., 2018; Terwee et al., 2018) (available at: www.cosmi n.nl).

Moreover, to analyze and evaluate construct validity, it is necessary to take into account two different parameters: convergent validity (comparison with other outcome measurement instruments) and discriminative or known-groups validity (comparison between subgroups). To evaluate the first parameter (convergent validity), it is necessary to formulate a series of hypotheses about expected relationships between measures of FI and other well defined measurement instruments against which to evaluate the results of studies. These hypotheses were created starting from the experience of the authors and the scientific literature. In particular, the correlations were expected to be: ≥ 0.50 with instruments measuring similar constructs (e.g. other scales, already validated, that measured the construct of involvement towards food); < 0.50 and ≥ 0.30 with instruments measuring related but dissimilar constructs (e.g., food enjoyment); and < 0.30 with instruments measuring unrelated constructs (e.g. information seeking, looking at advertising).

To assess the second parameter (discriminative or known-groups validity), formulating a hypothesis regarding expected differences among groups (e.g. base on age, sex, education) in advance is necessary. Based on our experience and on the scientific literature, we have formulated some hypotheses highlighting how, generally, older, more highly educated women are those who show a higher level of FI. This is just a general guideline, as males' or females' involvement level could change according to the type of food/beverages considered in the involvement measure. An overall rating of sufficient (+), insufficient (−), or inconsistent (±) was determined by counting the number of results that met the hypotheses across all studies using the same measure (Prinsen et al., 2018). In particular, if ≥ 75% of the studies were in accordance or not in accordance with the hypothesis, the overall rating was marked as sufficient or insufficient (+ or −), whereas if < 75% of studies displayed the same scoring, the overall rating became inconsistent (±). If the ratings are inconsistent we have: (1) found explanations and summarized per subgroup; (2) not summarized the results and not grade d the evidence; or (3) base d the conclusion on the majority of consistent

results, and downgraded for inconsistency (±). Which strategy is most appropriate depends on the specific situation.

APPENDIX B

In order to evaluate the quality of evidence as high, moderate, low, or very low, we followed the guidelines in the table below that was taken from Mokkink et al. (2018, p. 33)

Table B1. Quality of evidence evaluation criteria

Quality of evidence	Definition	Lower if
High	We are very confident that the true measurement property lies close to that of the estimate* of the measurement property	Risk of bias -1 Serious -2 Very serious -3 Extremely serious
Moderate	We are moderately confident in the measurement property estimate: the true measurement property is likely to be close to the estimate of the measurement property, but there is a possibility that it is substantially different	Inconsistency -1 Serious -2 Very serious
Low	Our confidence in the measurement property estimate is limited: the true measurement property may be substantially different from the estimate of the measurement property	Imprecision -1 total n=50-100 -2 total n<50
Very low	We have very little confidence in the measurement property estimate: the true measurement property is likely to be substantially different from the estimate of the measurement property	Indirectness -1 Serious -2 Very serious

In particular, risk of bias can occur if the quality of the study is doubtful or inadequate, as assessed with the COSMIN Risk of Bias checklist, or if only one study of adequate quality is available. Inconsistency could occur if when summarizing the results of different studies, they are in contrast to each other. The imprecision refers to the total sample included in the studies: if the sample size of the summarized studies is below 100 the quality of evidence was downgraded

one level, and two levels when the total sample was below 50. Finally, indirectness can occur if studies are included in the review that were (partly) performed in another population or another context of use than the population or context of use of interest in the systematic review. This occurs when a review considers studies that do not have the same population defined by the review itself. For evaluating content validity, only three of these factors were applicable, namely risk of bias, inconsistency, and indirectness

SUPPLEMENTARY MATERIAL A

Summary of findings tables

Structural validity	Summary o pooled results	Overall rating	Quality of evidence
Food involvement scale (FIS) (Bell & Marshall, 2003)	Two factors: Set and Disposal and Preparation and Eating	Indeterminate	Moderate (one adequate and one doubtful)
Personal Involvement Inventory (Pll) (Zaichkowsky, 1985)	Unidimensional	Indeterminate	Moderate (two doubtful studies)
Consumer Involvement Profile (CIP) (Laurent & Kapferer, 1985)	four factors: Imporisk (the perceived importance of the product and the perceived importance of the consequences of a mispurchase); The subjective probability of a mispurchase (risk probability); The hedonic value of the product class (pleasure); The perceived sign value of the product class (sign)	Indeterminate	Moderate (one adequate study)
Short Personal Involvement Inventory (PII) (Zaichkowsky, 1994)	Unidimensional	Insufficient	high (one very good study and one doubtful with indeterminate results not considered)
Revised Product Involvement Inventory (RPII) (McQuarrie & Munson, 1992)	Unidimensional (translated in Finnish) Two factors (translated in English)	Indeterminate; indeterminate	Moderate (one adequate study); moderate (one adequate study)
Purchase-Decision Involvement Scale (PDI) (Mittal, 1989)	Unidimensional	Indeterminate	Moderate (one doubtful study and one very good)
General Food Health Involvement (Hansen, Boye & Thomsen, 2010)	Unidimensional	Insufficient	High (two very good quality studies)
Food Involvement (For Food Enthusiasts) Scale (Robinson & Getz, 2016)	four factors: Food-Related Identity; Food Quality; Social Bonding; and Food Consciousness.	Indeterminate	Moderate (One adequate study)
Food Involvement Inventory (FII) (Lee, Lee, Chung, Kim & Kim, 2019)	four factors: Behavioural cooking; affective; behavioural purchase; cognitive	Insufficient	High (one very good quality studies)
Consumer Involvement In Product (Traylor & Joseph, 1984)	Unidimensional	Indeterminate	Low (one doubtful study)
Wine Involvement Scale (WIS) (Graham, Mark & Donald, 2007)	three factors: expertise; Enjoyment and symbolic centrality	Indeterminate	Low (one doubtful study)
Nutrition Involvement (Chandon & Wansink, 2007)	Unidimensional	Indeterminate	Low (one doubtful study)
the Food Involvement and Focus Questionnaire, FIFQ (De Boer, Hoogland & Boersema, 2007)	Unidimensional	Indeterminate	Moderate (one adequate study)
Wine Product Involvement (Hirche & Bruwer, 2014)	Three factors: knowledge, pleasure and activity.	Insufficient	High (one very good study)

Internal Consistency	Summary o pooled results	Overall rating	Quality of evidence
Food Involvement Scale (FIS) (Bell And Marshall, 2003)	Cronbach's alpha= Set and Disposal (S&D) Involvement subscale 0.47-0.85; Preparation and Eating subscales 0.44-0.80	Indeterminate	Moderate (Three studies that tested the 2-factorial structure were taken into account: Two very good studies and one doubtful)
Personal Involvement Inventory (Pll) (Zaichkowsky, 1985)	Cronbach's alpha=0.742-0.97	Indeterminate	High (four very good quality studies)
Consumer Involvement Profile (CIP) (Laurent & Kapferer, 1985)	Cronbach's alpha= imporisk 0,87, sign 0 .90, pleasure 0.88, and risk probability 0.72.	Indeterminate	High (one very good quality studies)
Short Personal Involvement Inventory (PII) (Zaichkowsky, 1994)	Cronbach's alpha= 0.84-0.93	Indeterminate	Moderate (Three studies that tested the unidimensional structure were taken into account: one doubtful study, Two very good studies)
Revised Personal Involvement Inventory (RPII) (Mcquarrie & Munson, 1992)	English version (with two factors): Cronbach's alpha from 0.80-0.95	Indeterminate	Low (one doubtful study)
	Finnish version with one factor: 0.92-0.95	Indeterminate	High (one very good)
Purchase-Decision Involvement Scale (PDI) (Mittal, 1989)	Cronbach's alpha = 0.783-0.875	Indeterminate	High (two very good studies)
General Food Health Involvement (Hansen, Boye & Thomsen, 2010)	Cronbach's alpha = 0.91	Indeterminate	Moderate (two study doubtful)
Food Involvement (For Food Enthusiasts) Scale (Robinson & Getz, 2016)	Cronbach's alpha= Food-Related Identity 0.900; Food Quality 0.677: Social Bonding 0.726; Food Consciousness 0.673	Indeterminate	High (one very good quality studies)
Food Involvement Inventory (FII) (Lee, Lee, Chung, Kim & Kim, 2019)	Cronbach's alpha= 0.94	Indeterminate	Very low (one study Inadequate)
Fine Wine Involvement Scale (Roe & Bruwer, 2017)	Cronbach's alpha= 0.846	Indeterminate	Low (one study doubtful)
Wine Product Involvement (Bruwer & Huang, 2012)	Cronbach's alpha=: Interest (four items) 0.757 Behaviour (five items) 0.731 Ritual (four items) 0.818 Pleasure (six items) 0.822 Risk (five items) 0.583 Overall wine involvement (24 items) 0.922	Indeterminate	High (one very good quality studies)
Ego Involvement (Crandall, 1987)	Cronbach's alpha=.61	Indeterminate	Low (one study doubtful)
Consumer Involvement In Product (Traylor & Joseph, 1984)	Cronbach's alpha=.92	Indeterminate	Low (one doubtful study)
Wine Involvement Scale (WIS) (Graham, Mark & Donald, 2007)	Cronbach's alpha= 90 for expertise to .79 for symbolic centrality and 0,86 enjoyment	Indeterminate	High (one very good quality study)
Wine Involvement Profile Scale (WIP) (Bruwer, Burrows, Chaumont, Li & Saliba, 2014)	Cronbach's alpha= 0.884	Indeterminate	Low (one study doubtful)

Nutrition Involvement (Chandon & Wansink, 2007)	Cronbach's alpha= 0.83;	Indeterminate	Moderate (one very good study and one doubtful study)
The Food Involvement And Focus Questionnaire, FIFQ (De Boer, Hoogland & Boersema, 2007)	Cronbach's alpha=0 .75	Indeterminate	High (one very good study)
Wine Product Involvement (Hirche & Bruwer, 2014)	Cronbach's alpha= 0 .852	Indeterminate	Very low (one inadequate study)
Gastronomy Involvement (Quee-Ling, Karim , Awang & Abu Bakar, 2017)	Cronbach's alpha= 0 .84	Indeterminate	Low (one study doubtful)

Cross Cultural Validity/Measurement Invariance	**Summary o pooled results**	**Overall rating**	**Quality of evidence**
Personal Involvement Inventory (Pll) (Zaichkowsky, 1985)	Between three food categories: red wine, instant coffee and breakfast cereal and Between two group: who had recently visited a quick-service or upscale restaurant to consume organic menu	Sufficient	Low (two inadequate studies)
Consumer Involvement Profile (CIP) (Laurent & Kapferer, 1985)	The 4-Factors structure was confirmed for these products: Oil, yogurt, chocolate and champagne	Indeterminate	Very low (one study inadequate)
Short Personal Involvement Inventory (PII) (Zaichkowsky, 1994)	Between 2 adv: Pepsi and ice cream and between two products: ice cream and soft drinks	insufficient	Very low (one inadequate study)
Revised Personal Involvement Inventory (RPII) (Mcquarrie & Munson, 1992)	The Factor structure (unidimensional) was confirmed for these products: frankfurter, yogurt, margarine and chocolate range of variance from 59% to 71% (factor loadings from 0.65 to 0.89) eigne>1 (+) (translated in Finnish)	Sufficient (for some products: frankfurter, yogurt, margarine and chocolate);	Very low (one study inadequate);
	In the analyses of the 15 individual product ratings, the RPII showed only a single factor in four cases, and two factors in the remaining eleven cases (not specify the type of food products) (translated in English)	insufficient (only a single factor in four cases, and two factors in the remaining eleven cases (not specify the type of food products)	Very low (one study inadequate)
Purchase-Decision Involvement Scale (PDI) (Mittal, 1989)	Between three/situational products wine (special occasion) wine (regular occasion) beer	Sufficient	Very low (one inadequate study)
General Food Health Involvement (Hansen, Boye & Thomsen, 2010)	Measurement invariance: for age (low 44 y.o and high 44 y.o) for education (no high school and high school or	Sufficient	Low (one study doubtful)

	more). The values of CFI were in all models above 0.90 and the values of RMSEA were in all cases between 0.06-0.07. The values of Akaike's Information Criterion (AIC) were 625.57 (model with no subgroups), 540.00 (model with age divided into subgroups) and 525.20 (model with education divided into subgroups), respectively, indicating that the split into sub-samples is meaningful		
Ego Involvement (Crandall, 1987)	Man and female	Insufficient	Very low (one inadequate study)
Consumer Involvement In Product (Traylor & Joseph, 1984)	The Factor structure (unidimensional) was confirmed for these products: Cola, potato chips, Dry cereal, milk	Sufficient	Very low (one study inadequate)

Reliability	**Summary o pooled results**	**Overall rating**	**Quality of evidence**
Food Involvement Scale (FIS) (Bell & Marshall, 2003)	test-retest: (2-week: r = 0:85 and 0.75, for the 'Set and Disposal' and the 'Preparation and Eating' subscales, respectively, and p <0.01 for both; and 8-week: r = 0.79 and 0.78, respectively, and p <0.02 for both)	sufficient	Very low (one study doubtful and -1 for imprecision)
Personal Involvement Inventory (Pll) (Zaichkowsky, 1985)	breakfast cereals, r = 0.88; and red wine, r = 0.93.	sufficient	Low (one study doubtful and one inadequate with indeterminate results not considered)
Short Personal Involvement Inventory (PII) (Zaichkowsky, 1994)	Soft drinks= r=0.84; ice cream r=0.73	sufficient	Low (one study doubtful)
Purchase-Decision Involvement Scale (PDI) (Mittal, 1989)	Test-retest (2-week) (r = 0.79, p < 0.01)	sufficient	Very low (one study doubtful and -1 downgrade for the imprecision)

Hypotheses Testing	**Summary o pooled results**	**Overall rating**	**Quality of evidence**
Food Involvement Scale (FIS) (Bell & Marshall, 2003)	43 out of 54hypotheses confirmed	Sufficient	Moderate (two studies doubtful, 2 very good, two adequate)
Personal Involvement Inventory (Pll) (Zaichkowsky, 1985)	18 out of 23 hypotheses confirmed	Sufficient	moderate (two very good quality studies and one adequate quality and one study doubtful quality and on inadequate)
Consumer Involvement Profile (CIP) (Laurent & Kapferer, 1985)	2 out of 16 hypotheses confirmed	Insufficient	Low (one study doubtful)
Short Personal Involvement Inventory (PII) (Zaichkowsky, 1994)	2 out of 3 hypotheses confirmed	Sufficient	High (take into account only the very good study)

Revised Personal Involvement Inventory (RPII) (Mcquarrie & Munson, 1992)	3 out 7 hypotheses confirmed (English version)	Inconsistent	
	0 out 2 hypotheses confirmed (Finnish version)	Insufficient	Moderate (one adequate study)
Purchase-Decision Involvement Scale (PDI) (Mittal, 1989)	12 out 17 hypotheses confirmed	Sufficient	Moderate (one very good quality study and three adequate and one doubtful)
General Food Health Involvement (Hansen, Boye & Thomsen, 2010)	7 out 10 hypotheses confirmed	inconsistent	
Food Involvement (For Food Enthusiasts) Scale (Robinson & Getz, 2016)	2 out 3 hypotheses confirmed	Sufficient	Low (one study doubtful)
Fine Wine Involvement Scale (Roe & Bruwer, 2017)	2 out 5 hypotheses confirmed	inconsistent	
Wine Product Involvement (Bruwer & Huang, 2012)	4 out 4 hypotheses confirmed	Sufficient	Low (one study doubtful)
Ego Involvement (Crandall, 1987)	0 out 1 hypothesis confirmed	Insufficient	Low (one study doubtful)
Consumer Involvement In Product (Traylor & Joseph, 1984)	1 out 2 hypotheses confirmed	Inconsistent	
Wine Involvement Profile Scale (WIP) (Bruwer, Burrows, Chaumont, Li & Saliba, 2014)	2 out 3 hypotheses confirmed	Sufficient	Low (one study doubtful)
Nutrition Involvement (Chandon & Wansink, 2007)	7 out 8 hypotheses confirmed	Sufficient	Moderate (two adequate study and one doubtful)
The Food Involvement And Focus Questionnaire, FIFQ (De Boer, Hoogland & Boersema, 2007)	17 out 17 hypotheses confirmed	Sufficient	Moderate (one adequate study)
Wine Product Involvement (Hirche & Bruwer, 2014)	2 out 7 hypotheses confirmed	Insufficient	High (one very good study)

EFA: Exploratory Factor Analysis
CFA: Confirmatory Factor Analysis
FA: Factor Analysis
y.o.=years old

SUPPLEMENTARY MATERIAL B

General characteristics of included studies

Scale	Structural validity			Internal consistency			Cross cultural validity/Measurement invariance			Reliability			Hypothesis testing		
Food involvement scale (FIS)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)
Bell & Marshall (2003)	894	D	2 Factors: Factor analysis was conducted (EFA) CFA Results NR (?)	894	D	'Set and Disposal' (S&D) Involvement subscale item-total correlation= 0.85; Preparation and Eating' (P&E) Item-total correlation = 0.80 (?)	NR	NR	NR	2 groups: 28 and 30 subjects	D	test-retest: (2-week: r = 0:85 and 0.75, for the 'Set and Disposal' and the 'Preparation and Eating' subscales, respectively, and p=0.01 for both; and 8-week: r = 0.79 and 0.78, respectively, and p=0.02 for both). (+)	73	D	Between groups: Results in line with 9 hypothesis (9+) Results not in line with 4 hypothesis (4-)
Marshall & Bell (2004)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	109	V	Between measures: Results not in line with 2 hypothesis (-2) Results in line with 2 hypothesis (2+)
													2068	D	Between groups: Results in line with 6 hypothesis (6+) Results not in line with 1 hypothesis (1-)

Lawrence et al. (2011)	NR	NR	NR	378	I	Cronbach's alpha 0.63 (?)	NR	NR	NR	NR	NR	NR	378	A V	Between groups: Results in line with 2 hypothesis (2+) Results not in line with 1 hypothesis (-1) Between measures: Results in line with 14 hypothesis (14+)
Somers, Worsley & McNaughton (2014)	1041	A	2 Factors: principal component analysis (with varimax rotation) EFA was conducted CFA results NR (?)	1014	V	'Set and Disposal' (S&D) Involvement subscale Cronbach's alpha = 0.471; Preparation and Eating' (P&E) Involvement Subscale Cronbach's alpha = 0.757 (?)	NR	NR	NR	NR	NR	NR	1014	A	Between groups: Results not in line with 2 hypothesis (2-) Results in line with 7 hypothesis (7+) Between measures: Results not in line with 1 hypothesis (1-) Results in line with 4 hypothesis (4+)
Piqueras-Fiszman & Jaeger (2015)	NR	NR	NR	487	I	Cronbach's alpha 0.80 (?)	NR	NR	NR	NR	NR	NR	NR	NR	NR
Cliceri et al. (2018)	NR	NR	NR	125	V	Set and Disposal resulted in a Cronbach's alpha of 0.64 and Preparation and Eating resulted in a Cronbach's alpha of 0.44. (?)	NR	NR	NR	NR	NR	NR	NR	NR	NR

Scale	**Structural validity**			**Internal consistency**			**Cross cultural validity/measurement invariance**			**Reliability**			**Hypothesis testing**		
Personal Involvement Inventory (PII)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)

Zaichkowsky (1985)	Not clear	D	Unidimensional: factor analyzed using varimax rotation EFA was conducted CFA results NR (?)	110	V	The Cronbach's alpha ranged from 0.95 to 0.97 for red wine, cereals and for instant coffee (?)	202	I	Between three food categories: red wine, instant cofee and breakfast cereal: EFA (+)	110	D	breakfast cereals, r = 0.88; and red wine, r = 0.93. (+)	57	D I	between groups: results in line with 1 hypothesis (1+) between measures: results in line with 5 hypothesis (5+)
Lagerkvist, Okello & Karanja (2015)	NR	NR	NR	40	V	Cronbach's alpha 0.907, 0.803 and 0.742 for Treatments 1, 2 and 3, respectively (?)	NR	NR	NR	40	I	Test-retest not value reported (?)	40	A	between groups: results in line with 1 hypothesis (1+)
Lu, & Chi (2018)	387	D	Unidimensional: Factor analysis (EFA) was conducted CFA results NR (?)	387 (group 1=202 and group 2=185)	V	Cronbach's alpha Group 1 =0.973 Group 2= 0.972 (?)	387	I	Between two group: who had recently visited a quick-service or upscale restaurant to consume organic menu items 202 = quick-service segment, 185 = upscale segment EFA (+)	NR	NR	NR	387	V	between measures: results in line with 8 hypothesis (8+) results non in line with 4 hypothesis (4-) between groups: results in line with 2 hypothesis (2+) results non in line with 1 hypothesis o (1-)
Pambo et al. (2018)	NR	NR	NR	432	V	Cronbach's alpha Group 1= 0.977 Group 2= 0.981 Group 3= 0.976 (?)	NR	NR	NR	NR	NR	NR	432	V	between groups: 1 hypothesis in line (+1)

Scale	**Structural validity**			**Internal consistency**			**Cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
Consumer involvement profile (CIP)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)

Laurent and Kapfere (1985)	207	A	4 Factors: Factor analysis (EFA) with oblique factor analysis that reproduce 66% of the total variance was conducted. The eigenvalue (>1) and Factor loadings>0,40 CFA results NR (?)	207	V	4 factors: Imporisk; risk probability; pleasure; sign. Cronbach's alpha : imporisk 0.87, sign 0.90, pleasure 0.88, and risk probability 0.72 (?)	207	I	Oil, yogurt, chocolate and champagne (?)	NR	NR	NR	207	D	between measures: 2 hypothesis in line (+2) 14 hypothesis non in line (-14)

Scale	**Structural validity**			**Internal consistency**			**Cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
Short Personal Involvement Inventory	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)
Zaichkowsky (1994)	106	D	factor analysis varimax rotation (EFA) was conducted confirmed a two factors structure CFA results NR (?)	106	D	Cronbach's alpha range 0.87-0.95 (?)	52	I	Ice cream and Pepsi cola (Advertisement) and Ice cream and soft drinks (products) EFA (-)	106	D	Test-retest Advertisement soft drinks r=0,84, ice cream r=0,73 (+)	NR	NR	NR
Foxall, Leek, & Maddock (1998)	NR	NR	NR	311	V	Cronbach's alpha 0.84 (?)	NR	NR	NR	NR	NR	NR	305	D	Between measures: 1 hypothesis IN LINE (+1)
Taylor et al. (2018)	235	V	Unidimensional: (CFI) of .95, a root mean square error of approximation (RMSEA) of .078, and a $\chi 2$/df of 2.43 (-)	235	V	Cronbach's alpha 0.93. (?)	NR	NR	NR	NR	NR	NR	235	V	Between measure: 2 hypothesis IN LINE (+2) 1 hypothesis not in line (-1)

Foxall & Bhate (1993)	NR	NR	NR	151	D	Cronbach's alpha 0.84 (?)	NR	NR	NR	NR	NR	NR	151	D	Between groups: 1 hypothesis in line (+1) 1 hypothesis not in line (-1)

Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
Revised product involvement inventory (RPII)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)
McQuarrie & Munson, (1992).	249	A	2 factors: Principal components factor analyses with varimax rotation (EFA) as conducted CFA result NR (?)	249	D	Cronbach's alpha from 0.80 to 0.95 (?)	249	I	In the analyses of the 15 individual product ratings, the scale showed only a single factor in four cases, and two factors in the remaining eleven cases EFA (-)	NR	NR	NR	249	D	between measures: 4 hypothesis not in line (-4) 3 hypothesis in line (+3)
Kähkönen & Tuorila (1999)	253	A	Unidimensional: principal components method with varimax rotation: variance from 59% to 71% (factor loadings from 0.65 to 0.89) eigenvalue>1 CFA results NR (?)	253	V	Cronbach's alpha from 0.92 to 0.95 (?)	253	I	The Factor structure was confirmed for these products: frankfurter, yogurt, margarine and chocolate EFA(+)	NR	NR	NR	253	A	between measures: 2 hypothesis not in line (-2)

Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
Purchase-Decision Involvement Scale (PDI)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)

Mittal (1989)	228	D	Unidimensional: CFA= (chi-square = 4.74, d.f = 3, p = 0.19) (?)	NR	NR	NR	60	I	Between wine (special occasion) wine (regular occasion) beer: EFA (+)	85	D	r = 0.79, p < 0.01. (+)	90	A	between measure: 1 hypothesis non in line (-1) 1 hypothesis in line (+1) between groups: 1 hypothesis in line (+1)
Choi (2019)	NR	NR	NR	282	V	Cronbach's alpha 0.875 (?)	NR	NR	NR	NR	NR	NR	282	V	between measure: 2 hypothesis in line (+2) 1 hypothesis non in line (-1)
														A	between groups: 4 hypothesis in line (+4)
Kamrath,, Bidkar, , & Bröring. (2019)	350	V	Unidimensional: factor analysis (EFA) was conducted CFA results NR (?)	350	V	Cronbach's alpha 0.783 (?)	NR	NR	NR	NR	NR	NR	350	A	between measures: 2 hypothesis in line (+2) 2 hypothesis non in line (-2)
														D	between groups: 2 hypothesis in line (+2) 1 hypothesis non in line (-1)

Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/measurement invariance**			**Reliability**			**Hypothesis testing**		
General food health involvement	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)
Hansen, Boye & Thomsen (2010)	504	V	Unidimensional: RMSEA=0.08; CFI= 0.94; chi-square=198.07 df =68) (-)	504	D	Cronbach's alpha 0.91 (?)	504 for age (low 44 y.o and high 44 y.o) for education (no high school and high school or more)	D	CFI were in all models above 0.90 and the values of RMSEA were in all cases between 0.06-0.07. The values of Akaike's Information Criterion (AIC) were 625.57 (model with no subgroups), 540.00	NR	NR	NR	504	A	between measures: 2 hypothesis in line (+2) 2 hypothesis non in line (-2) between groups: 1 hypothesis in line (+1)

									(model with age divided into subgroups) and 525.20 (model with education divided into subgroups), (+)							
Hansen, Thomsen & Beckmann (2013)	504	V	Unidimensional CFI = 0.94 RMSEA=0.07 (-)	504	D	Cronbach's alpha 0.91 (?)	NR	NR	NR	NR	NR	NR	504	A	between measures: 4 hypothesis in line (+4) 1 hypothesis non in line (-1)
Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
food involvement (for food enthusiasts) scale	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)
Robinson & Getz (2016)	541	A	4 factors: a principal axis factor analysis with Varimax rotation was performed, eigenvalues greater than 1 (5.821; 1.977; 1.749; 1.323), and together accounting for 49% of the variance, with >0,40 factor loadings CFA results NR (?)	541	V	Cronbach's alphas: Food-Related Identity 0.900; Food Quality 0.677: Social Bonding 0.726; Food Consciousness 0.673	NR	NR	NR	NR	NR	NR	649	D	between groups: 2 hypothesis in line (+2) 1 hypothesis non in line (-1)
Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
Food involvement inventory (FII)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)
Lee et al. (2019)	516	V	4 factors: The factor analysis (EFA) was performed using the method of principal component	516	I	Cronbach's alpha 0.94,(?)	NR	NR	NR	NR	NR	NR	NR	NR	NR

			extraction and varimax rotation CFA results: χ2=1027.019 χ2/df= 3.818 p value=<0,000 RMSEA=0.074 (-)												
Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
fine wine involvement scale	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)
Roe & Bruwer (2017)	NR	NR	NR	213	D	Cronbach's alpha 0.846 (?)	NR	NR	NR	NR	NR	NR	213	D	between groups: 2 hypothesis in line (+) 1 hypothesis non in line (-1) between measures: 2 hypothesis non in line (-2)
Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
Wine product involvement	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result(rating)
Bruwer & Huang (2012)	NR	NR	NR	101	V	Cronbach's alpha: Interest 0.757 Behaviour 0.731 Ritual 0.818 Pleasure 0.822 Risk 0.583 Overall 0.922 (?)	NR	NR	NR	NR	NR	NR	101	D	between groups: 4 hypothesis in line (+4)
Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
Ego involvement	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result (rating)	n	meth qual	Result (rating)	n	meth qual	Result(rating)
Crandall (1987)	NR	NR	NR	104	D	Cronbach's alpha: 0.61 (?)	104	I	man and woman EFA (-)	NR	NR	NR	104	D	between groups: 1 hypothesis non in line (-1)
Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		

Consumer involvement in product	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result (rating)	n	meth qual	Result (rating)	n	meth qual	Result(rating)
Traylor & Joseph (1984)	280	D	Unidimensional: factor analysis (EFA) was performed used on Cola, potato chips, Dry cereal, milk variance from 67,3% to 100% CFA results NR (?)	280	D	Cronbach's alpha: 0.92 (?)	280	I	Cola, potato chips, Dry cereal, milk EFA (+)	NR	NR	NR	280	I D	between measures: 1 hypothesis non in line (-1) between groups: 1 hypothesis in line (+1)
Scale	**Structural validity**			**Internal consistency**			**Cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
Wine Involvement Scale (WIS)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result (rating)	n	meth qual	Result (rating)	n	meth qual	Result(rating)
Brown, Havitz & Getz (2007)	161	D	3 factors: factor analysis (EFA) was performed using the principal components analysis; eigenvalues: 8.52; 1.40; 1.1 and total variance 64,91%; factor loadings>0,40 CFA results NR (?)	161	V	Cronbach's alpha:. expertise 0.90; symbolic centrality 0.79; enjoyment 0.86 (?)	NR	NR	NR	NR	NR	NR	NR	NR	NR
Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
Wine involvement profile scale (WIP)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result (rating)	n	meth qual	Result (rating)	n	meth qual	Result(rating)
Bruwer et al. (2014).	NR	NR	NR	102	D	Cronbach's alpha 0.884 (?)	NR	NR	NR	NR	NR	NR	102	D	between groups: 2 hypothesis in line (+2) 1 hypothesis non in line (-1)
Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		

Nutrition involvement	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result (rating)	n	meth qual	Result (rating)	n	meth qual	Result(rating)
Chandon & Wansink (2007)	147	D	Unidimensional: factor analysis (EFA) was performed using the principal components analysis CFA results NR(?)	147	D	Cronbach's alpha 0.83 (?)	NR	NR	NR	NR	NR	NR	147	A D	between measures: 1 hypothesis in line (+1) between groups: 3 hypothesis in line (+3)
Van Esch & Gadsby (2019)	NR	NR	NR	348	V	Cronbach's alpha > 0.7 (?)	NR	NR	NR	NR	NR	NR	348	A	between measures: 3 hypothesis in line (+3) 1 hypothesis non in line (-1)

Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
the Food Involvement and Focus Questionnaire (FIFQ)	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result (rating)	n	meth qual	Result (rating)	n	meth qual	Result(rating)
De Boer, Hoogland, & Boersema (2007)	1530	A	Unidimensional: factor analysis (EFA) was performed using principal component analyses (Varimax); factor loadings> 0,40 and eigenvalue>1 variance explained 29% CFA results NR (?)	1530	V	Cronbach's alpha 0.75 (?)	NR	NR	NR	NR	NR	NR	1530	A	between groups: 3 hypothesis in line (+3) between measures: 14 hypothesis in line (+14)

De Boer & Schösler (2016)	742	D	Factor analysis was conducted (EFA) CFA results NR (?)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
wine product involvement	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result (rating)	n	meth qual	Result (rating)	n	meth qual	Result(rating)
Hirche & Bruwer, (2014)	117	V	3 subscales: knowledge; pleasure; activity. Exploratory factor analysis and CFA: chi square=75.250; df =32; chi square/df =2.352; GFI=0.906; NFI= 0.869; CFI= 0.918; RMSEA =0.096; (-)	117	I	Cronbach's alpha 0.852 (?)	NR	NR	NR	NR	NR	NR	106	V	between groups: 5hypothesis non in line (5-) 2hypothesis in line (+2)

Scale	**Structural validity**			**Internal consistency**			**cross cultural validity/Measurement invariance**			**Reliability**			**Hypothesis testing**		
Gastronomy involvement	n	meth qual	Result(rating)	n	meth qual	Result(rating)	n	meth qual	Result (rating)	n	meth qual	Result (rating)	n	meth qual	Result(rating)
Quee-Ling et al. (2017)	NR	NR	NR	160	D	Cronbach's alpha 0.84 (?)	NR	NR	NR	NR	NR	NR	NR	NR	NR

Note:
V = very good; A = adequate; D = doubtful; I = inadequate; NR = not reported; meth qual= methodological quality; EFA= Exploratory Factor Analysis; CFA= Confirmatory Factor Analysis; (+) sufficient; (–) insufficient; (?) indeterminate

SUPPLEMENTARY MATERIAL C

Quality of the Measure development studies

Measure development studies	Study design							Cognitive interview (CI) study[2]				TOTAL Measure development studies
	General design requirements					Concept elicitation [1]	Total measure design	General design requirements	Comprehensibility	Comprehensiveness	Total CI study	
	Clear construct	Clear origin of construct	Clear target population for which the measure was developed	Clear context of use	Measure developed in sample representing the target population			CI study performed in sample representing the target population				
Food Involvement Scale (FIS) (Bell & Marshall, 2003)	V	V	V	V	A	D	D	A	D	D	D	D
Personal Involvement Inventory (PII) (Zaichkowsky, 1985)	V	V	V	V	A	V	A	A	I	D	I	I
Consumer Involvement Profile (CIP) (Laurent & Kapferer, 1985)	V	V	V	V	A	D	D	V	D	D	D	D
Short Personal Involvement Inventory (PII) (Zaichkowsky, 1994)	V	V	V	V	A	V	A	A	I	D	I	I
A Revised Product Involvement Inventory (RPII) (Mcquarrie & Munson, 1992)	V	V	V	V	V	D	D				I	I
Purchase-Decision Involvement Scale (PDI) (Mittal, 1989)	V	V	V	V	V	D	D	V	I	D	I	I
General Food Health Involvement (Hansen et al., 2010)	V	V	V	D	V	I	I	I	D	D	I	I
Food Involvement (For Food Enthusiasts) Scale (Robinson & Getz, 2016)	V	V	V	V	V	D	D	V	D	D	D	D
Food Involvement Inventory (FII) (Lee et al., 2019)	V	V	V	V	V	A	A	V	D	D	D	D
Fine Wine Involvement Scale (Roe & Bruwer, 2017)	V	D	V	V	D	I	I	D	I	D	I	I

Wine Product Involvement (Bruwer & Huang, 2012)	V	V	V	V	D	D	D	D	I	D	I	I
Ego Involvement (Crandall, 1987)	V	D	V	V	D	D	D				I	I
Consumer Involvement In Product (Traylor & Joseph, 1984)	V	V	V	V	V	A	A	V	D	D	D	D
Wine Involvement Scale (WIS) (Brown et al., 2007)	V	V	V	V	V	D	D				I	I
Wine Involvement Profile Scale (WIP) (Bruwer et al., 2014)	V	V	V	V	V	D	D	D	D	D	D	D
Nutrition Involvement (Chandon & Wansink, 2007)	I	D	V	V	V	D	I				I	I
The Food Involvement And Focus Questionnaire (FIFQ) (de Boer et al., 2007)	V	V	V	D	V	D	D	D	D	D	D	D
Wine Product Involvement (Hirche & Bruwer, 2014))	V	V	V	V	V	D	D				I	I
Gastronomy Involvement (Quee-Ling et al., 2017)	V	V	V	V	V	D	D	V	D	D	D	D

V = very good

A = adequate

D = doubtful

I = inadequate

NA = not applicable

[1] When the study was not developed in a sample representing the target population, the concept elicitation was not further rated

[2] Empty cells indicate that a CI study (or part of it) was not performed

SUPPLEMENTARY MATERIAL D

Construct validity of measures of involvement in food

Outcome measure	Reference	Sample size	Hypotheses testing with other instruments		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Food involvement	Bell & Marshall (2003)	894			
			SUBGROUP COMPARISON		
			Gender: male and female	Men reported lower levels of involvement towards food than women (Mean, SD) Male: 47.97 (10.64) Female: 50.60 (12.12)	Y
			Age: 19-26; 27-45; 46-64	being older was associated with higher levels of total FIS (Mean, SD) 19-26: 47.69 (10.31); 27-45: 51.25 (12.68); 46-64: 50.74 (11.87)	Y
			High/low involvement and ability to discriminate, both in intensity of perceived taste characteristics and hedonics, between food samples that differed in levels of the sweetness, sourness, saltiness and fat perception.	For peanuts, the significant interactions suggest that, compared with individuals with lower FIS scores, individuals with higher FIS scores perceived greater differences between the samples for saltiness F=3.73 (2,68) p-value=0.043*, flavor 3.30 (2,68) p-value 0.048* strength and liking f=5.19 (2,68) p-value 0.021*.	3Y
				For grape juice, the significant interaction suggests that, compared with individuals with lower FIS scores, individuals with higher FIS scores perceived greater differences between the samples' flavor strength F=3.35 (2,68) p-value 0.046*; but these differences were not evident for perceived sweetness F=1.92 (2,68) ns or liking F=2.26 (2,68) ns.	1Y 2N
				For cranberry juice, the significant interaction suggests that, compared with individuals with lower FIS scores, individuals with higher FIS scores exhibited greater differences between samples for liking F= 3.53 (2,68) p-value 0.041*; these differences were not evident for perceived sourness F= 0.65 (2,68) ns or flavor strength F=0.40 (2,68) p-value ns.	1Y 2N
				For milk, the significant interactions suggest that, compared with individuals with lower FIS scores, individuals with higher FIS scores	2Y

				perceived greater differences between the samples for perceived flavor strength F= 3.99 (2,68) p-value 0.036* and liking f= 3.85 (2,68) p-value 0.038*.	
	Marshall & Bell (2004)	study1=109 study 2=2068	**SIMILAR CONSTRUCT**		
			Personal Involvement Inventory (PII) (Zaichkowsky, 1985)	r=0.397	N
			RELATED/DISSMILAR CONSTRUCT		
			the Food Neophobia Scale (FNS) (Pliner & Hobden, 1992),	r=-0.273	N
			VARSEEK Scale (VS) (Van Trijp et al., 1993)	r=0.460	Y
			Perceived Dietary Variety (PDV) (Bell & Meiselman, 1995).	r=0.288	Y
			SUBGROUP COMPARISONS		
			High/low involvement and healthier food choices	a greater percentage those with low involvement acquire calories through fat (35.3% vs 31.7%), have a higher daily average of kilocalories consumed (3175 vs 3089), take fewer calories from fruit (10, 4% vs 14.0%), they consume fewer calories from vegetables (7.3% vs 9.8%) and more calories from snacks (19.7% vs 14.6%). moreover, those with low involvement skip meals more during the week (2 vs 1.2) but no difference exists for meals made outside the home (9.2% vs 8.8%)	6 Y 1 N
	Lawrence et al. (2011)	378			
			NOT RELATED CONSTRUCT	*women of lower educational attainment*	
			Food insecurity	r=-0,08	Y
			General perceived control	r=0,18	Y
			general self efficacy	r=0,24 b=0,22	Y
			prudent diet score	r=0,25 b=0,03	Y
			Outcome expectation of healty diet (Negative)	r=-0,06	Y
			Outcome expectation of healty diet (POSITIVE)	r=0,16	Y
			Social support for healty diet	R=0,1	Y
				women of high educational attainment	
			Food insecurity	r=-0,1	Y
			General perceived control	r=0,21	Y
			general self efficacy	r=0,18 b=0,18	Y
			prudent diet score	r=0,19 b=0,03	Y
			Outcome expectation of healty diet (Negative)	r=-0,15	Y

			Outcome expectation of healty diet (POSITIVE)	r=0,16	Y
			Social support for healty diet	r=0,13	Y
			SUBGROUP COMPARISONS		
			level of education: high and low	Women of lower educational attainment tended to have lower general food involvement (42,1% vs 44,4%) p<0,001,	Y
			Age	b=0,14 and b=0,04 for two groups	1 N 1Y
	Somers, Worsley & McNaughton (2014)	1041	**SUBGROUP COMPARISONS**		
			Gender	male (mean): 57,10 and female (mean): 62,37 p<0,001	Y
			Age (55-64 and >65)	55-64 (mean)=60,39 and >65 (mean)= 59,74 p=0,408	N
			Education: high/low	low (mean)=59,25 and high (mean)=60,79 p=0,01	Y
			Perceived health status	Excellent (mean) 62 and good (mean)=60,93 p=0,002	Y
			Usual meal preparer	Yes (mean)=62,17 No (mean)=52,78 p<0,001	Y
			Time spent in meal preparation	NO (mean)=53,83; <15 minutes (mean) 57,45; >15 minutes (mean) 62,58 p<0,001	Y
				Regression model (b coefficients)	
			Gender	b=0,09 (p=<.0001)	Y
			Education	b=0 (p=0.94)	N
			Marital status	b=0,14 (p=<.0001)	Y
			RELATED/DISSMILAR CONSTRUCT		
			food mavenism	b=0,36 (p=<.0001)	Y
			pleasure motivation	b=0,31 (p=<.0001)	Y
			food enjoyment	~~b=~~0,12 (p=<.0001)	N
			NOT RELATED CONSTRUCT		
			Self-rated health	b=0,01(p=0,59)	Y
			Health motivation	b=0,17 (p=<.0001)	Y
	Cliceri et al. (2018)	125	no hypothesis		
	Piqueras-Fiszman & Jaeger (2015)	Study 1=487 study 2=399	no hypothesis		
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**

Personal Involvement Inventory (Pll)	Zaichkowsky (1985)	Study 1= 152 study 2= 123 study 3=45		*For instant coffee*	
			RELATED/DISSMILAR CONSTRUCT		
			Research of information about a product	r=0,3	Y
			Interest in reading the consumer reports about product	r=0,47	Y
			comparing product characteristics among brands	r=0,52	Y
			Great deal of differences among brand of this product	r=0,63	Y
			Best brand of this product	r=0,68	Y
			SUBGROUP COMPARISONS		
			Different high or low-involvement products: instant coffee (low involvement product)	Mean for involvement: instant coffee (mean, SD)=66,40; Color television=97, 30 and laundry detergent 103, 23	Y
	Lagerkvist, Okello & Karanja (2015)	40	**SUBGROUP COMPARISONS**		
			three groups with different treatments before and after (3x2)	The level of involvement increased significantly (p<0.001) within all treatments, but particularly in Treatment 3, where cameras were provided (t=22.4; 20.8 and 29.7 for Treatments 1, 2 and 3, respectively).	Y
	Lu et al. (2018)	387	**SUBGROUP COMPARISONS**	*Regression (b coefficients)*	
			Perceived value of food at restaurant (4 values--> dining-centered excitement, social attention and escapism, tangible value, intangible value) for two different groups: those who prefer quick-service restaurants and those who prefer upscale restaurants	Results from the quick-service restaurant diners suggested Involvement as an antecedent of perceived value (all four values) (dining-centered excitement: b = 0.516, p < 0.001; social attention and escapism: b = 0.244, p < 0.001; tangible value: b = 0.265, p < 0.001; and intangible value: b = 0.698, p < 0.001) for group 1.	Y
				Results from the upscale restaurant diners suggested that involvement had a primary influence on perceived intangible value (b = 0.720, p < 0.001) and dining-centered excitement (b = 0.528, p < 0.001), followed by social attention and escapism (b = 0.408, p < 0.001) and tangible value (b = 0.399, p < 0.001) for group 2	Y
				The effects of involvement on dining-centered excitement and intangible value did not appear to	N

				vary between segments; however, involvement was a stronger predictor of social attention and tangible value at upscale (vs quick-service) restaurants.	
			SIMILAR CONSTRUCT	*quick service group*	
			Hedonic: excitement	r=0,513 (quick service) b=0,516	Y
				upscale group	
			Hedonic: excitement	r= 0,519 (upscale) b=0,528	Y
			RELATED/DISSMILAR CONSTRUCT	*quick service group*	
			hedonic: social	r=0,243 (quick service) b =0,244	N
			Utilitarian: tangible	r=0,286 (quick service) b =0,265	N
			Utilitarian: intangible	r=0,706 (quick service) b =0,698	N
			Satisfaction	r=0,407 (quick service)	Y
			Behavioural intentions	r=0,466 (quick service)	Y
				upscale group	
			hedonic: social	r=0,413 (upscale) b =0,408	Y
			Utilitarian: tangible	r= 0,400 (upscale) b =0,399	Y
			Utilitarian: intangible	r=0,731 (upscale) b =0,720	N
			Satisfaction	r=0,360 (upscale)	Y
			Behavioural intentions	r=0,474 (upscale)	Y
	Pambo et al. (2018)	432	**SUBGROUP COMPARISONS**		
			Three group for different treatments: benefit, Drawbacks and control (general information)	treatment 1 (benefit)= mean=104,97 sd=26,25 and treatment 2 drawbacks 101,22 sd=24,93 control mean=103,69 sd=26,28. The results indicate that product involvement was treatment-specific. In particular, the Drawbacks group registered the lowest mean, and a lower variability. The Control group, on the other hand, had the lowest minimum personal involvement value with a greater variability.	Y
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Laurent and Kapferer (1985)	Consumer Involvement Profile (CIP)	207			
			Factor 1 (riskimpo):		
			RELATED/DISSMILAR CONSTRUCT		
			extensiveness of the choice process	b=0,61	Y
			information seeking.	b=0,27	N
			Interest in articles and TV	b=0,13	N

			programs		
			Looking at advertising	b=0,05	N
			Factor 2 (sign value):		
			RELATED/DISSMILAR CONSTRUCT		
			extensiveness of the choice process	b=0,10	N
			information seeking.	b=0,18	N
			Interest in articles and TV programs	b=0,14	N
			Looking at advertising	b=0,06	N
			Factor 3 (pleasure value):		
			RELATED/DISSMILAR CONSTRUCT		
			extensiveness of the choice process	b=0,00	N
			information seeking.	b=0,15	N
			Interest in articles and TV programs	b=0,28	N
			Looking at advertising	b=0,37	Y
			Factor 4 (risk probability):		
			RELATED/DISSMILAR CONSTRUCT		
			extensiveness of the choice process	b=0,06	N
			information seeking.	b=0,08	N
			Interest in articles and TV programs	b=0,01	N
			Looking at advertising	b= (-)0,04	N
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Zaichkowsky (1994)	Short Personal Involvement Inventory (PII)	study 1=54 study 2=52	No hypothesis		
	Foxall & Bhate (1993)	151	**SUBGROUP COMPARISONS**		
			Innovative/not innovative purchaser	The more involved adaptors are responsible for the highest level of innovative purchasing	Y
			High frequency of healthy food brand purchasing/low frequency of healthy food brand purchasing	High-involved adaptors will be responsible for the greatest frequency of healthy food bran purchasing	N
	Foxall, Leek & Maddock (1998)	311	**NOT RELATED CONSTRUCT**		

			KAI cognitive style	r=-0,04. (p=0,531)	Y
			KAI cognitive style	r=-0,04. (p=0,531)	Y
	Taylor et al. (2018)	235	**RELATED/DISSMILAR CONSTRUCT**		
			Frequency of consumption	r=0,41 b=0,41	Y
			Intrinsic motivation	r=0,41 b=0,31	Y
			Extrinsic motivation	r=0,26 b=0,11	N
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Mittal (1989)	Purchase-Decision Involvement Scale (PDI)	Study 1= 256 study 2=138			
			RELATED/DISSMILAR CONSTRUCT		
			Product importance	r=0.316	Y
			The extent of consumer information	r=0,79	N
			SUBGROUP COMPARISONS		
			The emergency situation (special occasion) of buying wine/ regular buy of wine	The emergency situation (special occasion) of buying wine level of involvement was (mean)= 5,28 regular buy of wine (mean)=4,19 (t = 3.26, p = 0.003).	Y
	Choi (2019)	282	**SUBGROUP COMPARISONS**		
			Dietary supplements User and not user	(mean, sd) 2.96 + 0.993 vs 2.14 + 0.929 (t) 6.827 p<0.001	Y
				(mean, sd) 3.04 + 1.043 vs 2.25 + 0.957 (t) 6.327 p<0.001	Y
				(mean, sd) 2.64 + 1.063 vs 1.96 + 0.803 (t) 5.642 p<0.001	Y
				(mean, sd) 2.58 + 1.113 VS 2.00 + 0.918 (t) 4.467 p<0.001	Y
			RELATED/DISSMILAR CONSTRUCT		
			Future purchase intention of Dietary supplements	r=0,647 b=0.756	N
			NOT RELATED CONSTRUCT		
			Health conditions	r=0,194	Y
			Health Consciousness	r=0,274	Y
	Kamrath, Bidkar, & Bröring (2019)	350	**RELATED/DISSMILAR CONSTRUCT**		
			Purchase of Dietary Supplements	r=0.423 b=0,278	Y
			NOT RELATED		

			CONSTRUCT		
			Health status	r=0.041 b=0,034	Y
			Health motivation	r=0.335 b=0,334	N
			Use of information	r=0.540 b=0,454	N
			SUBGROUP COMPARISONS		
			Age: Older/young	older participants were higher involved than younger participants (p= .024).	Y
			Gender	Compared to male, female consumers scored higher on their involvement decision behavior (p=0,010)	Y
			Education	No differences	N
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Hirche & Bruwer (2014)	Wine Product Involvement	117			
			SUBGROUP COMPARISONS		
			Consumption of alone/"me and someone else/Only someone else	among those with low involvement 30.2% consume wine at home and 17% away from home and among those with high involvement 31.1% consume wine at home and 21.7% away from home. Pearson chi-square 0.286 p-value 0,593	N
			Consumption of wine at home/ outside home	among those with low involvement, 6% consumes wine alone, 76% "me and someone else" and 18% "only someone else". Among those with high involvement 12.5% consume wine alone, 78.6% "me and someone else" and 8.9% "only someone else". Pearson chi-square 2,851 p-value 0,240	N
			Different consumption situation: Without food/ lunch-dinner/ celebration-party/ gift/ other	Pearson chi square 8,436 p-value 0,077	N
			Importance of Product attribute for high and low involved groups: Style (red, white, etc.) Country , Grape variety, Price , Wine brand , Producer brand , Region, Vintage , Promotion (special/sale), Label/package design Award/medal , Expert rating Description on shelf , Description on back label , Alcohol level , Closure (cork, screw, etc.) , Technical comments on back label Hotelling's trace	F=0.892 p-value=0.347 F=2.634 p-value=0.108 F=17.334 p-value=0.000 F=0.187 p-value=0.666 F=0.757 p-value=0.386 F=4.609 p-value=0.034 F=5.430 p-value=0.022 F=4.132 p-value=0.045 F=0.691 p-value=0.408 F=2.948 p-value=0.089 F=4.003 p-value=0.048 F=0.870 p-value= 0.353 F=0.513 p-value=0.475 F=2.583 p-value=0.111 F=0.952 p-value=0.332	2 Y 2 N

				F=2.532 p-value=0.115	
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
McQuarrie & Munson, (1992)	Revised Product Involvement Inventory (RPII)	249			
			RELATED/DISSMILAR CONSTRUCT		
			Attitude (total scale)	r=0,76	N
			Attitude (importance factor)	r=0,74	N
			Attitude (interest factor)	r=0,64	N
			search for information about Breakfast cereal (interest)	b=0,38	Y
			search for information about Breakfast cereal (importance)	b=0,37	Y
			search for information about instant coffee (interest)	b=0,30	Y
			search for information about instant coffee (importance)	b=0,25	N
	Kähkönen & Tuorila (1999)	253	**RELATED/DISSMILAR CONSTRUCT**		
			Pleasantness	From r=0,35 to 0,70	N
			Buying probability	From r=0,45-0,68	N
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Hansen, Boye & Thomsen (2010)	General Food Health Involvement	504			
			RELATED/DISSMILAR CONSTRUCT		
			Product-specific food helath information seeking	b=-0,134	N
			Product-specific food helath competency	b=0,234	Y
			General food health competency	b=0.614	N
			SIMILAR CONSTRUCT		
			Product specific food health involvement	b=0,553	Y
			SUBGROUP COMPARISONS		
			Gender	Women had a higher level of general food health involvement than men (standardized coefficient of 0.232, p-value ,	Y

				0.001). The mean of general food health involvement was for women 5.60, whereas the mean for men was 4.95.	
	Hansen, Thomsen & Beckmann (2013)	504	**RELATED/DISSMILAR CONSTRUCT**		
			Product-specific food helath information seeking	r=0,44 b=0,434	Y
			Product-specific health information complexity	r=0,30 B=0,316	Y
			General food health competency	r=0,64 b=0,634	N
			NOT RELATED CONSTRUCT		
			Post-purchase health-related dissonance	r=0,28	Y
			Usability of product-specific health information	r=0,10	Y
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Robinson & Getz (2016)	Food Involvement (For Food Enthusiasts) Scale	541			
			SUBGROUP COMPARISONS		
			Non enthusiastic and foodies	All the 4 dimensions have greater mean for the foodies that the non-enthusiastic group: Mean (SD) Food-related identity: 5.00 (1.34); 4.54 (1.17) Food quality: 4.01 (1.16); 3.69 (0.77) Social bonding: 4.77 (1.11); 4.69 (0.95) Food consciousness: 5.40 (0.95); 5.13 (1.01)	Y
			Age (old/young)	Older are more involvement than young subject	Y
			Gender	gender is not a determinant in the construction of the four involvement dimensions.	N
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Lee et al. (2019)	food involvement inventory (FII)	516	No hypothesis		

Outcome measure	Reference	Sample size	Hypotheses testing with other instruments		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Roe & Bruwer, (2017)	fine wine involvement scale	213			
			SUBGROUP COMPARISONS		
			the purchase of fine wine (those who purchse fine wine/those who not purchse fine wine)	consumers with a high level of wine product involvement are more likely to select a fine wine for purchase than consumers with low involvement	Y
			consumers' consumption occasion brand choice	There were no significant effects	N
			Age (45 years old and over/<44 years old)	Those who have more than 44 years old have a higher level of involvement than youngers	Y
			RELATED/DISSMILAR CONSTRUCT		
			monthly personal wine consumption	b=0,235	N
			Household consumption of wine	b=0,247	N
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Bruwer & Huang (2012)	Wine Product Involvement	101			
			SUBGROUP COMPARISONS		
			BYOB (bring-your-own-bottle) those who are more prone to BYOB and those who are not prone to BYOB	those who are more active in BYOB have a higher involvement (37% of them did in the last month the BYOB) than those who are less active in BYOB (just the 23% of them did in the last month the BYOB)	Y
			Reasons to be engaged in BYOB (Functional, social, time, financial)	High-involved wine consumers have a significantly higher mean in terms of functional reasons (4,567 VS 4,023) while low-involved wine consumers have significantly higher means in terms of social (4,212 vs 3,020) and time reason (4,377 vs 3,942)	Y
			Attitude toward pay corkage fees (high/low)	The results indicate that high-involved wine consumers are willing to pay a higher corkage fee than low-involved wine consumers.	Y
			importance of the availability of BYOB at the restaurant (high/low)	The result shows the mean for high-involved wine consumers was 6.02, which is significantly higher than that recorded for low-involved wine consumers at 5.27	Y

Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Crandall (1987)	Ego Involvement	104			
			SUBGROUP COMPARISONS		
			gender (male female)	the men's mean of ego involvement was 3,20 and female's mean 3,63 and the difference was not significant	N
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Traylor& Joseph (1984)	Consumer Involvement In Product	280			
			RELATED/DISSMILAR CONSTRUCT		
			purchase frequency	r = - .24	N
			SUBGROUP COMPARISONS		
			three categories of brand selectivity (not at all, somewhat, and very selective)	Those with greater brand selectivity also have higher levels of involvement	Y
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Brown, Havitz & Getz (2007)	Wine Involvement Scale (WIS)	161	No hypothesis		
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Bruwer et al. (2014)	Wine Involvement Profile Scale (WIP)	102			
			SUBGROUP COMPARISONS		
			Gender	males are more highly involved consumers in an independent high-end wine retail store than females	Y
			Importance of price	There is no difference of involvement between who place less o more importance to price of wine	N
			Brand committed (low/high)	Those who are less brand committed are higher involved	Y
Outcome	**Reference**	**Sample**	**Hypotheses testing with other instruments**		

measure		size			
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Chandon & Wansink (2007)	Nutrition Involvement	147			
			RELATED/DISSMILAR CONSTRUCT		
			BMI	(r = –.23, p < .01)	Y
			SUBGROUP COMPARISONS		
			choice of meals (low/high calories)	Those who chose meals contained fewer calories (MI = 577 calories) are higher nutrition-involved than participants who chose meals contained higher calories (MI = 958 calories; F(1, 138) = 42.9, p < .001).	Y
			Estimation of calories of meal (accurate estimator/not accurate estimator)	Those who are good estimator ((PDEV = –2.8%)) are higher nutrition-involved than participants who are less accurate in the prediction of calories of meals (PDEV = –31.4%; F(1, 138) = 17.5, p < .001).	Y
			Number of calories assumed (high/low)	Those who assumed more calories (MI = 958 calories) are lower nutrition-involved than participants who assumed less calories (MI = 577 calories)	Y
	Van Esch & Gadsby (2019)	348	**NOT RELATED CONSTRUCT**		
			Sports drink consumption	r=0.128	Y
			Perceived taste	r=0.153	Y
			Familiarity with the brand	r=0,371 b=0,56	N
			Clear colour	r=0.121	Y
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
De Boer, Hoogland & Boersema, (2007)	The Food Involvement and Focus Questionnaire, FIFQ	1530			
			NOT RELATED CONSTRUCT		
			Security	r=(-)0,01	Y
			Conformity	r=(-)0.18 b= (-)0.20	Y
			Tradition	r=(-)0.20 b= (-)0.20	Y
			Benevolence	r=0,03	Y
			Universalism	r=0.17 b=0,12	Y
			Self-direction	r=0.16 b=0,03	Y
			Stimulation	r=0.12 b=0,08	Y

			Hedonism	r=0.01 b=0,08	Y
			Achievement	r=0.03 b=(-)0,05	Y
			Power	r=(-)0.04 b=(-)0,05	Y
			Animal friendly	b=0,27	Y
			Picky about meat	b=(-)0,01	Y
			Buys free-range meat	b=0,26	Y
			Low-high on meat	b=0,06	Y
			SUBGROUP COMPARISONS		
			gender	b=0,13 Food involvement was somewhat higher among women	Y
			Age (young/old)	b=0,14 involvement increased with age	Y
			meals together (yes/no)	b=0,10 involvement increased eating in the company of others	Y
	De Boer & Schösler (2016)	742	No hypothesis		
Outcome measure	**Reference**	**Sample size**	**Hypotheses testing with other instruments**		
			Construct (measure)/subgroup comparison	**Correlation**	**Hypothesis Met (Y/N)**
Quee-Ling et al. (2017)	Gastronomy involvement	868	No hypothesis		

Y= yes; N=no; b=Beta; r=correlation; =Measures development studies

CHAPTER TWO

"Food is more than just a source of nutrients": a qualitative phenomenological study on Food Involvement

ABSTRACT

The role of food in people's life has changed dramatically in recent years. In particular, it is becoming more symbolic and linked to subjective values. For this reason, recent scientific research has delved into the construct of Food Involvement. However, to the best of our knowledge, there are no empirical studies aimed at exploring this construct deepening the symbolic value assumed by it. Accordingly, the current study aims to qualitatively explore the personal meanings that consumers attribute to Food Involvement and to detect the psychological domains that characterize this lived experience. The study included a purposive sample of adults selected according to three different prototypical profiles until reaching data saturation: mothers, cooks or athletes, all with medium or high levels of Food Involvement. Fourteen in-depth phenomenological interviews were conducted and analyzed according to the principles of Interpretative Phenomenological Analysis (IPA). Results showed that Food Involvement is characterized by a deep relationship between the consumer and food that allows satisfying one's ambitious transformative project that involves the self, the other or both actors. This symbolic role played by Food Involvement was recognized by both those with medium or high involvement. However, the orientations in one's transformative process of mothers, athletes and cooks is different. In particular, the transformative project of mothers is oriented towards the other, that of cooks towards the self and athletes' project towards the self and others. This study gives a scientific contribution to the literature about Food Involvement to create effective measurement scales that assess the symbolic role that Food Involvement has in people's lives.

1. INTRODUCTION

The role of food in people's life has deeply changed during the last decades. In particular, the change of society, and more precisely the transition from the industrial society to the so-called post-industrial one, has partly removed food from its nutritional function, becoming more symbolic and linked to meanings and values strongly connected to the inner world of people (Lindeman & Sirelius, 2001; Rozin, 2005). Indeed, although eating is a physiological necessity, studies revealed that food has different roles in people's lives (Bell & Marshall, 2003; Brunsø et al., 2021). Food has

become a social agent used by people to establish social connections (Costa et al., 2019). Consequently, food choices are now considered an important component of people's identity and self-image (Dyett et al., 2013; Fox & Ward, 2008). Certain food trends and specific diet regimens followed by consumers are clear examples of that. Recent research carried out on vegan women (Costa et al., 2019) showed that for them the vegan diet is more than that. Indeed, this vegan lifestyle allowed them to follow a healthier lifestyle, to have more meaningful social relationships, a stronger sense of control and agency and a connection to the vegan sub-culture. Another example can be found considering "green" consumers (Gilal et al., 2020). Research showed that a variable that strongly influences this type of consumption is the need to show ones' social status and to belong to a certain group of consumers (Kushwah et al., 2019). The subjective relevance given to food also plays a key role in the purchase of organic products and in the definition of this type of consumer (Castellini et al., 2020; Chen, 2007; Teng & Lu, 2016).

Given the symbolic value that food is acquiring in recent years and its scientific relevance in predicting some food consumption, many studies on consumers are trying to understand and measure the role that food assumes in people's lives, investigating its deeper meanings from the consumer perspective (Robinson & Getz, 2016; Verbeke & Vackier, 2004). A personal and emotional variable widely used in consumer behaviour research to assess the role of food in people's lives is the construct of Food Involvement (Robinson & Getz, 2016; Verbeke & Vackier, 2004). This construct is generally defined as the individual's level of perceived importance, interest, attachment and arousal towards a product (Laurent & Kapferer, 1985; McQuarrie & Munson, 1992). Food Involvement is defined (Bell & Marshall, 2003) as a level of interest that people give to food and it is a stable personality trait that changes between individuals. This construct was revised and expanded by Lee et al. (2019) who have defined it as an attitude towards food, composed of cognitive, emotional and behavioural factors. The construct of Food Involvement and its measurement scales have been used in various studies concerning food consumption, showing that it can explain and predict some healthy and responsible consumption choices, demonstrating how the subjective value given to food is closely related to consumption choices (Jezewska-Zychowicz et al., 2020; Kushwah et al., 2019; Lazaroiu et al., 2019; Scalvedi et al., 2018; Van Loo et al., 2017). However, to the best of our knowledge, the definitions of Food Involvement seem to lack in taking into account the symbolic and psychological aspects related to the emotional relationship between consumers and food, leaving an important area of Food Involvement unexplored (Castellini & Graffigna, 2022). The absence of empirical research that deepens the meaning given to food from a symbolic and psychological perspective has recently been confirmed

by a systematic review of the literature (Castellini & Graffigna, 2022). This study argues that we are still a long way from understanding what it means to be involved in food from the subjective perspective of consumers and, consequently, from creating measurement scales that effectively capture this subjective dimension, by encouraging the conduction of qualitative studies that delve into the more symbolic and psychological aspects related to Food Involvement.
According to these premises, our study seeks to fill this knowledge gap by understanding the subjective experience of individuals involved in food consumption. In more detail, this study aimed to address two main research questions: (1) what does it mean to be involved in food? (2) what are the main psychological domains involved in this experiential process?

2 MATERIALS AND METHODS

2.1 Participants and recruitment

Purposeful and consecutive sampling was used to increase the likelihood of including participants who were able to provide meaningful and according to the requirements of Interpretative Phenomenological Analysis (IPA) (Smith, 2004). Interpretative phenomenological analysis (IPA; Smith, 1996) focuses on personal meaning and sense-making processes related to a specific experience people live (Smith et al., 2009). This process is also described as a double hermeneutic or dual interpretation process and consists of a process in which researchers interpret how people try to make sense of certain experiences (Smith & Osborn, 2008). This assumes that subjects may not be able to express everything they experience, and therefore it is important to go beyond the verbatim and interpret the information given by participants (Harper, 2011). This approach is in line with our research questions as we expect people to provide us with novel insights into their experience with food as they are medium or high involved in it but, at the same time, we understand that it is difficult to describe the deep meaning of their experience with food so we cannot observe all processes directly. In particular, the inclusion criteria used to select the participants were: persons over 18 years old and belonged to three different categories: mothers, cooks or athletes with medium or high levels of Food Involvement (average levels of Food Involvement greater than 5 on a scale from 1 to 7, measured using the validated scale of Food Involvement (Bell & Marshall, 2003). The first selection of subjects was based on three prototypical categories of persons (i.e. mothers, cooks or athletes) that were selected as prototypical because of their lifestyles it is assumed that they may have many opportunities and occasions to be in contact with, handle and prepare food, and so that they may have an intensive experience with respect to being involved in food.

Specifically, mothers were chosen because they are, especially in Italy, primarily responsible for grocery shopping and cooking, athletes because they are very careful about food choice to have adequate sports performance, and finally, cooks were chosen because given the nature of their work they handle and cook food every day. This first selection is detailed in Table 1. After identifying the people who, from this first selection phase, could potentially have the characteristics in line with the inclusion criteria, they were sent an invitation by email to take part in this research. In this email was explained the research's aims and was asked them to fill out a short screening questionnaire about their socio-demographic characteristics and their level of Food Involvement (Bell & Marshall, 2003) in order to select only subjects with high-medium level of Food Involvement (second selection phase). This scale was chosen as even if these prototypical subjects, due to their lifestyles, have many opportunities to be in contact with, handle and prepare food they are not necessarily involved in a positive way in food. Therefore, to avoid this bias all subjects were assessed using the Food Involvement scale (Bell & Marshall, 2003), widely used in the literature, especially in research on consumers in the food sector.

Finally, subjects belonging to one of the three prototypical categories (i.e., mothers, athletes and cooks) with high or medium levels of Food Involvement were selected and contacted by the researchers to set dates and times of the interview. All individuals who agreed to be interviewed signed the informed consent and agreed to the recording. This study has been performed in accordance with the Declaration of Helsinki and has been approved by an independent ethics commission of the Department of Psychology at Università Cattolica del Sacro Cuore in Milan (CERPS_IRB#90-21).

Table 1. Features of prototypical categories of subjects

Category	**Inclusion criteria**	**Justification for inclusion**
Mothers	Adult women (>18 years old) who have children who are not yet independent in managing their own meals (1-15 years old)	Mothers were chosen because especially in Italy, they are those who deal with the management of shopping and cooking.
Athletes	Adult people (>18 years old) who regularly participate in a sporting activity/discipline individually or in team.	Athletes were chosen as they often have to take care and have a special attention to nutrition and food to achieve their sporting goals

Cooks	Adult people (>18 years old) who work as professional chefs or teachers in hotel schools	Cooks were chosen because given their profession, it is assumed that they devote a lot of time to food and its preparation

2.2 Data collection

In-depth phenomenological interviews were conducted (according to the IPA method) to investigate the personal meanings that people involved in food associate to their nutritional experience and to figure out which are the main psychological domains that characterize this experience of involvement. Interviewing and data collection continued to data saturation, namely until the existing themes were consistently repeated, and no new themes emerged from the data (Francis et al., 2010). In this study, to establish the point of data saturation and consequently the optimal sample size, the main themes that emerged were coded and noted by the two authors in parallel as the interviews were conducted. The researchers stopped the recruitment of subjects when no further code was identified through the last interview, reaching data saturation (Franklin et al., 2019). All the interviews were carried out virtually using the digital platform Teams (https://www.microsoft.com/en-us/microsoft-teams/group-chat-software).

The interview guide focused on the relationship that people have with food by exploring some moments and episodes in which consumers felt particularly involved in it. The use of these questions investigating the moments of involvement in food were added in the interview since having chosen people who have opportunities and occasions, for family, professional and personal interest reasons to handle and prepare food they are able to give examples of moments in which they felt particularly involved in it. Moreover, the use of questions that investigate lived experiences, in this case concerning the relation with food, are essential in qualitative research, especially in-depth phenomenological interviews, because subjects may not be able to directly express the meaning and symbols related to an object, and therefore it is important to ask them some examples of lived experience from which the researcher can extract symbols and meanings. Some examples of questions asked in the interviews are shown in Table 2. When an interesting topic, related to the research's aims, occurred during the interview, other questions were asked to explore the respondent's meaning-making process in more detail. When participants did not go into much detail, probes were used such as "Can you tell me more about this?". The audio files of the interviews were transcribed verbatim.

Table 2. Interviews' guide

Main topics	Questions
Representations and subjective images related to food and food consumption	1.How would you describe your relationship with food? how did it evolve? Are you satisfied today? 2. If I asked you to use an image to represent what food means to you, which image would you use? why? 3. If I asked you to use three adjectives to define yourself as a consumer, which ones would you use? why? 4. Very often people say that "we are what we eat" do you agree? why?
Experience of involvement in food	5.Are there any particular moments/occasions in which you have invested time and energy in preparing a dish? Can you describe these moments? 6. Think about the last time you felt particularly involved in food/nutrition. Can you tell me about the episode? 7. Are there any categories of food on which you feel particularly involved in choosing? Which are? why?

2.3 Data analysis

According to Interpretative Phenomenological Analysis (IPA method), the analysis of the interviews was based on the six steps explained by Smith et al. (2009):

1. The first step consisted of reading and re-reading the transcriptions of the interviews.
2. The second step involved initial coding on the right side of the text, which consisted of both descriptive notes and more interpretative notes.
3. Step three involved the recognition of emergent themes, which were written on the left side of the text.
4. Step four consisted of looking for links across emergent themes by developing 'superordinate themes'
5. In step five, the researcher considered the next interview and repeated the process until the existing themes were consistently repeated and no new themes emerged from the data (data saturation).
6. Finally, step six consisted of searching for patterns across interviews.

Both authors conducted the analysis in parallel, creating moments of confrontation and exchange to clarify some doubts and identify emergent themes and superordinate themes and to establish the point of data saturation and consequently the optimal sample size.

Moreover, specific strategies are employed in this research to ensure validity and reliability of interpretations and consequently of results (Barbour, 2001; Mays & Pope, 2000; Pope, 2000). First of all, triangulation was used to increase the validity of this study (Farmer et al., 2006). This entailed the use of multiple Investigators (in this case the authors of this paper) to promote cross-comparison and validation of results. Indeed, if different investigators examine the notes and other documents and arrive at similar conclusions this increases both validity and reliability of results (Harris et al., 2009). Furthermore, as previously explained, to ensure reliability of our interpretations and results both authors analyzed the data. The authors are trained analyzers of qualitative research and they interpreted the data independently, assigning codes to the various emerged themes, and after that they compared their results and interpretations to control the consistency of results.

3 RESULTS

3.1 Sample description

A total of 14 subjects participated in this research of which 5 men and 9 women from 24 to 58 years old. Key socio-demographic characteristics, levels of Food Involvement, and belonging to the three categories (moms, cooks, and athletes) were detailed in Table 3. To protect the privacy of the subjects, participants' names have been replaced with pseudonyms. Interviews length ranged from 30 to 60 min; interviews were digitally recorded, for a total of about 9 hours of recordings.

Table 3. Participant information involved in the study

Pseudonym	**gender**	**age**	**Food Involvement average**	**Food Involvement level (From 4 to 5 medium level; >5 high level)**	**Category**
Luigi	Male	28	5.67	High	Athlete
Serena	Female	30	5.00	Medium	Mother
Debora	Female	36	5.33	High	Mother

Massimo	Male	55	4.92	Medium	Athlete
Irene	Female	29	6.08	High	Athlete
Giulia	Female	25	4.25	Medium	Athlete
Lorenzo	Male	24	5.00	Medium	Athlete
Cinzia	Female	34	5.67	High	Mother
Valentina	Female	35	5.42	High	Mother
Arianna	Female	28	5.25	High	Athlete
Teresa	Female	35	5.33	High	Mother
Alberto	Male	58	5.25	High	Cook
Michele	Male	25	5.67	High	Cook
Susanna	Female	31	5.42	High	Cook

3.2 Themes emerged from interviews

The results allowed to deepen the psychological domains related to Food Involvement and the role ascribed to it. We synthesized our finding in Fig. 1. In detail, the study shows that Food Involvement is characterized by a relationship between the consumer and food which passes through some actions (e.g. cooking, handling food, getting information, etc.) and that involves different typologies of foods (e.g. fruit, vegetables, meat). However, this food-consumer relationship acquires a peculiar meaning for people: subjectively, feeling involved in food enables a psychologically transformative experience that involves the self, the others or both actors. In the following paragraphs, we will deepen all the aspects illustrated in Figure 1. Moreover, in line with Newberry(2011), Table 4 includes the prevalence of themes according to each participant.

Table 4. Prevalence of themes: Number of Quotes per themes and participant.

	Food Involvement as a self-transformative process	**Food Involvement as a transformative process of self-to-others**	**Food Involvement as the other-oriented transformative process**
Participants			
Luigi	2	7	0
Serena	4	0	6
Debora	2	1	6
Massimo	2	1	3
Irene	4	3	0
Giulia	2	1	4
Lorenzo	3	7	1
Cinzia	2	0	3
Valentina	3	0	5

Arianna	2	0	3
Teresa	2	2	4
Alberto	6	2	3
Michele	6	0	5
Susanna	5	0	2

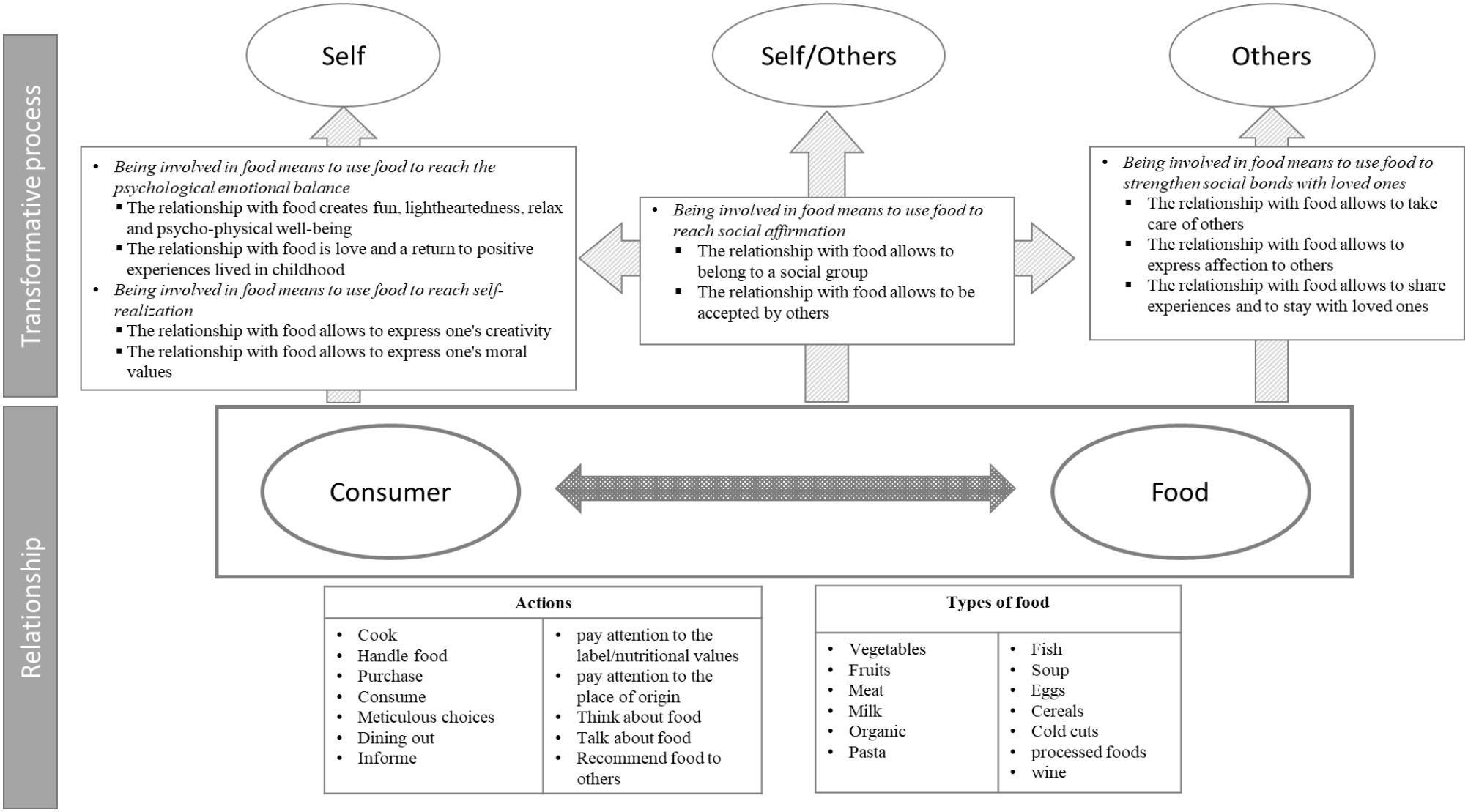

Fig.1 Representation and domains of Food Involvement

3.2.1 Food Involvement as a relationship between consumer and food: actions and types of food

The results show that Food Involvement is characterized by a relationship between the consumer and food which is acted out through certain actions. The most frequently mentioned actions are: 1) *making meticulous food choices*, which implies paying attention to the characteristics of food (e.g., labels, place of origin and nutritional values); 2) *cooking and handling food*; 3) *getting informed about the healthiness of food*, knowing its nutritional value and the impact it can have in terms of social, environmental and economic sustainability.

Regarding *meticulous consumption choices*, some participants reported:

> *" I am particularly involved in food when I am choosing what to buy. For example, I pay attention to the labels of origin and nutritional values. [...] today a lot of people for example take pork they put it in the cart... without seeing how much it weighs.... when it expires, when it is packaged... instead I look at it while a lot of people underestimate it."*
>
> Michele, male, cook, high involvement

> *"I declare myself involved in food because I read labels, the nutritional values of foods... First of all, I read the ingredients, and then I read the nutritional values."*
>
> Giulia, female, athlete, medium involvement

Another action that emerged several times in the interviews is related to *handling food and cooking it*. Some participants reported:

> *"Well, when I cook, I feel a very strong bond with food. I mean, I always have this involvement with cooking that stimulates me "*
>
> Michele, male, cook, high involvement

> *"I like cooking is a moment of serenity and relationship with food. Even handling food allows me to create relationship with food "*
>
> Susanna, female, cook, high involvement

Finally, concerning *being informed*, some declare:

«If a person is involved in food, at least he must know it and must inform himself. I feel that my connection with food also passes through information, for example, I inquired about the so-called "trans fats" and I avoid them because they are bad for my health "

Massimo, male, athlete, medium involvement

"Before buying food, I get information and this determines an involvement in food. For example, I know macronutrients and micronutrients and what can be good or bad for my health "

Irene, female, athlete, high involvement

"Conscious consumption allows you to say you have a special relationship with food. We should all feel this need to inform ourselves and understand that respect for the environment, animals and our country's economy comes through conscious and informed food choices."

Alberto, male, cook, high involvement

Furthermore, the involvement in food inevitably passes through the use of food. In the interviews, there are no foods that involve the consumer more than others. Indeed, different products are mentioned (e.g., meat, fruit, vegetables, processed foods, etc.). Some of them cited by the participants:

"The foods to which I pay more attention and therefore I feel more involved are fruit and vegetables"

Lorenzo, male, athlete, medium involvement

"I pay a lot of attention to the choice of meat"

Susanna, female, cook, high involvement

"Well, by consuming milk very often, I choose it carefully and this involves me and my time."

Giulia, female, athlete, medium involvement

"Absolutely eggs, it's a product that involves me in the sense that I pay attention to my choice"

Michele, male, cook, high involvement

3.2.2 Food Involvement as a self-transformative process

However, being involved in food does not only imply a relationship between the consumer and food - that inevitably passes through some actions and types of foods - but it allows the realization of a psychological transformative experience that can involve the self, the others or both. In this section, we focus on the self-transformative experience that can relate to Food Involvement. In particular, the Food Involvement experience may lead to reaching an emotional psychological balance and may allow individuals to express their identity and to satisfy their need for self-realization. Regarding the achievement of *psychological-emotional balance,* many people reported that to be involved in food is a way to have fun and relax that has a positive impact on body and mood, generating psychophysical well-being. Some participants reported:

"The involvement in food determines a physical pleasure of its own [...] I relax because I drink a glass of wine and I listen to good music and my head empties."

Susanna, female, cook, high involvement

"Getting carried away with food and what I can do with it makes me feel "light" I leave the world outside the door and achieve a state of well-being that aligns me with myself "

Cinzia, female, mother, high involvement

In addition, the achievement of one's emotional balance also passes through the consumption of foods that were consumed during childhood, bringing back to happy moments lived. Some of the participants said:

"There are some products I'm fond of like sheep ricotta that my mom always made me eat as a child because I was intolerant (to lactose) Now I'm not intolerant but if at the supermarket I see those products I still buy them because they bring me back as a child, I'm fond of them"

Michele, male, cook, high involvement

"Often to feel better in the evening I have a cup of milk because this experience brings me back to what I used to do with my parents and I feel happy. These foods linked to my childhood generate positive emotions in me and make me feel better, I have a bond with them "

Susanna, female, cook, high involvement

The second aspect that characterizes Food Involvement as a self-transformative process is the fact that food and food choices are closely linked to individuals' identity as those are strongly correlated with their personal goals and moral values. It is possible to say that *being involved in food means using food to reach self-realization.* It is about the individual aspiration to be what you want even expressing your creativity. In particular, some participants reported:

" Having a strong connection to food allows me to express my creativity of realizing who I am. I also do floral arrangements with vegetables and fruit."
Irene, female, athlete, high involvement

"Having a connection to food also means affirming one's thoughts, beliefs and values by helping the narrative of whom we want to be. Food choices tell who you are"
Susanna, female, cook, high involvement

3.2.3 Food Involvement as a transformative process of self-to-others

Moreover, interviewees described their Food Involvement as a "self-to-others" transformative process. This means that food is seen as a means through which it is possible to affirm oneself only if the other recognizes the individual as he wants to be seen. We can therefore say that one's transformative process is realized when it is recognized by the other. This means that some people strongly involved in food adhere to and emulate some dietary patterns of a target group to become a member, a desire that otherwise could not be realized. In brief, we can say that *being involved in food means using food to reach social affirmation,* as the relationship with food allows one to belong to a social group and to be accepted by others. Some participants said:

"Adolescence is the moment in which one opposes no? the rules of the family and one looks for some rules ... we look for some new spaces and, at that moment, I realize that this choice was... it was dictated by the need to adhere more to a sporty, athletic model that was new to my family. Because nobody in my family was an athlete or had had these experiences. And so, as to say, this has a little bit destabilized the balance... or if you want even the dynamics of my family and I realize that it was a little bit, in retrospect, I really realized that it was my way of saying: look I want to adhere to that group, to that image and so I use nutrition also to bring this diversity of mine."

Teresa, female, mother, high involvement

"I was doing an Erasmus period abroad and no one was paying attention to me. One day, with a lot of effort, I decided to arrive at the office with my tiramisu. they ate the tiramisu and I swear to you that at that moment everything changed, from that moment there I noticed that I was no longer one who came in who went out I was "THE" Italian! look I swear to you, I'm not joking, for real. ... I felt that tiramisu was a turning point because it was a means of saying "guys, I'm here" and everyone turned to look at me. I think that this event was the click that triggered the mechanism and led me to be accepted in the group".

Luigi, male, athlete, high involvement

The models seen on TV or on social media pushed me to change food habits. I used food to become who I am with an enviable physique that others can positively comment.

Lorenzo, male, athlete, medium involvement

3.2.4 Food Involvement as the other-oriented transformative process

Moreover, interviewees described their Food Involvement as a psychological process that is functional to strengthen the bond with others and re-establish positive relationships, especially with loved ones. We can therefore summarize this concept by saying that *being involved in food also means engaging in a process of food transformation to strengthen the social bond with loved ones.* Indeed, many participants described the essence of their Food Involvement such as the experience that enables a sense of "conviviality", "sharing", "being with others" and "taking care of others". A metaphor often used by participants to represent their full experience of Food Involvement is the image of a table around which there are relatives and friends:

"An image that I associate with feeling involved in food is a table with my family around it because for me it represents conviviality, being together, a time of discussion and it is an important moment in the day."

Cinzia, female, mother, high involvement

"The image that I link to being involved in food is the image of a person in the kitchen with the kids around and the husband making dinner. That image represents what food is for me so being together, sharing and taking care of my family."

Valentina, female, mother, high involvement

Therefore, the relationship established with food allows one to stay with others and share one's experiences and opinions and through which it is also possible to solve family arguments or a simple way to say "I love you", putting in place a dynamic of gifts and counter-gifts. Some participants reported:

"Food is sharing and conviviality, for example, being at the table means being in a group having a chat with others, if you are interested in food, you are also interested in what being around a table can give you."
Valentina, female, mother, high involvement

"I felt particularly involved in food that time I used it to settle an argument between my son and husband. I used food to apologize, it was my way of letting them know I was truly sorry and to make it up to them."
Serena, female, mother, medium involvement

"I became particularly interested in food and cooking that time I cooked together with my husband. While I was cooking, I was happy because even if it was tiring, I was doing something together with my husband and for my husband, so the food was a kind of gift I was giving him."
Valentina, female, mother, high involvement

"I like to cook to bring others to love food as much as I do, I want to bring others to have those five minutes of happiness in eating a dish and give them a moment of happiness."
Debora, female, mother, high involvement

3.3 The role of Food Involvement by levels of involvement and by prototypical categories

This study does not find differences in the way of giving meaning and interpreting Food Involvement among those with high or medium involvement. Contrary, this research finds different orientations in one's transformative process among the 3 groups of prototypical subjects involved: mothers, cooks and athletes (Table 5).

Table 5. Prevalence of themes: Number of Quotes and prototypical subjects.

	Food Involvement as a self-transformative process	**Food Involvement as a transformative process of self-to-others**	**Food Involvement as the other-oriented transformative process**
Groups			
Mothers	13	3	24
Athletes	15	19	11
Cooks	17	2	10

In particular, for mothers, being involved in food allows them to carry out their other-oriented transformative project. Some mothers report that they feel involved in food when they cook for their loved ones by dedicating themselves to them.

I felt strongly involved in food that time I cooked for my husband his favorite dish which is braised wild boar. I wanted to have a nice family dinner with my son and husband and make them happy by making their favourite dish.

Serena, female, mother, medium involvement

One episode that I remember in which I invested a lot of time and energy to prepare a dish was for the first birthday of my daughter. I made a cake with sugar paste and I also modelled duck putting it on the cake. It was a special occasion where I invited all the relatives and I wanted to share that moment with them.

Valentina, female, mother, high involvement

The moments when I spend a lot of time preparing food and I feel involved in it are never times in which I cook for myself but usually for my family. A very recent episode that I can tell you is the one in which I cooked the parmigiana […]. Even in this case, I cooked for my whole family without a particular event simply to be together and to let them know that I love them.

Debora, female, mother, high involvement

Regarding cooks, to be involved in food allows them to carry out their self-oriented transformative project. Some cooks say they feel involved in food because through it they can express their passion and dedication for cooking, expressing themselves in their dishes.

I have a special relationship with food because it is through it that I can create the ideas that come into my mind differentiating myself from others and showing my skills and who I am. Food allows me to express myself and my passion.

Alberto, male, cook, high involvement

I enjoy cooking and I am very emotionally invested in my relationship with food. I like to cook because I can practice and try out all the new recipes I have learned and be a cook, this is a source of personal pride.

Michele, male, cook, high involvement

I decided to become a cook and dedicate myself to this passion because that's how I express myself. Each chef has his or her own distinctive characteristic that allows their dish to be recognized as a personal style.

Susanna, female, cook, high involvement

Finally, athletes consider Food Involvement as a means to realize the "self-to-others" transformative process. Some athletes report that they felt involved in food when they used it to adhere to a model that allowed them to fulfil themselves as athletes and, at the same time, be perceived by others as such.

Especially on Instagram, looking at certain models, I had the desire to change my body and see how it could be transformed. I followed these sports food models because I wanted to become part of that world that, I know, sometimes is a little sick but if you want to join them you have to go through nutrition too.

Lorenzo, male, athlete, medium involvement

my desire to change my diet was born in gym. Indeed, attending a group of people who practice karate with a certain eating style, they taught me how to eat. Seeing each other three times a week to train and exchange tips on what to eat this convinced me to change my lifestyle. The group dynamics lead you to get involved from the nutritional point of view, it is part of the process of joining the group.

Luigi, male, athlete, high involvement

4. DISCUSSION

The present exploratory study aimed to investigate the personal meanings that people associate with Food Involvement and to figure out which are the main psychological domains that characterize this experience. The results arising from the fourteen interviews revealed the complex and deep relationship that people involved in food have with it. At a first analysis, involvement in food can be defined as a relationship established between food and the consumer which passes through the implementation of some behaviours involving different products. This finding is confirmed by several previous studies which defined Food Involvement as the individual's level of perceived importance, interest, attachment and arousal towards a product (Laurent & Kapferer, 1985; McQuarrie & Munson, 1992), connecting it to various behaviours such as cooking, seeking information and reading the label (Lee et al., 2019). However, previous studies claimed that Food Involvement is strongly linked to some types of food which are more expensive and associated with a greater risk in choosing (Zaichkowsky, 1985) but, on the contrary, in this research, there do not seem to be foods that more than others determine a high psychological involvement. Actually, Food Involvement seems to be a means through which it is possible to enable a complex psychological transformative process that engages the self and/or the other.

In particular, Food Involvement is experienced by consumers as a self-transformative process that allows the realization of one's self-centered project. The concept of "self-transformative process" in the literature (Harmeling et al., 2015) is defined as a process through which the person deliberately becomes an active agent in the relationship with the object of interest (van Doorn et al., 2010) incorporating the attributes of the object into personal self-expression (Sprott et al., 2009). This relationship allows people to satisfy their self-affirmation and self-esteem needs by becoming what they wish to be, namely, the best version of them self. Placing this theoretical concept within our research on food, we can say that the self-transformative process is a process through which people deliberately becomes an active agent in the relationship with food as they use it as a means to transform them self and their self-concept. This self-transformation takes place incorporating the attributes of food into personal self-expression in order to become what they want to be.

In particular, through involvement in food, it is possible to reach a psychological-emotional balance and express one's own identity by satisfying the need for self-realization. Regarding the achievement of psychological-emotional balance, some participants said that to be involved in food allows them to use it to have fun and relax, aspects that have a positive impact on body and mood, generating psychophysical well-being. On the other hand, others claimed that the achievement of one's emotional balance also passes through the consumption of foods that were consumed during

childhood, bringing back to happy moments lived, generating positive emotions. This is in line with several studies and theories which showed that there is a strong connection between food and one's emotions (Evers et al., 2018; Gutjar et al., 2014; Jiang et al., 2014). Indeed, it is pointed out that food can enhance positive emotions by way of association with situations or contexts (Locher et al., 2005). Food products do not merely represent a means to satiety, but can also signify comfort or reward, eliciting positive feelings. Indeed, the motivation to eat is not simply driven by a desire for nutrients but emotional, and psychological processes play an important role as well (Hamburg et al., 2014). Emotional states affect when people eat, how much they eat, and which food products they choose and consuming food, in turn, affects subsequent emotional states (Macht, 2008). Moreover, participants said that to be involved in food means to use food to satisfy one's needs for self-realization. These results are confirmed by previous studies that identify the consumption of food as the belief that people acquire the characteristics of the food they decide to buy and consume, an aspect that can be explained with the expression "you are what you eat " (Fischler, 2011; Rozin, 2005). In fact, past studies shown that the expressive value of food is much stronger than its utilitarian value, especially for certain types of consumers. For example, consumers who define themselves as "green" buy more organic products since it is through them that they can express their own values related to sustainability and benefit from the recognition of others (Khare & Pandey, 2017). Another category of consumers that has been much studied for their tendency to use food as a means of expression is that one of individuals who consume halal food. They purchase these products to mark their own identity and beliefs strongly linked with their culture and religion (Vanany et al., 2020; Wilkins et al., 2019).

Furthermore, for some participants the transformative process generated by their involvement in food relates both to “the self” and “the other”. This means that food is a way to affirm oneself and realize one's transformative project only if the other recognizes us for how we want to be perceived and allows us to experience a sense of belonging to our reference group. In short, we can say that being involved in food means using food to reach social affirmation. This aspect can be traced back to some previous studies which observed how by sharing the same consumption the same identity can be acquired (Butler & Fitzgerald, 2010). Therefore, the sharing of a similar consumption or food style acquires a symbolic meaning which communicates group membership and recognition, excluding those who do not share the same eating habits (Fischler, 2011).

Finally, the transformative process generated by the involvement in food is also other-oriented. This means that when involvement is experienced, food is used to strengthen and re-establish the connection with others, especially if they are loved ones, putting in place a dynamic of gifts and

counter-gifts. We can therefore summarize this evidence by saying that to be involved in food means to use food to strengthen the social bond with loved ones. These findings are confirmed by recent studies that have analyzed the dimensions and role of commensality. Research carried out by (Giacoman, 2016) showed that commensality can be described as a practice that aims to strengthen cohesion among others, both in symbolizing a sense of belonging and respect for shared norms and in serving as an interactive space. In particular, a paramount role related to eating together is to create bonds through the reciprocity established between people who gather together at the same table (Cappellini & Parsons, 2012; Fischler, 2011; Julier, 2013). Indeed, as pointed out by Mauss (2007) hosts and guests enter into a dynamic of gifts and counter-gifts that lead to the production, strengthening, and reproduction of social ties among the subjects in a meal. The reciprocity generated among the participants in a meal, therefore, refers to the function of defending social bonds because the gift symbolized by the meal is also rewarded through the support of those constituting the group (Sobal, 2000).

However, we do not find differences in the way of giving meaning and interpreting Food Involvement among those with high or medium involvement, probably because the score differences used to select the subjects are not so discriminant to underline differentiations. Contrary, mothers, athletes and cooks associate Food Involvement with different meanings and roles (Table6). Regarding mothers, several studies show how often they use food to compensate for the time taken away from their children for mainly work reasons (Alm & Olsen, 2017; Devine et al., 2009), supporting our results that suggest that for mothers Food Involvement is seen as a way to carry out their transformative project that is mainly oriented to others. Regarding cooks, to be involved in food allows them to carry out their transformative project that is mainly oriented to the self. This can be explained by the fact that being a cook, contrary to other profiles, is a profession that is often driven by a passion for food and it is through it that one can realize his or her professional project which is strictly correlated to a personal one (Bergman, 2014). Finally, athletes consider Food Involvement as a means to realize the "self-to-others". This result can also be related to previous studies which argue that athletes, through sport, seek to belong to a group which can be facilitated not only by practicing the same discipline and hanging out with the same people but often also by following the same diet which is very important and central for athletes (Dimanche & Samdahl, 1994; Jones, 2017; Wheaton, 2010). In particular, it is interesting to reflect on the relationship between sport involvement and involvement in food. Sport involvement has been defined as *"the degree to which participation in a sport activity becomes a central component of a person's life and provides both hedonic and symbolic value"* (Beaton et al., 2011, p. 1) and many studies showed that

high levels of sports involvement, especially among younger people (Croll et al., 2006), resulted in higher levels of attention and interest in nutrition which are manifested in healthier food consumption behaviors (e.g., eating more fruits and vegetables) (Papaioannou et al., 2004). However, these results are not confirmed by all studies. Indeed, the relationship between sport involvement and interest in food seems to change depending on the sport in which one is involved. A study conducted by Money-Taylor et al. (2022) showed that body builders and especially females are at higher risk of eating disorders and disordered eating than non-athletes. However, these studies talked about interest in healthy nutrition but seem to lack studies that put in relation sport involvement with the construct of Food Involvement.

Table 6. Food Involvement for categories of ideal-typical subjects

	Self	**Self/Others**	**Others**
Mothers			**X**
Athletes		**X**	
Cooks	**X**		

However, if we reread these results and compare them with what is known about Food Involvement, we find some innovative aspects that have not yet been taken into account by the main studies on Food Involvement. In particular, if the dimension of the relationship between food and consumer characterized by an emotional, behavioural and cognitive dimension has been widely analyzed and considered by the theories on Food Involvement (Lee et al., 2019; Zaichkowsky, 1987), there is less research that recognizes Food Involvement as a process through which it is possible to realize one's identity dimension (self-realization). In particular, the Food Involvement scale validated by Bell & Marshall (2003), the most widely used to measure this construct, treats this identity dimension as an antecedent of Food Involvement but not as a central dimension of it (Castellini & Graffigna, 2022). Another scale widely used to capture involvement in food is the Personal Involvement Inventory (Zaichkowsky, 1985) which defines FI as the relevance given to an object, underlining the affective dimension of the construct and treating the identity one as an antecedent. However, the scales about Food Involvement that consider this dimension of identity as a central dimension of it are mainly food-specific scales since they capture the involvement in a specific product which in most cases is wine (Brown et al., 2007; Hirche & Bruwer, 2014; Roe & Bruwer, 2017). However, as the results of this study show, the dimensions of involvement are not strictly linked to a type of food. Indeed, it is not a particular category of food products that opens to

different psychological dimensions of involvement, but it is food as such that generates the psychological activation of consumers. Given this evidence, the dimension of identity should be observed and measured even in Food Involvement scales that focus on food in general and not only in food-specific scales that focus on precise products. Moreover, if we consider the dimensions of social affirmation and the bond that Food Involvement allows establishing with others, we find only one Food Involvement scale that measures these aspects as a central dimension of it: the Food Involvement (For Food Enthusiasts) Scale (Robinson & Getz, 2016). However, this scale was developed for contexts based on leisure or tourism and therefore not very applicable and not used in the field of consumers' research (Castellini & Graffigna, 2022).

Therefore, we can affirm that Food Involvement can no longer be considered as a simple relationship that is established between consumers and food, defining it as a mere pleasure or importance given to food. This research shows how Food Involvement involves the consumer at 360 degrees, becoming a process through which, it is possible to realize one's ambition project aimed at self, others or both. Consequently, it is possible to re-define the involvement in food as a qualifier of the relationship between consumers and food in which the subjects are active players as they use it as a transformative experience. This allows them to satisfy their emotional, self-affirmation and/or social-realization needs involving the self, others or both actors. This psychological transformative process makes consumers able to become what they want to be, expressing their own values. In brief, Food Involvement could represent the degree to which food is used by consumers to reach life goals oriented towards self, others or both. Given this definition, emerged from this study, scholars in this field should consider to develop novel metrics of Food Involvement, consistent with the complexity of meanings behind this concept.

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5. CONCLUSION

This work with adults involved in food allows us to conclude what it means to be involved in food, enriching the available theory on this subject, particularly concerning the psychological dimensions of Food Involvement and the role ascribed to it.

We found that Food Involvement is characterized by a relationship between the consumer and food which passes through some actions (e.g., cooking, handling food, getting information, etc.) and that involve foods (e.g., fruit, vegetables, meat). However, this food-consumer relationship acquires a deeper meaning for people, indeed to be involved in food allows satisfying one's ambitious transformative project that involves the self, the other or both actors. Moreover, this study showed that there are different orientations in one's transformative process among the 3 groups of

prototypical subjects involved in this research: mothers, cooks and athletes. In particular, the transformative project of mothers is oriented towards the other, that of cooks towards the self and that of athletes towards the self and others.

One of the main contributions of this work is the understanding of the role that Food Involvement has for people and consequently allows to figure out what are the main psychological domains of it, giving a strong contribution to the literature to create effective measurement scales that assess the role that food has in people involved in it. As shown by our study, there is no unified view on what it means to be involved in food despite the copious literature on Food Involvement. This study allows the development of an integrated view on the phenomenon and permits us to cover this scientifical gap existing in consumer behaviour research and in particular it allows us to understand the symbolic value and the psychological dimensions that characterize Food Involvement, still little explored. Our results dialogue with previous literature, but has the advantage of being the result of an empirical study, which is missing on this topic.

The main limitations of this study concern the choice of prototypical categories of medium-high involvement in food (mothers, athletes and cooks). Indeed, these early insights should be tested in other categories such as foodie, nutrition professionals, or people with diseases that involve a high investment in nutrition (e.i. Diabetes, IBD). Furthermore, the present study has a cultural limit as it was carried out in Italy but the symbolic role of food is strongly culturally based. However, having used an IPA methodology, it was necessary to study prototypical cases with high experiential intensity, and Italy represents a prototypical case since Italian consumers are highly involved in food (European Commission, 2012). However, future studies should delve into how these results can be applied to other contexts and represent tendencies in the population at large. Finally, could be also interesting to analyses the relationship between Food Involvement, as intended in this study, and the functional and expressive role of food products.

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CHAPTER THREE

Development and validation of the Psychological Food Involvement Scale (PFIS)

ABSTRACT

Food Involvement reflects the bond between consumer and food, and serves as a means of expression, identity and social recognition. Yet no existing scales are able to assess the complex psychological nature of Food Involvement. To fill this gap, this study developed and validated a Psychological Food Involvement Scale (PFIS). Data were collected by an online self-report questionnaire, involving 476 Italians aged 20-72 years (M = 48.13, SD = 13.18). The structure and psychometric properties of PFIS were examined through an exploratory and a confirmatory factor analysis, and construct validity was assessed by correlating it with Food Involvement Scale, Food Variety Seeking Scale and the General Health Interest Scale. As a behavioural indicator of validity, food and drink consumption was assessed using the Dietary Habits and Nutrition Beliefs Questionnaire. Factor analysis indicated that the PFIS comprised four stable dimensions: Emotional Balance; Self-Realization; Social Affirmation; Social Bonding. Females had higher PFIS scores. People more psychologically involved in food were more interested in healthy eating and more likely to vary their diet. The PFIS discriminated between dietary patterns. Higher PFIS scores were associated with frequent consumption of meat/fish and wholegrains/legumes. Frequent intake of meat/fish and aperitif/snack foods was associated with Social Bonding and meat/fish with Emotional Balance. The PFIS also explained consumption of vegetable drinks and lactose-free milk indicating the symbolic value ascribed to them related to self-expression, acceptance by others, and emotions. This implies potential for the PFIS for use in research to understand food choice and promote healthy eating.

1.Introduction

Food Involvement is a personal characteristic that influences attitudes that people have towards food and eating (Bell & Marshall, 2003; Brunsø et al., 2021; Derinalp Çanakçı & Birdir, 2020). General health interest (Roininen et al., 1999) and the need to consume a variety of foods (Van Trijp & Steenkamp, 1992) are attitudinal variables that have been found to be closely related to Food Involvement (Bell & Marshall, 2003; Brunsø et al., 2021; Derinalp Çanakçı & Birdir, 2020). People with higher levels of Food Involvement are also more interested in healthy eating and more likely to vary their diet by seeking out new foods (Bell and Marshall, 2003; Derinalp Çanakçı and Birdir, 2020). Food Involvement is a construct that is used to explain the interaction between the consumer and the food product at the point of purchase (Chen, 2007; Eertmans et al., 2005; Kamrath et al., 2019). Previous research conducted by Lu and Chi (2018) showed how involvement in organic food positively affected the utilitarian and hedonic value ascribed to it, which in turn positively impacted upon its consumption frequency. Other research (Kamrath et al., 2019) implied that strong involvement in dietary supplements positively affected both the intention to search for information about these products and the frequency of consumption. A behaviour that is attracting much interest, especially in Italy, is consumption of cow's milk and non-dairy beverages. In recent years, in Italy, consumption of lactose-free milk and non-dairy beverages has increased at the expense of consumption of cow's milk with lactose (Zingone et al., 2017). Although these types of beverages have been designed to offer an alternative to those who suffer from intolerances and allergies to lactose or milk proteins, nowadays most of those who consume these products do not show allergies and intolerances to milk (Savarese et al., 2021). From these evidences it is clear that there are other reasons, mainly of a psychological nature, which lead to the choice of these products (Hartmann et al., 2018; McCarthy et al., 2017). Consequently, these types of products are, prototypical to study the Food Involvement (Ares et al., 2010). Previous research has concluded that Food Involvement indirectly affected greater milk intake (Vermeir & Verbeke, 2006) through the importance given to one's health (Eertmans et al., 2005).

It is difficult to compare the results of previous studies given the measurement scales used applied completely different approaches and theoretical paradigms to measure the construct of Food Involvement (Bell & Marshall, 2003; Lee et al., 2019; Robinson & Getz, 2016; Zaichkowsky, 1985) showing that, to date, there is not a consistent scale by which to measure this construct. Food Involvement is commonly defined as perceived relevance of the food based on a person's inherent needs, values, and interests (Zaichkowsky, 1985) and "*the level of interest and concern that a consumer brings to product upon a purchase- decision task*" (Mittal, 1989, p. 148). A recent

systematic review that mapped and analysed (from a psychometric and content perspective) the different scales of Food Involvement used in consumer behaviour literature, agreed that the Food Involvement construct referred to enduring involvement characterized by subjective psychological experience (Castellini & Graffigna, 2022a). Yet, there does not appear to be any existing scales that measure both psychological and social dimensions of Food Involvement (Robinson & Getz, 2016), with most scales focusing mainly on the interest and importance given to food (Lee et al., 2019). Yet, Food Involvement is a multifactorial phenomenon that involves the consumer at 360 degrees, tapping into social, cognitive, affective and also identity-related psychological dimensions (Ghali-Zinoubi & Toukabri, 2019; Robinson & Getz, 2016).

In light of this, a recent qualitative study on Food Involvement (Castellini & Graffigna, 2022c) adopted a psychological perspective to shed light on the nature of Food Involvement, to understand what it means to people and to determine the main psychological domains that characterize it. This study defined Food Involvement as *"a deep relationship between the consumer and food that allows satisfying one's ambitious transformative project that involves the self, the other or both actors [..]In brief, Food Involvement could represent the degree to which food is used to enable one's transformative project oriented towards self, other or both actors".* This prior qualitative study indicated that involvement in food is mainly determined by four psychological domains: Emotional Balance (being involved in food means to use food to reach the psychological emotional balance); identity related to Self-Realization (being involved in food means to use food to reach self-realization); Social Affirmation (being involved in food means to use food to reach social affirmation); and, Social Bonding (being involved in food means to use food to strengthen social bonds with loved ones). These results highlighted the complex psychological nature of the Food Involvement construct and highlighted the need for new scales to assess it as confirmed by previous studies (Lee et al., 2019; Robinson & Getz, 2016). Findings from this prior qualitative research (Castellini & Graffigna, 2022c) have been used to design a metric to assess the different levels of Psychological Food involvement (Psychological Food Involvement Scale, or PFIS). The objectives of this study, therefore, are to establish the metric's psychometric properties and to determine the extent to which it discriminates between individuals on the basis of their psychology (i.e., different from other similar constructs) and dietary patterns. In particular, the current work aims to answer the following research questions: (1) What is the structural validity of the PFIS? (2) What is the internal validity of the PFIS? (3) What is the construct validity of PFIS? (4) Can the scale discriminate between individuals with different dietary patterns? (5) What is the correlation

between PFIS and consumption of cow's milk and non-dairy beverages? (6) What is the correlation between PFIS and peoples' socio-demographics profile?

2. Materials and Methods

This study has been performed in accordance with the Declaration of Helsinki and has been approved by an independent ethics committee of Università Cattolica del Sacro Cuore in Milan (CERPS). Study methods and planned data analyses were preregistered on the Open Science Framework (OSF) before data analysis had begun (https://osf.io/qa2zs/).

2.1 Participants and Design

Data were collected via a questionnaire survey that was conducted using a CAWI (Computer Assisted Web Interviewing) methodology between April 30th and May 4th 2022, involving Italian adults (>18 years old). The initial sample comprised 512 Italian adults of whom 252 (49%) were female and aged 20+ years randomly selected from the consumer panel managed by Norstat srl (https://norstat.it/) using random digit dialing that is a technique for drawing a sample of households from the frame or set of telephone numbers.

2.2. Measures

The items comprised within the scale under investigation were formulated and based upon the results of a prior qualitative phase conducted on 14 consumers with medium-high level of involvement in food and analysed according to the principles of Interpretative Phenomenological Analysis (IPA) (Castellini & Graffigna, 2022c). The items were then discussed among a group of consumer psychologists. The resulting tool, which was tested in this study, comprised 21 items. Responses to each item were on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). The scale presented in the survey was in Italian however an English translation is provided in this paper but it is not validated and was not filled out by the participants (Table 1).

Table 1. Psychological Food Involvement Scale (PFIS) (initial list of items).

Item number	Item text (Italian)	Item text (English)
PFIS1	Il cibo mi dà piacere	Food gives me pleasure
PFIS2	Il cibo mi permette di raggiungere un benessere psico-fisico	Food allows me to achieve psycho-physical well-being

PFIS3	Il cibo mi permette di rilassarmi	Food allows me to relax
PFIS4	Il cibo è una parte importante della mia vita	Food is an important part of my life
PFIS5	Il cibo impatta sulle mie emozioni	Food has an impact on my emotions
PFIS6	Consumare cibi che ero solito mangiare da bambino/a mi genera emozioni positive	Consuming foods that I used to eat as a child generates positive emotions in me.
PFIS7	Scegliere cosa mangiare è un modo per esprimere me stesso/a	Choosing what to eat is a way of expressing myself
PFIS8	Scegliere cosa mangiare è un modo di esprimere la mia creatività	Choosing what to eat is a way to express my creativity
PFIS9	Scegliere cosa mangiare racconta qualcosa di me	Choosing what to eat tells something about me
PFIS10	Scegliere cosa mangiare riflette il tipo di persona che sono	Choosing what to eat reflects the kind of person I am
PFIS11	Scegliere cosa mangiare mi permette di esprimere chi sono	Choosing what to eat allows me to express who I am
PFIS12	Attraverso le mie scelte alimentari le persone possono capire qualcosa di me	Through my food choices people can understand something about me
PFIS13	Scegliere cosa mangiare mi permette di essere considerato/a dagli altri come vorrei che mi considerassero	Choosing what to eat allows me to be considered by others as I would like them to consider me
PFIS14	Scegliere cosa mangiare è un modo per farmi riconoscere dagli altri per quello che sono	Choosing what to eat is a way for others to recognize me for who I am
PFIS15	Scegliere cosa mangiare è un modo per farmi accettare dagli altri per quello che sono	Choosing what to eat is a way for others to accept me for who I am
PFIS16	Le mie scelte alimentari sono determinate da come voglio apparire agli altri	My food choices are determined by how I want to appear to others
PFIS17	Le mie scelte alimentari sono determinate da un modello alimentare al quale voglio aderire	My food choices are determined by a dietary pattern to which I want to adhere
PFIS18	Cenare/pranzare con le persone a me care mi permette di rafforzare il legame con loro	Dining with loved ones allows me to strengthen my bond with them
PFIS19	Cenare/pranzare con le persone a me care è un momento importante in cui condividere esperienze	Dining with loved ones is an important time to share experiences
PFIS20	Preparare pranzi/cene per le persone a me care è un modo per prendermi cura di loro	Preparing lunches/dinners for my loved ones is a way to take care of them

PFIS21	Preparare pranzi/cene per le persone a me care è un modo per esprimere il mio affetto	Preparing lunches/dinners for my loved ones is a way to express my affection

To assess construct validity (Mokkink et al., 2018) of the Psychological Food Involvement Scale (PFIS) scale, scores on this instrument were correlated with those of instruments that measure similar constructs (Food Involvement Scale (FIS) (Bell & Marshall, 2003) and related but dissimilar constructs (Food variety seeking VARSEEK Scale (Van Trijp & Steenkamp, 1992) and General Health Interest Scale (Saba et al., 2019). As a behavioural indicator of validity food and drink consumption was assessed using the Dietary Habits and Nutrition Beliefs Questionnaire (Kowalkowska et al., 2018) to determine whether PFIS was able to discriminate between different types of dietary pattern. Finally, with an exploratory aim, the consumption frequency of milk and non-dairy beverages and the socio-demographics features of people were mapped and correlated with the PFIS.

The measures used were:

Food Involvement Scale (FIS): Developed by Bell and Marshall (2003), the FIS captures the perceived level of importance that an individual places on food. This 12-item instrument includes questions on food acquisition, preparation, cooking, eating and disposal and comprises two dimensions: “set and disposal” (three items); and, “Preparation and items” (nine items). Responses are on a seven-point scale ranging from strongly disagree (1) to strongly agree (7). Both dimensions were expected to have a positive relationship with the construct under investigation.

Food Variety Seeking Scale (VARSEEK): Developed by Van Trijp and Steenkamp (1992), the Varseek-scale is a one-dimensional construct with 8 items that capture a predisposition to try new foods and experiment with new diets. Response formats are on a five-point scale ranging from strongly disagree (1) to strongly agree (5). This scale is expected to have a positive relationship with the construct under investigation.

General Health Interest Scale: Is a validated sub-scale of the Health and Taste Attitudes Scale (Roininen et al., 1999) that was also validated in Italian by Saba et al. (2019). This subscale comprises eight items measured using a 7-point Likert scale from 1= Totally disagree to 7= Totally agree. A high score on this subscale means a high interest in eating healthily and being interested in light and natural products. Given these features, this scale is expected to have a positive relationship with the construct under investigation.

Dietary Habits and Nutrition Beliefs Questionnaire (KomPAN):

The questionnaire was developed in 2014 in two versions: interviewer-administered and, self-administered (Kowalkowska et al., 2018). The questionnaire contains 4 sections: Dietary habits; Food frequency questionnaire (FFQ); Nutrition beliefs; and, Lifestyle and personal data.

In this study only the 24-item FFQ was included (Gawecki, 2018). Frequency of food and drink consumption was evaluated on a 6-point scale with categories ranging from ‘never’ (1) to ‘few times a day’ (6). Responses to these questions were then factor analysed (using?) to generate dietary patterns and to test the hypothesis that the PFIS can discriminate between different eating styles.

Consumption of cow’s milk and non-dairy beverages alternative to milk was assessed using 21 ad-hoc questions inspired by the study of De Graaf et al. (2016). Of these, 12 questions investigated the consumption of milk on product characteristics (presence of lactose: with or without lactose; type of skimming: skimmed, semi-skimmed and whole; heat treatments: fresh or UHT); and, 9 questions investigated consumption of the main alternative non-dairy beverages to milk on the Italian market (soy, rice, oat, walnut, almond, hazelnut, coconut, millet, chestnut). Frequency of consumption was evaluated in 6 categories (from 'never' (1) to 'few times a day' (6)).

Socio-Demographic Profile: Analysis sought to determine the relationship between responses to the Psychological Food Involvement Scale (PFIS) and socio-demographic characteristics of the sample (age, gender, profession, region of residence, level of education, marital status, inhabited centre size, number of children). A question about food allergies and intolerances was added, asking the participants if they had one and if so, to specify it.

2.3. Statistical Analysis

Descriptive statistics were computed for responses to each questionnaire item (asymmetry, kurtosis, mean, median, and standard deviation) (See Supplementary materials A). Univariate outliers were controlled considering the values of asymmetry and kurtosis (<±2) that are considered acceptable (Byrne, 2013; J. F. Hair et al., 2010) and by checking box plots. Outliers were identified using standardized (Z scores) and participants with scores greater than |3| eliminated. In the case of the PFIS scale, Mardia's (1970) coefficient was used to evaluate multivariate normality and to compare with the critical ratio. Mahalanobis distance (where $p < .001$ (Harrington, 2009; Tabachnick & Fidell, 2007) was used to detect multivariate outliers which were deleted from the database. Finally, to assess whether data were suitable for EFA, Bartlett's test of sphericity (significance level<0.05) (Bartlett, 1954) and Kaiser-Meyer-Olkin (KMO, cut-off for adequacy set at >0.6) (Kaiser, 1970, 1974) were calculated.

After testing these assumptions, Exploratory Factor analysis (EFA) with Promax rotation was performed to evaluate the structure and psychometric properties of the PFIS. To determine the number of potential underlying factors we applied the following criteria: eigenvalues >1, Scree plot, Parallel Analysis, factor loadings >|0.50|, and plausibility of the factors in terms of their substantive meaning (Hair et al., 2019).

Next, to check the adequacy of the items to the identified dimensions, a confirmatory factor Analysis (CFA) was run using MPLUS 8. The model was estimated using Maximum Likelihood with robust standard errors. Model fit was assessed using Chi-square/degrees of freedom ratio <5, comparative fit index (CFI) > .90, Tucker–Lewis index (TLI) > .90, root mean square error of approximation (RMSEA) < .08, and standardized root mean square residual (SRMR) < .08 (Hu & Bentler, 1999). The reliability of the scale was evaluated using Cronbach's alpha, average inter-item correlation (AIC), composite reliability and maximal reliability (Anderson & Gerbing, 1988). An average inter-item correlation of at least 0.50 was regarded as good (Streiner & Norman, 2008) a Cronbach's alpha greater than 0.70 (Nunnally & Bernstein, 1994) and coefficients of reliability of 0.7 or higher were taken to show good reliability (Anderson & Gerbing, 1988). Average variance extracted was estimated to assess convergent validity of the extracted factors. To establish convergent validity, it was assumed that the average variance extracted should be higher than 0.5, and composite reliability should be greater than the respective average variance extracted (Anderson & Gerbing, 1988).

Construct validity of the PFIS questionnaire was assessed by analysing the correlations (Pearson's coefficients) with instruments that measure similar constructs (Food Involvement Scale (FIS) (Bell & Marshall, 2003) or related but dissimilar constructs (Food Variety Seeking VARSEEK Scale (Van Trijp & Steenkamp, 1992); and, the General Health Interest Scale (Saba et al., 2019). The scoring of all these scales was calculated in accordance with the validation studies, namely, that negatively stated items were reversed and an average of all the items that make up the single scales were calculated for each participant.

A further objective was to test the ability of the scale to discriminate between individuals on the basis of their dietary patterns. Dietary patterns were determined using Principal Component Analysis (PCA) with varimax rotation on responses to the FFQ of the Dietary Habits and Nutrition Beliefs Food Frequency Questionnaire (Kowalkowska et al., 2018). The varimax normalized rotation was used in order to extract non correlated factors and to obtain a higher explained variance (Field, 2017). To determine the number of potential underlying factors, the following criteria were applied: eigenvalues >1; Scree plot; Parallel Analysis; factor loadings >|0.50|; and, plausibility of

the factors in terms of their substantive meaning (Hair et al., 2019). The different factorial scores that emerged were correlated with PFIS in order to test the degree to which different dietary patterns (both healthier and less healthy) correlated with the proposed scale.

Potential relationships between PFIS and milk or non-dairy beverage consumption were assessed using Spearman's Rho, owing to the non-normal distribution of data (Portney & Watkins, 2015). Averaging the frequency of consumption scores implied 3 variables (consumption of cow's milk, consumption of lactose-free milk and consumption of not dairy beverages). Since the consumption of cow's milk and vegetable beverages is not only determined by intolerances but by psycho-social values attributed to the products we decided to eliminate, after data collection and just from this analysis, those who are lactose intolerant (N=24). This choice was made to understand the symbolic value that guides the choice of these products avoiding medical reasons (eg. related to intolerances) that could interfere in the reading of these data.

Finally, different levels of Psychological Food Involvement by socio-demographic features were determined using Pearson's correlation, Independent Samples T-tests and analyses of variance (ANOVAs).

3. Results

3.1 Sample Description

In total, 512 questionnaires were collected. Following initial analysis, 36 participants were eliminated as considered multivariate outliers on the PFIS (See supplementary material A). Consequently, the final sample comprised 476 people of whom 238 (50%) were female, aged between 20 and 72 years (M = 48.13, SD = 13.18) (Table 1).

Table 1. Demographic profile of the sample (N=476)

	n	**%**
1. Gender		
Male	238	50.0
Female	238	50.0
2. Age		
18-24	37	7.8
25-34	68	14.3
35-44	91	19.1

45-54	128	26.9
55-59	65	13.7
60-72	87	18.3
3. Education		
Elementary-Junior High	56	11.7
Senior High	246	51.7
College or University	174	36.6
4. Geographic area		
North-West	127	26.7
North-East	89	18.7
Centre	105	22.1
South and Islands	155	32.6
5. Inhabited centre size		
Up to 10000 inhabitants	114	24.0
10/100.000 inhabitants	204	42.9
100/500.000 inhabitants	62	13.0
More than 500.000	81	17.0
Do not know	15	3.2
6. Profession		
Entrepreneur / freelancer	49	10.3
Manager / middle manager	17	3.6
Employee / teacher / military	178	37.5
Worker / shop assistant / apprentice	32	6.7
Homemaker	53	11.1
Student	56	11.8
Retired	41	8.6
Unoccupied	50	10.5
7. Household net monthly income level		
Up to 600 €	24	5.0
601-900 €	18	3.8
901-1200 €	39	8.2
1201-1500 €	68	14.3

1501-1800 €	52	10.9
1801-2500 €	86	18.1
2501-3500 €	58	12.2
More than 3501 €	52	11.0
Missing	79	16.6

3.2 Psychometric Scales Structure and Psychometric Properties

The FIS scale (Bell and Marshall, 2003) is composed of two subfactors called “Set and Disposal” and “Preparation and Eating”. Testing the reliability of these factors within our data indicated that "set and disposal” had a low Cronbach’s alpha (0.449). Consequently, we decided to estimate the total scale score, considering it as a single-factor, and calculating the mean score, as done by previous validation studies (O’Kane et al., 2022). The scale then showed good reliability, with a Cronbach’s alpha equal to 0.773. Food Variety Seeking Scale (VARSEEK) showed very good reliability, with a Cronbach’s alpha equal to 0.916. The General Health Interest Scale also showed good reliability, with a Cronbach’s alpha equal to 0.820. Responses to all these scales were normally distributed (See Appendix A). Table 2 shows the means, standard deviations, medians, asymmetry and kurtosis of the Psychological Food Involvement Scale (PFIS) items and Table 3 shows their inter-item correlations. Item distribution appears normal.

Table 2. Descriptive statistics for Psychological Food Involvement Scale (PFIS) items on total sample (N=476)

ITEM	M	SD	Md	A	K
Food gives me pleasure	5.88	1.218	6.00	-1.006	0.589
Food allows me to achieve psycho-physical well-being	5.51	1.246	6.00	-0.489	-0.527
Food allows me to relax	5.29	1.322	5.00	-0.373	-0.553
Food is an important part of my life	5.43	1.369	6.00	-0.717	0.116
Food has an impact on my emotions	5.10	1.479	5.00	-0.595	-0.129
Consuming foods that I used to eat as a child generates positive emotions in me.	5.17	1.493	5.00	-0.625	-0.127
Choosing what to eat is a way of expressing myself	5.12	1.388	5.00	-0.363	-0.370
Choosing what to eat is a	4.91	1.511	5.00	-0.434	-0.377

way to express my creativity					
Choosing what to eat tells something about me	5.00	1.485	5.00	-0.541	-0.063
Choosing what to eat reflects the kind of person I am	4.96	1.536	5.00	-0.521	-0.262
Choosing what to eat allows me to express who I am	4.84	1.550	5.00	-0.472	-0.258
Through my food choices people can understand something about me	4.68	1.605	5.00	-0.484	-0.259
Choosing what to eat allows me to be considered by others as I would like them to consider me	3.99	1.850	4.00	-0.119	-0.917
Choosing what to eat is a way for others to recognize me for who I am	4.02	1.832	4.00	-0.162	-0.931
Choosing what to eat is a way for others to accept me for who I am	3.61	1.944	4.00	0.081	-1.159
My food choices are determined by how I want to appear to others	3.11	1.990	3.00	0.493	-1.042
My food choices are determined by a dietary pattern to which I want to adhere	4.25	1.842	4.00	-0.329	-0.827
Dining with loved ones allows me to strengthen my bond with them	5.53	1.391	6.00	-0.863	0.319
Dining with loved ones is an important time to share experiences	5.60	1.354	6.00	-0.983	0.676
Preparing lunches/dinners for my loved ones is a way to take care of them	5.43	1.486	6.00	-0.928	0.492
Preparing lunches/dinners for my loved ones is a way to express my affection	5.43	1.480	6.00	-0.975	0.685

Note: M=mean; SD=Standard Deviation; Md=median; A= asymmetry; K= kurtosis; Answering scale from 1 = ‘strongly disagree’ to 7 = ‘strongly agree’.

Table 3. Inter-item correlations among Psychological Food Involvement Scale (PFIS) items (N=476)

	PFIS1	PFIS2	PFIS3	PFIS4	PFIS5	PFIS6	PFIS7	PFIS8	PFIS9	PFIS10	PFIS11	PFIS12	PFIS13	PFIS14	PFIS15	PFIS16	PFIS17	PFIS18	PFIS19	PFIS20	PFIS21
PFIS1	1																				
PFIS2	.763**	1																			
PFIS3	.720**	.794**	1																		
PFIS4	.743**	.684**	.711**	1																	
PFIS5	.625**	.653**	.709**	.700**	1																
PFIS6	.517**	.557**	.541**	.499**	.591**	1															
PFIS7	.583**	.605**	.652**	.621**	.636**	.585**	1														
PFIS8	.532**	.567**	.638**	.565**	.585**	.561**	.773**	1													
PFIS9	.473**	.521**	.548**	.509**	.548**	.489**	.751**	.768**	1												
PFIS10	.418**	.498**	.504**	.479**	.525**	.495**	.720**	.764**	.860**	1											
PFIS11	.400**	.481**	.540**	.489**	.551**	.502**	.735**	.772**	.830**	.884**	1										
PFIS12	.361**	.448**	.479**	.424**	.508**	.480**	.632**	.637**	.755**	.749**	.781**	1									
PFIS13	.188**	.305**	.370**	.303**	.391**	.387**	.486**	.570**	.581**	.625**	.657**	.709**	1								
PFIS14	.198**	.296**	.373**	.327**	.410**	.382**	.499**	.565**	.582**	.624**	.660**	.740**	.874**	1							
PFIS15	.068	.197**	.266**	.204**	.310**	.265**	.363**	.418**	.447**	.476**	.535**	.593**	.782**	.800**	1						
PFIS16	.004	.126**	.171**	.136**	.236**	.194**	.232**	.310**	.319**	.351**	.407**	.427**	.627**	.641**	.769**	1					
PFIS17	.134**	.279**	.262**	.198**	.284**	.272**	.363**	.350**	.412**	.418**	.400**	.454**	.457**	.495**	.504**	.518**	1				
PFIS18	.491**	.495**	.436**	.435**	.412**	.523**	.501**	.501**	.428**	.425**	.435**	.381**	.276**	.311**	.184**	.080	.266**	1			
PFIS19	.554**	.524**	.478**	.465**	.449**	.515**	.518**	.505**	.455**	.430**	.432**	.379**	.231**	.249**	.128**	.034	.238**	.812**	1		
PFIS20	.513**	.507**	.489**	.493**	.465**	.470**	.537**	.550**	.484**	.440**	.485**	.383**	.278**	.306**	.165**	.077	.227**	.666**	.755**	1	
PFIS21	.514**	.512**	.486**	.500**	.471**	.487**	.523**	.531**	.486**	.434**	.460**	.383**	.271**	.294**	.153**	.055	.213**	.649**	.732**	.865**	1

Note: * $p < 0.05$; ** $p < 0.001$;

After confirming the adequacy of the sampling according to the KMO and Bartlett's test of sphericity (KMO= 0.94 and X^2=9679.15, p= <0.001), an exploratory factor analysis with Promax rotation was performed on the total sample to determine the factor structure. The analysis with an unconstrained number of factors yielded eigenvalues of 10.75, 3.18, 1.37 and 1.04, with 77.77% of variance explained. Looking at the factor loadings, however, one item (PFIS6: *Consuming foods that I used to eat as a child generates positive emotions in me*) appeared to be poorly saturated, with the extracted factors (factor loading<0.50) and therefore was eliminated. A second factor analysis with Promax rotation was conducted. The KMO and Bartlett's test of sphericity (KMO= 0.94 and X^2=9358.4, p= <0.001) was tested and this re-analysis yielded eigenvalues of 10.287, 3.151, 1.369 and 1.033, with 79.19% of variance explained. Also, whereas the scree plot identified 4 factors, the parallel analysis identified 3 factors (Figure 1). Considering the readability of these data and what came out in the qualitative analysis (Castellini & Graffigna, 2022c) which informed the study, the 4 factors were retained.

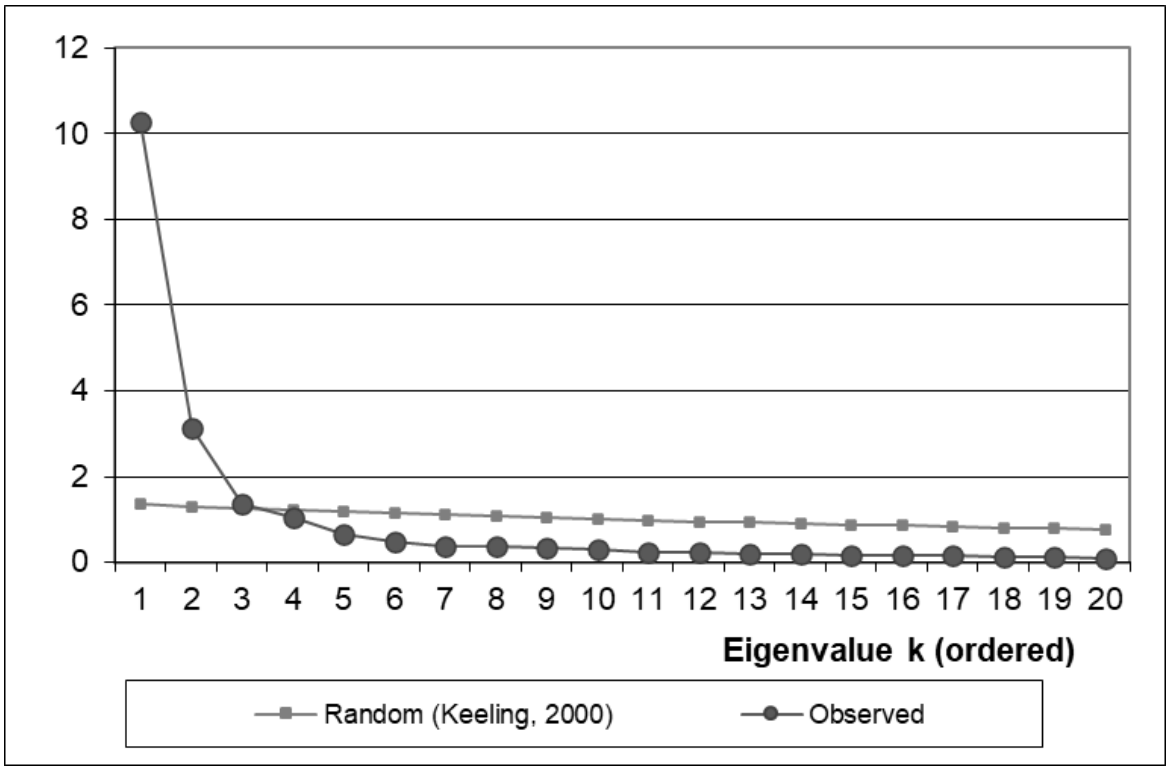


Fig 1. Parallel Analysis scree plot.

Factor 1 contained PFIS1, PFIS2, PFIS3, PFIS4 and PFIS5 items, all loading above 0.72 (α= 0.922). This factor investigates the emotion and psychophysical well-being that food elicits in people (Emotional Balance). *Factor 2* contains PFIS13, PFIS14, PFIS15 and PFIS16, PFIS17 all loading above 0.52 (α= 0.902). This factor investigates the degree to which food and one's food choices are perceived as an important means of being accepted by others and appearing to others as one wants to be seen (Social Affirmation). *Factors 3* contains PFIS7, PFIS8, PFIS9, PFIS10, PFIS11 and PFIS12 items, all loading above 0.61 (α= 0.950). This factor investigates how much food and one's food choices are considered an important means of expressing oneself and one's personality (Self-Realization). *Factor 4* contains PFIS18, PFIS19, PFIS20 and PFIS21, all loading above 0.80 (α= 0.921). This factor investigates how much the food is considered a means through which to care for loved ones and a way to strengthen the bond between them (Social Bonding) (Table 4). All factors share a positive statistically significant relationship (Table 5).

Table 4. EFA Factor Dimensions, Scale Items, and Factor Loadings (N=476)

Factor	Item number	Item text (English)	Factors Loadings
1. Emotional Balance	PFIS1	Food gives me pleasure	0.877
	PFIS2	Food allows me to achieve psycho-physical well-being	0.850
	PFIS3	Food allows me to relax	0.896
	PFIS4	Food is an important part of my life	0.836
	PFIS5	Food has an impact on my emotions	0.722
2. Social-Affirmation	PFIS13	Choosing what to eat allows me to be considered by others as I would like them to consider me	0.720
	PFIS14	Choosing what to eat is a way for others to recognize me for who I am	0.767
	PFIS15	Choosing what to eat is a way for others to accept me for who I am	0.986
	PFIS16	My food choices are determined by how I want to appear to others	0.925
	PFIS17	My food choices are determined by a dietary pattern to which I want to adhere	0.520
3. Self-Realization	PFIS7	Choosing what to eat is a way of expressing myself	0.605
	PFIS8	Choosing what to eat is a way to express my creativity	0.643
	PFIS9	Choosing what to eat tells something about me	0.952

	PFIS10	Choosing what to eat reflects the kind of person I am	1.025
	PFIS11	Choosing what to eat allows me to express who I am	0.924
	PFIS12	Through my food choices people can understand something about me	0.625
4.Social Bonding	PFIS18	Dining with loved ones allows me to strengthen my bond with them	0.801
	PFIS19	Dining with loved ones is an important time to share experiences	0.911
	PFIS20	Preparing lunches/dinners for my loved ones is a way to take care of them	0.880
	PFIS21	Preparing lunches/dinners for my loved ones is a way to express my affection	0.841

Table 5. Descriptive, Cronbach's alphas, and inter-scale correlation of Psychological Food Involvement Scale (PFIS) scale (Emotional Balance, Self-Realization, Social-Affirmation and Social Bonding) on total sample (N=476).

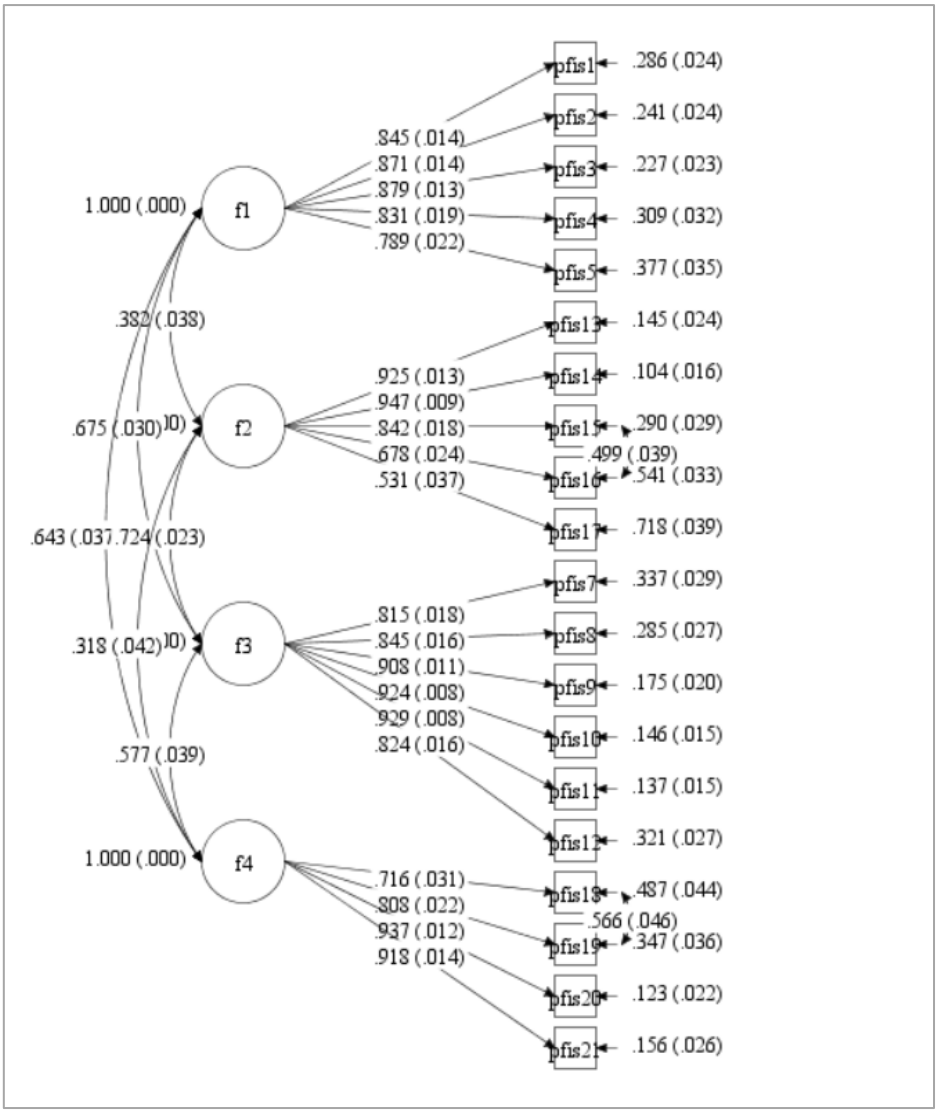
Scale	M	SD	Md	A	K	Alpha	Emotional Balance	Social-Affirmation	Self-Realization	Social Bonding
Emotional Balance	5.44	1.16	5.6	-0.564	-0.145	0.922	1			
Social-Affirmation	3.79	1.60	3.8	0.093	-0.785	0.902	0.328***	1		
Self-Realization	4.91	1.35	5.0	-0.445	-0.114	0.950	0.667***	0.641***	1	
Social Bonding	5.49	1.28	5.8	-0.916	0.735	0.921	0.613***	0.261***	0.572***	1

Note: M=mean; SD=Standard Deviation; Md=median; A= asymmetry; K= kurtosis;
*** $p < 0.001$.

Confirmatory factor analysis was run with MPlus using the MLM method. According to the modification indices, two pairs of the measurement errors (between items 18 and 19, items 15 and 16) were allowed to freely covary to improve the measurement model fit. Results showed that the proposed model (Figure 2) provided a good fit to the data, $X^2(162) = 643.735$; $p < .001$; Chi-square/df = 3.97; CFI = 0.94, TLI = 0.93, RMSEA = 0.079 (LO90 = 0.073, HI90 = 0.085) SRMR=0.068 and strong factor loadings ranging from 0.53 to 0.94 (factor loadings < |0.30| are weak and factor loadings >|0.50| can be considered good (Hair et al., 2019). For each factor the reliability indicators were calculated showing good results (Table 6).

Table 6. PFIS reliability indexes (N=476)

Factors	Average Item Correlation	Composite Reliability	Maximal Reliability	Average Variance Extracted
Emotional Balance	0.71	0.92	0.93	0.72
Social-Affirmation	0.65	0.89	0.95	0.63
Self-Realization	0.76	0.95	0.96	0.77
Social Bonding	0.75	0.91	0.94	0.72



Note: F1= Emotional Balance; F2= Social-Affirmation; F3= Self-Realization; F4= Social Bonding

Fig. 2. Factor structure of the PFIS scale. Standardized parameter estimates for the final model (N=476).

3.3 Construct Validity

Table 7 shows correlations between PFIS scale and related measures (Food Involvement Scale, General Health Interest Scale, Food Variety Seeking VARSEEK Scale). All scales considered correlated positively and significantly with PFIS and all subfactors (as hypothesized). However, the correlation between the sub-factor of the PFIS "Social Affirmation" and the FIS scale was not so strong ($r=0.104$, $p<0.05$). Relationships between the PFIS factors and FIS construct ranged from $r = 0.104$ to $r = 0.622$ (Table 7). This range of values addresses both convergent and discriminant validity. The PFIS scale appears to be to some extent related to the FIS, given the high correlation with Emotional Balance, Self-Realization and Social Bonding factors, but at the same time is different and non-redundant given the low correlation between FIS and Social-Affirmation factor. The PFIS scale was apparently able to measure a psychological facet of Food Involvement that was not captured by the FIS.

Table 7. Pearson's correlation between PFIS scale (Emotional Balance, Self-Realization, Social-Affirmation, Social Bonding) and related measures (N=476).

	Food Involvement Scale	Food variety seeking Scale	General Health Interest Scale
PFIS (Total score)	0.534^{***}	0.378^{***}	0.261^{***}
Emotional Balance	0.622^{***}	0.374^{***}	0.179^{***}
Social-Affirmation	0.104^{*}	0.147^{**}	0.156^{**}
Self-Realization	0.508^{***}	0.355^{***}	0.270^{***}
Social Bonding	0.590^{***}	0.387^{***}	0.232^{***}

Note: *p<0.05; **p<0.01; *** p < 0.001; PFIS=Psychological Food Involvement Scale

Principal Component analysis (PCA) with varimax rotation was carried out on responses to the FFQ of the Dietary Habits and Nutrition Beliefs Questionnaire (Kowalkowska et al., 2018) to determine dietary patterns (factors). Scores for the item concerning the consumption of lard was not normally distributed, indicating that most people (89%) never or seldom consumed it (See Appendix A). Given the item was not very informative with respect to consumption it was excluded from the PCA. The adequacy of the sampling based on the KMO and Bartlett's test of sphericity (KMO= 0.87 and X^2=3426.47, p= <0.001) was tested and showed very good results. Initial analysis

with all factors unconstrained yielded eigenvalues of 6.08, 2.53, 1.92 and 1.23, with 51.08% of variance explained. However, looking at the factor loadings, 7 items appeared to be poorly saturated, with the extracted factors (factor loading<|0.50|), therefore were eliminated one by one in order to have all the factor loading >|0.50|. The final factor analysis considered 16 FFQ items (Table 8). KMO and Bartlett's test of sphericity (KMO= 0.85 and X^2=2234.0, p= <0.001) were re-tested and this new analysis yielded eigenvalues of 4.579, 2.020, 1.716 and 1.142, with 59.10% of variance explained. Also, the scree plot and parallel analysis identified 4 factors (Figure 3). Consequently, four dietary patterns were derived: "Junk Food/Drinks", "Wholegrain and Legumes", "Aperitif/Snacks", "Meat and Fish" with good Cronbach's alpha and factor loadings (Table 8). The results did not show cross-loadings.

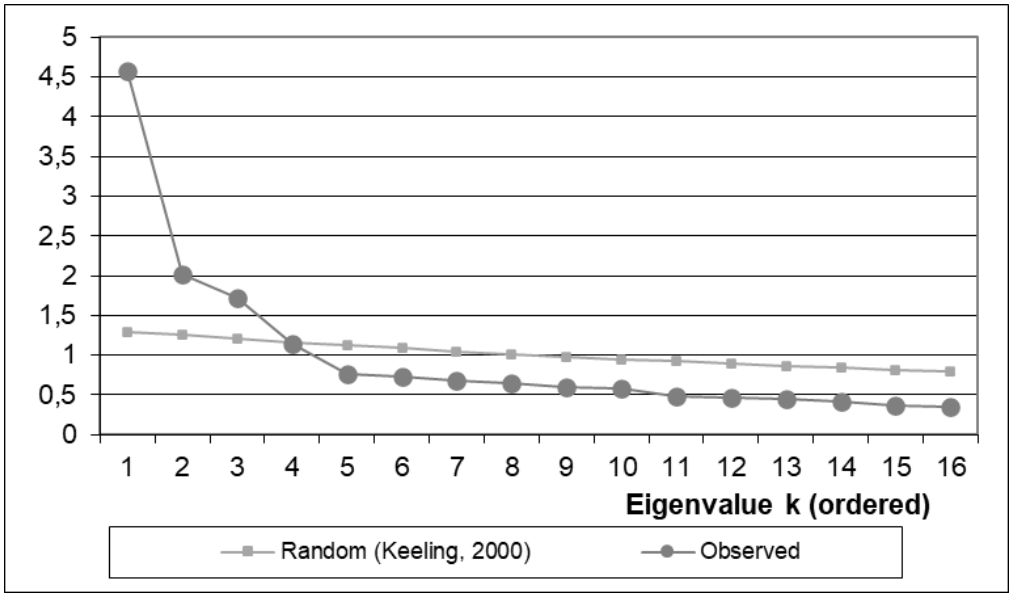


Fig. 3 Parallel Analysis scree plot.

Table 8. Factor-loading matrix for the dietary patterns identified by principal component analysis (PCA) (N=476).

Variables	Factor 1 Junk Food/Drinks (α=0.81)	Factor 2 Wholegrain and Legumes (α=0.71)	Factor 3 Aperitif/Snacks (α=0.64)	Factor 4 Meat and Fish (α=0.69)
Fast foods	0.762	-	-	-
Fried foods	0.600	-	-	-

Butter as a bread spread or as an addition to your meals/ for frying/ for baking etc	0.611	-	-	-
Tinned (jar) meats	0.768	-	-	-
Drink sweetened carbonated or still beverages	0.613	-	-	-
Energy drinks	0.759	-	-	-
Wholemeal (brown) bread/bread rolls	-	0.817	-	-
Buckwheat, oats, wholegrain pasta or other coarse-ground groats	-	0.825	-	-
Pulses-based foods	-	0.602	-	-
Bread and bakery products	-	-	0.720	-
Cheese	-	-	0.676	-
Fruit	-	-	0.563	-
Sweets, e.g., confectionary, biscuits, cakes, chocolate bars, cereal bars	-	-	0.676	-
Red meat	-	-	-	0.656
White meat	-	-	-	0.793
Fish	-	-	-	0.713

Factor loadings of <|0.50| are not shown.

Factor scores were correlated with the Psychological Food Involvement scale (PFIS) and the 4 respective sub-factors (Table 9). The results showed that higher total scores on the PFIS scale correlated positively with more frequent meat and fish consumption and more frequent intake of wholegrains and legumes. There were no significant correlations between total scores on the PFIS and the frequency with which junk food and drinks or aperitif/snacks were consumed.

If we consider correlations between the dietary patterns and the PFIS sub-factors we see that more frequent consumption of the junk food/drink pattern correlated positively with Social Affirmation while those who consumed aperitif/snack foods more frequently had higher levels of Social Bonding. Consumption of wholegrains and legumes showed a positive correlation with all sub-factors of the PFIS. More frequent consumption of meat and fish correlated positively with the factors of Emotional Balance and Social Bonding.

Table 9. Pearson's correlation between PFIS scale (Emotional Balance, Self-Realization, Social-Affirmation, Social Bonding) and dietary patterns (N=476).

	Junk food/drinks	Wholegrain and legumes	Aperitif/snack food	Meat and fish
PFIS (Total score)	0.087	0.214***	0.023	0.121**
Emotional Balance	-0.018	0.154**	0.060	0.163***
Social-Affirmation	0.220***	0.197***	-0.072	0.060
Self-Realization	0.064	0.181***	0.009	0.061
Social Bonding	-0.054	0.140**	0.125**	0.137**

Note: **p<0.01; *** p < 0.001; PFIS=Psychological Food Involvement Scale

3.4 Psychological Food Involvement and Socio-Demographic Factors

Considering the different levels of Psychological Food Involvement (PFIS) for the main socio-demographic characteristics, the results showed that females had higher levels of Psychological Food Involvement than males for all 4 dimensions of the PFIS and that people with a higher level of education (graduated from university) were more involved in food for Emotional Balance, Self-Affirmation and Self-Realization dimensions. The Social Bonding factor did not differ by education level. Finally, younger people had higher scores on the Emotional Balance factor. No other differences were found (Table 10).

Table 10. PFIS scores by socio-demographic features (N=476)

	PFIS Total score	T-value (df)	p-value	**Emotional Balance**	T-value (df)	p-value	**Social-Affirmation**	T-value (df)	p-value	**Self-Realization**	T-value (df)	p-value	**Social Bonding**	T-value (df)	p-value
Gender (mean)		-3.60 (474)	<0.001		-2.32 (474)	<0.05		-2.18 (474)	<0.05		-3.87 (474)	<0.001		-3.07 (474)	<0.01
Male (n=238)	4.70			5.31			3.63			4.68			5.32		
Female (n=238)	5.06			5.56			3.95			5.15			5.68		
Age (Pearson's correlation)	r=0.007	-	ns	r= -0.101	-	<0.05	r=0.020	-	ns	r=0.039	-	ns	r=0.052	-	ns
Level of education (mean)		-2.68 (474)	<0.01		-2.28 (474)	<0.05		-2.28 (474)	<0.05		-2.02 (474)	<0.05		-	ns
Non-graduated (n=302)	4.79			2.35			3.67			4.83			5.42		
Graduated (n=174)	5.05			2.59			4.01			5.07			5.63		
Income level (mean)		-	ns		-	ns		-	ns		-	ns		-	ns
Low (<1800€) (n=201)	4.88			5.38			3.88			4.95			5.40		
High (>1800€) (n=275)	4.88			5.48			3.72			4.88			5.56		
Profession (mean)		-	ns		-	ns		-	ns		-	ns		-	ns
Manger/freelancer (n=66)	4.98			5.48			4.04			4.98			5.55		
Employee / teacher / military (n=178)	4.83			5.40			3.79			4.86			5.38		
Worker / shop assistant / apprentice (n=32)	4.93			5.68			3.48			5.04			5.66		
Homemaker (n=53)	5.10			5.43			4.17			5.23			5.66		
Student (n=56)	5.02			5.72			3.79			5.01			5.70		
Retired/Unoccupied (n=91)	4.69			5.25			3.53			4.71			5.42		

Note: df=Degree of freedom; ns= not significant

3.5 Insight into Dairy Consumption and PFIS

Consumption of milk and vegetable-based milk substitute drinks implied that most were not normally distributed (See Appendix A). For this reason, we chose to use a non-parametric test (Spearman rank correlation) to explore the relationship between the frequency with which milk and milk substitutes were consumed and scores on the PFIS. The results showed positive correlations between the PFIS total scores and the frequency of consumption of lactose-free milk ($r=0.122$, $p<0.01$) and vegetable beverages ($r=0.152$, $p<0.01$) (Table 11). When the relationship between the sub-factors of the PFIS scale and milk consumption was considered, the Social Affirmation factor was associated with more frequent consumption of lactose-free milk ($r=0.276$, $p<0.001$). Consumption of non-dairy beverages was positively correlated with scores on the Emotional Balance ($r=0.114$; $p<0.05$), Social-Affirmation ($r=0.140$; $p<0.01$) and Self-Realization ($r=0.133$; $p<0.01$) sub-factors.

Table 11. Spearman rank correlation between the frequency with which milk and non-dairy beverages were consumed and scores on the PFIS scale (N=452)

	Consumption of non-dairy beverages	**Consumption of cow's milk**	**Consumption of lactose-free milk**
PFIS (Total score)	0.152**	0.061	0.122**
Emotional Balance	0.114*	0.015	-0.049
Social-Affirmation	0.140**	0.124**	0.276***
Self-Realization	0.133**	0.027	0.092
Social Bonding	0.082	0.035	-0.004

Note: *p<0.05; **p<0.01; *** p < 0.001; PFIS=Psychological Food Involvement Scale

4. DISCUSSION

The purpose of this study was to validate a metric for assessing the level of Psychological Food Involvement in people and examine its structure and psychometric properties. The structure and psychometric properties of the Psychological Food Involvement scale (PFIS) were determined through an exploratory factor analysis, which identified the presence of four clearly interpretable sub-factors, each corresponding to different dimensions of Food involvement. Confirmatory factor analysis yielded a good model fit, suggesting the presence of four stable dimensions of Psychological Food Involvement that are: Emotional Balance, which investigates the emotion and psychophysical well-being that food engenders in people; Self-Realization, that explores the degree to which food and in particular one's food choices are an important means of expressing oneself and one's personality; Social Affirmation, which assesses how much food and one's food choices are perceived as an important means of being accepted by others and appearing to others as one wants

to be seen; and, Social Bonding, that investigates how much food is considered a means through which to express care of others and a way to strengthen the bond between them.

Regarding the construct validity of the PFIS, results suggested good convergent and discriminant validity. Indeed the PFIS scale appears to some extent related to the previously devised Food Involvement Scale (Bell & Marshall, 2003), given the high correlation between FIS and Emotional Balance, Self-Realization and Social Bonding factors. At the same time the PFIS is different to the FIS and non-redundant given the low correlation between FIS and the Social-Affirmation factor. The PFIS scale, therefore, is able to measure a facet of Food Involvement that was not captured by the FIS. This result can be explained by considering the items and the measure of the FIS scale. The FIS does not have items that investigate the extent to which food and food choices are considered a means to be accepted by others (Social Affirmation), but rather it maps the consumer-food relationship onto the five phases of Goody's food provisioning process (acquisition, preparation, cooking, eating, and disposal) (Bell & Marshall, 2003).

As hypothesised, the Variety Seeking Scale (Van Trijp & Steenkamp, 1992) and the General Health Interest Scale (Roininen et al., 1999) were both positively correlated with the PFIS. As already showed by previous studies (Bell & Marshall, 2003; Derinalp Çanakçı & Birdir, 2020), this implies that people who are more psychologically involved in food are also more interested in healthy eating and more likely to vary their diet by seeking out new foods.

Considering the sub-factors of Psychological Food Involvement (PFIS), it could be argued that the *Emotional Balance* dimension is measured by previous scales of Food Involvement that have emphasized how food can be used as a source of joy and well-being (Lee et al., 2019; Zaichkowsky, 1987), there appear to be fewer metrics that have considered the Self-Realization, Self-Affirmation and Social-Bonding factors.

The *Self-Realization* factor, described as the degree to which people use food as a means of expressing oneself and one's personality, was considered by previous Food Involvement scales as an antecedent of this construct and not as a facet of it (Bell & Marshall, 2003; Bruwer & Huang, 2012; De Boer et al., 2007; Zaichkowsky, 1994). However, more recent studies recognized this dimension of Food Involvement as paramount in understanding modern food choices (Qasim et al., 2019). Indeed, the paradigm used to understand modern food consumption has changed from product-centred to consumer-centred according to which the value of a food product and the involvement in it depends on how the product succeeds in reflecting the beliefs, values and identity of consumers (Dagevos & van Ophem, 2013). This means that consumers' perception of food quality and involvement in food is changing, such that they are not only determined by the

functional and taste characteristics of the product but also by the link between the product and one's own values and ideals (Lin & Nayga, 2022; Worsley et al., 2016). Consequently, although the emotional and symbolic value given to food may be elusive and ephemeral, it can have a powerful and overt impact on consumers' choices about what to eat (Dagevos & van Ophem, 2013).

Social Bonding, defined as the degree to which people use food as a means through which to express care for others and a way to strengthen the bond between them. Only one previous metric created by Robinson and Getz (2016) appears to have considered Social Bonding in Food Involvement. The tool, however, was validated ad hoc for application in the field of tourism and not specifically for food. The Social Bonding sub-factor of the (PFIS), therefore, is novel and offers potential in furthering our understanding of food choice. This facet of Food Involvement reflects the relationship that people have with food as shown by some studies on the dimensions and role of commensality (Giacoman, 2016). It has been argued that sharing a meal together with others enables the strengthening of social ties as a symbolic moment of sharing (Cappellini & Parsons, 2012; Fischler, 2011; Julier, 2013). As Mauss (2007) pointed out, hosts and the guests reproduce a dynamic of gifts and counter-gifts that lead to the strengthening of social ties among the subjects of a meal. This exchange, therefore, allows social bonds to be defended, because the gift symbolized by the meal is also rewarded through the support of those who constitute the group (Sobal, 2000).

The *Social-Affirmation* dimension is another novel facet of Food Involvement, described as the degree to which people use food as a means to signal their social identity to group members (Barthes, 2012) or to follow norms of a social group or culture (Weber & Morris, 2010). Although this dimension is novel, previous studies on Food Involvement and past research on food choices have already recognized this particular function performed by food (Almerico, 2014).

These data imply that the PFIS is a valid measure not only of these important aspects of Food Involvement but also of food choice. As predicted, the PFIS was able to discriminate between different dietary patterns. Higher scores on Food Involvement were associated with more frequent meat and fish consumption and wholegrain and legume consumption. Contrary to expectation, however, no relationship was observed between Food Involvement and the frequency with which the junk food pattern was consumed. These results suggest that psychological involvement in food is not a deterrent to unhealthy consumption but could be an important motivation that leads people to consume healthier foods. Given the nature of our analysis, however, we cannot determine if eating healthier is a consequence or antecedent of being more involved in food.

Although the Junk food (and drink) pattern was unrelated to total PFIS scores, when we looked at PFIS subfactors, those who had higher levels of Social Affirmation, that is, people who use food

to be accepted by others and become part of a group, reported consuming junk food more frequently. This finding is in line with previous research which points out that, especially among younger people, the consumption of junk food can be a key aspect of identity and being accepted by groups who adopt this eating style (Davison et al., 2015; Zahra et al., 2014). Making healthy food choices can mean having to eat different dishes and therefore often feeling out of place, "wired" or “different” from peers and friends (Brown et al., 2000), behaviours that may undermine one's affirmation in the target group. A study carried out by Exline et al. (2012) corroborates this assumption and showed that those with a greater need to be accepted by others ate more junk food when they believed that this eating styles is what others expected.

Wholegrain and legumes are foods frequently consumed by people that follow vegan or vegetarian diets (Orlich et al., 2014). Our results indicated that this pattern of consumption correlated positively with all the subfactors of PFIS. These findings are corroborated by previous research conducted on vegan women (Costa et al., 2019) and which highlighted how a vegan diet was not experienced by women as a simple dietary choice but rather as a means through which to express their values, to belong to and be accepted by a group and by strengthening their sense of agency, all of which are aspects that recall the subfactors of the PFIS.

Aperitif/snack food pattern was consumed more frequently by those who had higher scores on the PFIS Social Bonding sub-factor. These people may use food to strengthen relationships with others. As recognized by previous researchers, aperitif/snacks tend to be consumed in the context of conviviality, which allows people to strengthen their relationships with friends, especially in Italy (Pierguidi et al., 2020). Although this does not necessarily mean that these people consume aperitif/snacks more frequently than others, it is possible to assume that this dietary pattern represents Food Involvement linked to social situations.

The meat and fish consumption pattern was associated with higher levels of Emotional Balance and Social Bonding. This agrees with results of precedent studies that emotion is among the main variables affecting meat consumption (Circus & Robison, 2019) and consequently can be a major barrier to reduce it (Pohjolainen et al., 2015). Fish is consumed by Europeans as a treat (Verbeke & Vackier, 2005). In Italy, meat and fish are the main foods that are used when grilling with friends and sharing with loved ones (Collier et al., 2021; Palmieri et al., 2021). This dietary pattern characterised by frequent intake of meat and fish may also explain the relationship observed in this current study between Emotional Balance and Social Bonding factors.

Previous studies have claimed that the increase of lactose-free milk and non-dairy beverages consumption at the expense of traditional milk is attributed to psychological variables related to

value, cultural and symbolic aspects (Hartmann et al., 2018). Consequently, these types of products are, prototypical to study the Food Involvement (Ares et al., 2010) highlighting the need for further investigation (Castellini & Graffigna, 2022b). This study, therefore, has sought to understand the potential link between milk consumption and Food Involvement.

When the relationship between PFIS and the consumption of milk was considered, total scores on the scale were found to correlate positively with the consumption of non-dairy beverages and lactose-free milk. The Emotion Balance, Self-Realization and Social-Affirmation dimensions correlated positively with more frequent vegetable-based milk substitute beverage consumption, reflecting the symbolic value attributed to this type of product, consumption of which was related to self-expression, acceptance by others, and with a strong emotional connotation. Social Bonding was unrelated to milk consumption, suggesting that it is not perceived as a class of product that is consumed in a group context. These results have been corroborated previously in a research study that compared consumption of cow's milk versus plant-based milk substitutes (Haas et al., 2019) and which showed that the psychological aspects and in particular one's own personal values were the main motivation for choice of plant-based milk substitute beverages. These consumers claimed that the main motives for choosing these beverages were linked to sustainability reasons such as respect for animals and the environment. Consuming these products, therefore, may generate positive emotions through expression of peoples' values and beliefs and by satisfying deep needs related to self-realization and identity. Lactose-free milk consumption was associated with the Social Affirmation sub-factor possibly reflecting a need to belong to a target group. Other studies conducted on lactose-free milk consumption have also highlighted how social influence plays a key role in this type of consumption (Savarese et al., 2021). Other studies corroborate these findings by showing how the consumption of these products has become more of a (fashion) trend than a choice determined by intolerances or health-related reasons (Castellini & Graffigna, 2022b). It could be argued that the consumption of lactose-free milk is symbolically connoted by the consumer and fuelled by the need to belong to a group and represents a new food consumption trend that is becoming increasingly widespread, especially in Italy (Zingone et al., 2017).

Finally, if we consider the relationship between Psychological Food Involvement and socio-demographic characteristics we see that women had higher levels of Food Involvement than men. This finding agrees with other studies (De Alencar et al., 2016) and is in line with Italian culture in which women are those who devote more time and energy to meal management within households (Chytkova, 2011). Psychological Food Involvement levels were also higher among those with a higher level of education, as showed by past studies (Barker et al., 2008). Graduates from university

were more involved in food for Emotional Balance, Self-Affirmation and Self-Realization. The finding that younger people had greater emotional involvement is in line with past studies showing that younger people use food to control their mood and well-being more, in comparison to older people (Bailly et al., 2012; Braet et al., 2008; Dakanalis et al., 2013).

This study is not without limitations. That the sample included only Italian consumers renders it uncertain how valid the PFIS would be when tested with other populations. That the sample was biased toward those in professional occupations may also render it difficult to generalise form the results. Data used to validate the scale, including the food frequency questionnaire were self-reported and therefore subject to limitations inherent in dietary assessment using an FFQ (Kipnis et al., 2002). Future research will therefore be required to test the validity of the scale in other populations and to further assess its role in explaining food choices. It will be paramount to determine if this new scale of Food Involvement is more effective in predicting food choices than previous ones. It is will also be important to understand the main predictors of Psychological Food Involvement in different groups of people in order to intervene to increase their involvement in food and in turn promote healthy food choices.

5. CONCLUSION

In recent years food choices have changed, becoming more involved as a means of expression, identity and social recognition (Costa et al., 2019; Robinson & Getz, 2016). This has created the need to develop and use multidimensional metrics that are able to capture the dimensions and the psychological characteristics of Food Involvement and to better understand the deep symbolic relation between consumer and food (Castellini & Graffigna, 2022c; Dagevos & van Ophem, 2013). To fill this gap in the literature, the present work aimed to validate a new Psychological Food Involvement scale (PFIS), the development of which has been informed by the results of the study conducted by Castellini and Graffigna (2022c). In keeping with these prior qualitative findings, this scale measures the level of psychological involvement that people have in food by declining it into 4 subfactors: Emotional Balance; Social Affirmation; Self-Realization; and, Social Bonding. This metric has demonstrated good psychometric properties and is able to explain and discriminate between different dietary patterns. Given the potential of the PFIS, it could be useful both from a research perspective, to better predict modern food choices, and as a tool to assess consumer need and to design more effective and tailored interventions to promote healthy food consumption.

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APPENDIX A

Table 1A. Descriptive statistics for General Health Interest Scale, Food Variety Seeking Scale (VARSEEK) and Food Involvement Scale (FIS) (N = 476)

Scale	M	SD	Md	A	K
General Health Interest Scale	4.43	1.07	4.25	-0.05	0.55
Food Variety Seeking Scale (VARSEEK)	3.40	0.80	3.50	-0.68	0.66
Food Involvement Scale (FIS)	5.00	0.88	5.00	0.10	-0.67

Note: M=mean; SD=Standard Deviation; Md=median; A= asymmetry; K= kurtosis.

Table 2A. Descriptive statistics for Dietary Habits and Nutrition Beliefs Questionnaire (KomPAN) items (N = 476)

ITEM	M	SD	Md	A	K
bread and bakery products, e.g. wheat bread, rye bread, wheat/rye bread, toast bread, bread rolls	4.00	1.35	4.00	-0.28	-0.70
wholemeal (brown) bread/bread rolls	2.82	1.44	3.00	0.44	-0.77
white rice, white pasta, fine-ground groats, e.g. semolina, couscous	3.29	1.10	3.00	0.09	-0.44
buckwheat, oats, wholegrain pasta or other coarse-ground groats	2.57	1.37	2.00	0.47	-0.84
fast foods, e.g. potato chips, hamburgers, pizza, hot-dogs	2.20	0.88	2.00	0.99	1.81
fried foods (e.g. meat or flour-based foods such as dumplings, pancakes etc.	2.47	0.91	2.00	0.70	0.87
butter as a bread spread or as an addition to your meals/ for frying/ for baking etc	2.31	1.20	2.00	0.80	0.11
lard as a bread spread, or as an addition to you meals/ for frying/ for baking etc.	1.43	0.92	1.00	2.53	6.62
drink milk (including	3.81	1.57	4.00	-0.55	-1.03

flavoured milk, hot chocolate, latte					
fermented milk beverages, e.g. yoghurts, kefir (natural or flavoured)	3.04	1.44	3.00	0.06	-1.04
fresh cheese curd products, e.g. cottage cheese, homogenised cheese, fromage frais	3.18	1.09	3.00	-0.01	-0.24
cheese (including processed cheese, blue cheese)	3.63	1.01	4.00	-0.10	0.38
cold meats, smoked sausages, hot-dogs	3.28	0.99	3.00	-0.18	0.19
red meat, e.g. pork, beef, veal, mutton, lamb, game	3.09	0.95	3.00	-0.23	0.11
white meat, e.g. chicken, turkey, rabbit	3.36	0.94	4.00	-0.37	0.59
fish	3.07	0.89	3.00	-0.12	-0.07
pulses-based foods, e.g. from beans, peas, soybeans, lentils	3.26	0.94	3.00	-0.04	0.09
fruit	4.74	1.21	5.00	-0.77	-0.04
vegetables	4.57	1.15	4.00	-0.46	-0.13
sweets, e.g. confectionary, biscuits, cakes, chocolate bars, cereal bars, other	3.78	1.17	4.00	-0.09	-0.58
tinned (jar) meats	1.80	0.99	2.00	1.42	2.37
drink sweetened carbonated or still beverages such as Coca-Cola, Pepsi, Sprite, Fanta, lemonade	2.50	1.21	2.00	0.70	0.05
energy drinks such as Red Bull, Monster, Rockstar or other	1.63	0.99	1.00	1.78	3.14
alcoholic beverages	2.73	1.32	3.00	0.48	-0.39

Note: M=mean; SD=Standard Deviation; Md=median; A= asymmetry; K= kurtosis.

Table 3A. Descriptive statistics for Frequency consumption of cow's milk and non-dairy beverages items (N = 452)

ITEM	M	SD	Md	A	K
1.Consumption of cow's	*1.90*	*0.88*	*1.66*	*1.51*	*2.71*

milk					
Fresh semi-skimmed cow's milk with lactose	2.35	1.42	2.00	0.74	-0.59
UHT semi-skimmed cow's milk with lactose	2.18	1.33	2.00	0.93	-0.18
Fresh skimmed cow milk with lactose	1.68	1.12	1.00	1.76	2.31
UHT skimmed cow milk with lactose	1.59	1.04	1.00	2.03	3.98
Fresh whole cow milk with lactose	1.97	1.32	1.00	1.34	0.77
UHT whole cow's milk with lactose	1.44	0.96	1.00	2.33	5.18
2. Consumption of lactose-free milk	*1.57*	*0.90*	*1.16*	*2.07*	*4.35*
Lactose-free fresh semi-skimmed cow's milk	1.75	1.21	1.00	1.57	1.53
UHT semi-skimmed cow's milk lactose-free	1.79	1.21	1.00	1.51	1.35
Fresh skimmed cow's milk without lactose	1.46	1.01	1.00	2.43	5.37
UHT skimmed cow's milk lactose free	1.50	1.02	1.00	2.23	4.50
Lactose-free fresh whole cow's milk	1.50	1.01	1.00	2.19	4.20
UHT whole cow's milk lactose free	1.44	0.96	1.00	2.33	5.18
3. Consumption of non-dairy beverages	*1.38*	*0.74*	*1.00*	*3.01*	*10.48*
Soy vegetable drink	1.57	1.02	1.00	1.95	3.25
Rice vegetable drink	1.48	1.03	1.00	2.48	5.95
Oat vegetable drink	1.48	0.99	1.00	2.41	5.78
Vegetable nut drink	1.24	0.72	1.00	3.55	14.17
Vegetable almond drink	1.53	0.89	1.00	2.15	5.31
Vegetable Hazelnut Drink	1.29	0.77	1.00	3.21	11.27
Coconut Vegetable Drink	1.38	0.87	1.00	2.76	8.02
Millet Vegetable Drink	1.22	0.77	1.00	4.02	17.16
Chestnut Vegetable Drink	1.22	0.75	1.00	3.89	15.68

Note: M=mean; SD=Standard Deviation; Md=median; A= asymmetry; K= kurtosis.

Supplementary material A

Assumption Tests: Multivariate normality and outliers

We assessed the normality of the all measures presented in the questionnaire. Considering the values of asymmetry and kurtosis (<±2 is acceptable) (Byrne, 2013; Hair et al., 2010). The Food variety seeking Scale (VARSEEK) (Van Trijp and Steenkamp, 1992), the Food Involvement scale (FIS) (Bell and Marshall, 2003) and General Health Interest Scale (Roininen et al., 1999) were normally distributed while we had normal distribution issues regarding the frequency of consumption (Table 1A). In particular, considering the Dietary Habits and Nutrition Beliefs Questionnaire (KomPAN) (Kowalkowska et al., 2018) the consumption of lard showed a non-normal distribution and the distribution of most of the consumption of milk and vegetable drinks. Given these results we decided not to consider lard consumption in the further analyses. Regarding Consumption of milk and vegetable beverages we decided not to eliminate these outliers but to use nonparametric methods (Spearman's rank correlation) to respond to our aim, preserving the sample size.

Table 1A. Descriptive statistics for all scales' items used in the questionnaire (n = 512)

ITEM	M	SD	Md	A	K
1. The Food variety seeking Scale (VARSEEK)					
When I eat out, I like to try the most unusual items, even if I am not sure I would like them.	3.25	1.095	3.00	-.445	-.358
While preparing foods or snacks, I like to try out new recipes	3.69	.953	4.00	-.709	.381
I think it is fun to try out food items one is not familiar with.	3.66	.948	4.00	-.799	.604
I am eager to know what kind of foods people from other countries eat.	3.69	1.098	4.00	-.761	.016
I like to eat exotic foods.	3.23	1.087	3.00	-.274	-.466
Items on the menu that I am unfamiliar with make me curious.	3.54	1.046	4.00	-.716	.065
I prefer to eat food products I am used to.	3.41	.969	3.00	-.146	-.300
I am curious about food products I am not	3.52	1.026	4.00	-.735	.224

familiar with.					
2.General Health Interest Scale					
The healthiness of food has little impact on my food choices	3.72	1.787	4.00	.089	-.954
I am very particular about the healthiness of food I eat	4.94	1.517	5.00	-.545	-.156
I eat what I like and do not worry much about the healthiness of food	3.76	1.764	4.00	.018	-.943
It is important for me that my diet is low in fat	4.32	1.626	4.00	-.216	-.557
I always follow a healthy and balanced diet	4.37	1.594	4.00	-.274	-.385
It is important for me that my daily diet contains a lot of vitamins and minerals	4.94	1.446	5.00	-.448	-.062
The healthiness of snacks makes no difference to me	3.40	1.818	3.00	.318	-.868
I do not avoid foods, even if they may raise my cholesterol	4.05	1.666	4.00	-.144	-.598
3.Food Involvement Scale					
I don't think much about food each day.	3.53	1.518	4.00	.127	-.367
Cooking or barbequing is not much fun.	3.16	1.890	3.00	.511	-.838
Talking about what I ate or am going to eat is something I like to do.	4.61	1.564	5.00	-.283	-.436
Compared with other daily decisions, my food choices are not very important.	3.17	1.748	3.00	.477	-.693
When I travel, one of the things I anticipate most is eating the food there.	5.32	1.562	6.00	-.736	-.164
I do most or all of the clean up after eating.	5.38	1.503	6.00	-.708	-.129
I enjoy cooking for others and myself.	4.74	1.834	5.00	-.441	-.827
When I eat out, I don't think or talk much about how the food tastes.	3.25	1.616	3.00	.308	-.578
I do not like to mix or	2.91	1.741	3.00	.579	-.642

chop food.					
I do most or all of my own food shopping.	5.12	1.761	5.00	-.628	-.632
I do not wash dishes or clean the table.	2.18	1.632	1.00	1.308	.709
I care whether or not a table is nicely set.	4.76	1.699	5.00	-.331	-.746
Dietary Habits and Nutrition Beliefs Questionnaire (KomPAN)					
bread and bakery products, e.g. wheat bread, rye bread, wheat/rye bread, toast bread, bread rolls	3.98	1.355	4.00	-.276	-.687
wholemeal (brown) bread/bread rolls	2.79	1.449	3.00	.454	-.763
white rice, white pasta, fine-ground groats, e.g. semolina, couscous	3.28	1.104	3.00	.096	-.451
buckwheat, oats, wholegrain pasta or other coarse-ground groats	2.54	1.358	2.00	.487	-.821
fast foods, e.g. potato chips, hamburgers, pizza, hot-dogs	2.18	.877	2.00	.968	1.704
fried foods (e.g. meat or flour-based foods such as dumplings, pancakes etc.	2.46	.927	2.00	.674	.689
butter as a bread spread or as an addition to your meals/ for frying/ for baking etc	2.33	1.206	2.00	.762	-.033
lard as a bread spread, or as an addition to you meals/ for frying/ for baking etc.	1.44	.943	1.00	2.476	6.089
drink milk (including flavoured milk, hot chocolate, latte	3.80	1.563	4.00	-.547	-1.028
fermented milk beverages, e.g. yoghurts, kefir (natural or flavoured)	3.05	1.440	3.00	.044	-1.058
fresh cheese curd products, e.g. cottage cheese, homogenised cheese, fromage frais	3.17	1.105	3.00	.002	-.277
cheese (including	3.63	1.023	4.00	-.071	.327

processed cheese, blue cheese)					
cold meats, smoked sausages, hot-dogs	3.25	1.012	3.00	-.189	.075
red meat, e.g. pork, beef, veal, mutton, lamb, game	3.08	.972	3.00	-.260	.021
white meat, e.g. chicken, turkey, rabbit	3.35	.944	4.00	-.421	.560
fish	3.06	.907	3.00	-.116	-.161
pulses-based foods, e.g. from beans, peas, soybeans, lentils	3.25	.955	3.00	-.036	-.055
fruit	4.74	1.210	5.00	-.761	-.079
Vegetables	4.56	1.147	4.00	-.437	-.164
sweets, e.g. confectionary, biscuits, cakes, chocolate bars, cereal bars, other	3.77	1.172	4.00	-.083	-.590
tinned (jar) meats	1.80	.996	2.00	1.403	2.206
drink sweetened carbonated or still beverages such as Coca-Cola, Pepsi, Sprite, Fanta, lemonade	2.50	1.215	2.00	.659	-.055
energy drinks such as Red Bull, Monster, Rockstar or other	1.64	1.013	1.00	1.814	3.212
alcoholic beverages	2.72	1.316	3.00	.489	-.387
Milk and non-dairy beverages frequency of consumption					
Fresh semi-skimmed cow's milk with lactose	2.35	1.414	2.00	.739	-.593
Lactose-free fresh semi-skimmed cow's milk	1.77	1.224	1.00	1.519	1.314
UHT semi-skimmed cow's milk lactose-free	1.81	1.230	1.00	1.465	1.126
UHT semi-skimmed cow's milk with lactose	2.14	1.314	2.00	.962	-.138
Fresh skimmed cow milk with lactose	1.65	1.091	1.00	1.811	2.561
Fresh skimmed cow's milk without lactose	1.51	1.075	1.00	2.308	4.684
UHT skimmed cow's milk lactose free	1.52	1.035	1.00	2.156	4.046
UHT skimmed cow milk with lactose	1.60	1.037	1.00	1.954	3.540
Fresh whole cow milk with lactose	1.96	1.319	1.00	1.322	.683

Lactose-free fresh whole cow's milk	1.52	1.035	1.00	2.082	3.565
UHT whole cow's milk lactose free	1.48	1.016	1.00	2.237	4.530
UHT whole cow's milk with lactose	1.65	1.071	1.00	1.789	2.733
Soy vegetable drink	1.57	1.046	1.00	1.970	3.315
Rice vegetable drink	1.52	1.083	1.00	2.364	5.156
Oat vegetable drink	1.49	.987	1.00	2.374	5.578
Vegetable nut drink	1.25	.730	1.00	3.445	13.129
Vegetable almond drink	1.54	.935	1.00	2.237	5.661
Vegetable Hazelnut Drink	1.30	.816	1.00	3.245	11.269
Coconut Vegetable Drink	1.39	.902	1.00	2.786	7.978
Millet Vegetable Drink	1.23	.782	1.00	3.943	16.322
Chestnut Vegetable Drink	1.22	.739	1.00	3.840	15.294

Note: M=mean; SD=Standard Deviation; Md=median; A= asymmetry; K= kurtosis.

Concerning the PFIS scale, we first considered the univariate outliers (Table 2A). If we look at the Asymmetry and Kurtosis values of the distributions, we can see that all items are normal distributed.

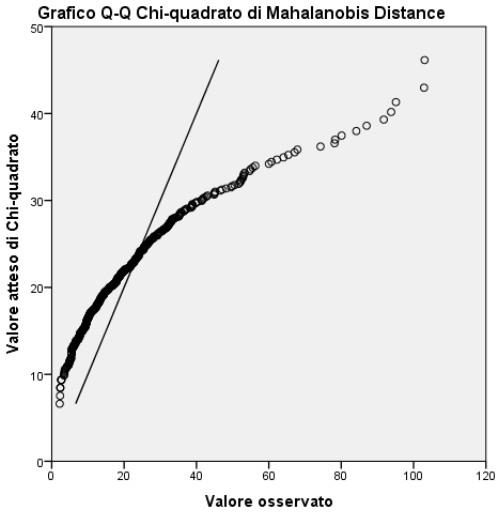
Table 2A. Descriptive statistics for PFIS items (n = 512)

ITEM	M	SD	Md	A	K
PFIS1	5.83	1.299	6.00	-1.155	1.135
PFIS2	5.48	1.280	6.00	-.546	-.354
PFIS3	5.21	1.431	5.00	-.580	-.059
PFIS4	5.40	1.405	6.00	-.735	.134
PFIS5	5.08	1.506	5.00	-.612	-.122
PFIS6	5.13	1.546	5.00	-.653	-.113
PFIS7	5.12	1.449	5.00	-.489	-.169
PFIS8	4.87	1.566	5.00	-.475	-.357
PFIS9	5.00	1.535	5.00	-.548	-.154
PFIS10	4.91	1.610	5.00	-.573	-.267
PFIS11	4.79	1.627	5.00	-.487	-.354
PFIS12	4.63	1.664	5.00	-.475	-.365
PFIS13	3.89	1.888	4.00	-.078	-.998

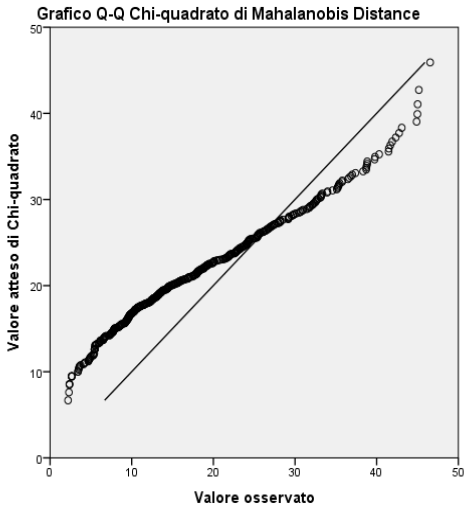
PFIS14	3.98	1.886	4.00	-.126	-1.019
PFIS15	3.54	1.980	4.00	.126	-1.198
PFIS16	3.06	2.013	3.00	.526	-1.047
PFIS17	4.25	1.882	4.00	-.318	-.900
PFIS18	5.48	1.460	6.00	-.955	.561
PFIS19	5.57	1.411	6.00	-1.075	.908
PFIS20	5.45	1.503	6.00	-.950	.470
PFIS21	5.40	1.517	6.00	-.947	.527

Note: M=mean; SD=Standard Deviation; Md=median; A= asymmetry; K= kurtosis; Answering scale from 1 = 'strongly disagree' to 7 = 'strongly agree'.

Moreover, Mardia's coefficient was used to evaluate multivariate normality (Mardia,1970) comparing the Mardia's coefficient with the critical ratio. However, Mardia's coefficient suggested that the data did not follow multivariate normality (Mardia's coefficient=700.97; Critical Ratio=483). Consequency, Mahalanobis distance was used to detect multivariate outlier. From this analysis we found the presence of 36 multivariate outliers that were eliminated from our database. After removing outliers, we recalculated the Mardia's coefficient value that now it has reduced (Mardia's coefficient=409.24; Critical Ratio=483) showing a distribution that does not deviate from the normal multivariate (Fig. 1A). After performing these analyses, 476 subjects remained in the final database and they were considered for subsequent scale validation and sample analysis.



With all participants



With selected participants (n=476)

FIG. 1A. Plot of quantiles related to Mahalanobis distance.

CHAPTER FOUR

Food Involvement to understand new food trends: lesson learned from studies on consumption of cow's milk and plant-based beverages in the Italian context

The consumers in last years have changed; They are no longer looking for products exclusively for quality and their utilitarian value but searching for goods that reflect their own values and beliefs (Gil-Giménez et al., 2021). Food consumption choices represent a privileged field of study of this consumer evolution (Costa et al., 2019).

In particular, a consumption trend that seems to reflect these consumer changes is related to the purchase of plant-based and lactose-free beverages to replace cow's milk with lactose. The consumption of dairy products and milk has been decreasing in a progressive way (Zingone et al., 2017) especially in Italy. On the other hand, lactose-free milk and vegetable drinks consumption is increased (Dekker et al., 2019; IRI, 2019). Although these products were created for intolerant people most of consumers who buy lactose-free milk and vegetable drinks don't have any intolerances and allergies to lactose or milk proteins (Savarese et al., 2021). From this evidence it is clear that there are other reasons, mainly of a psychological nature, which lead to choose lactose-free milk and vegetable drinks, decreasing the consumption of cow's milk. Indeed, the scientific literature claimed that these types of consumption are strongly governed by emotional, identity and psychological aspects linked to emotions and to a need for self-affirmation and self-expression rather than rational and conscious processes (Haas et al., 2019; Hartmann et al., 2018; Savarese et al., 2021).

Consequently, to better understand these food choices, it is necessary to change the paradigm of studying the consumer by switching from a product-centred to a consumer-centred paradigm in which the emotional and symbolic value given to food assume a key role to understand the contemporary food consumption choices (Dagevos & van Ophem, 2013). In this direction, the consumer psychology could be an important key to understand the psychological and symbolic interpretation of food consumption.

However, there is not a construct and validated measures in the literature on food consumption behaviours universally recognized to measure psychological dimensions elicited by food even if the

most widely used measures with this purpose is Food Involvement. It is defined as "*the perceived relevance of the object to the person's intrinsic needs, values, and interests*" (Zaichkowsky, 1985, p. 342) and "*the level of interest and concern that the consumer perceives with respect to a purchase decision*" (Mittal, 1989, p. 150) characterized by a psychological nature (Slama & Tashchian, 1985). Despite the undoubted value of the Food Involvement for understanding modern consumer choices (Chen, 2007; Eertmans et al., 2005), in literature there are many different definitions and measurement scales used to capture it. This shows that, to date, there is a lack of scientific agreement on the structural dimensions of this construct and its reliable measurement scales (Kotler & Keller, 2006; Krugman, 1965)

Based on these premises, this study aims to deepen the psychological experience of investment (emotional and behavioural) in food. This in order to better explain the phenomenon of Food Involvement and to generate a valid and effective scale that can capture it, by contributing to predict food consumption behaviours and in particular the consumption of cow's milk and non-dairy beverages.

To answer this research question, a mixed-methods study was implemented, combining both qualitative and quantitative approaches. In more detail, three studies were conducted.

In Study 1, with the aim of deeply assessing currently used scales to evaluate the involvement in food, a systematic literature review has been conducted. This study sought to systematize their considered psychological domains and to analyse their psychometric properties. The results underlined a lack of a comprehensive approach to define and measure the Food Involvement that is able to grasp the experiential shades of the different psychological domains implied in this experience.

According to the gaps identified in the second study, Study 2 focused on deepening the subjective experience of individuals involved in food consumption in order to explore the personal meanings that consumers attribute to Food Involvement and to detect the psychological domains that characterize this lived experience. A qualitative study with 14 individuals with medium or high levels of Food Involvement and belonging to three different prototypical profiles (mothers, cooks or athletes) was developed. The study was carried out according to the principles of Interpretative Phenomenological Analysis (IPA). In brief, the results showed that Food Involvement could be defined as *"a deep relationship between the consumer and food that allows satisfying one's ambitious transformative project that involves the self, the other or both actors [..]Briefly, Food Involvement could represent the degree to which food is used to enable one's transformative project oriented towards self, other or both actors".* In particular, this study showed that involvement in

food is mainly determined by four psychological domains: the emotional domain (being involved in food means to use food to reach the psychological emotional balance); the identity domain related to self-realization (being involved in food means to use food to reach self-realization) and social affirmation (being involved in food means to use food to reach social affirmation) and the domain related to the social psychological dimension (being involved in food means to use food to strengthen social bonds with loved ones). These findings definitely highlighted the complex psychological nature of the Food Involvement construct by highlighting the need for new scales able to assess it.

Based on the findings coming from the qualitative research, the Study 3, carried out in collaboration with the Faculty of Social Science at the University of Bradford (UK), aimed to develop and validate a new scale of Food Involvement (Psychological Food Involvement Scale, or PFIS) testing its ability to explain the consumption of cow's milk (with and without lactose) and non-dairy beverages. A quantitative study was conducted using an on-line survey filled out by 512 Italians. The results showed that the Psychological Food Involvement Scale (PFIS) has good validity and reliability and it is composed by twenty items grouped in four factors (Emotional Balance, Social Affirmation, Self-Realization and Social Bonding), corroborating the findings that come from the qualitative phase. This construct evaluates the degree to which food is used to achieve one's transformative project aimed at reaching emotional balance, social affirmation, self-realization and/or social bonding. In particular the factor called Emotional Balance investigates the emotion and psychophysical well-being that food determines in people; the factor called Self-Realization explores how much food and in particular one's food choices are an important means of expressing oneself and one's personality; the third factor is Social Affirmation and it assess how much food and one's food choices are an important means of being accepted by others and appearing to others as one wants to be seen and the last factor is Social Bonding that investigates how much food is considered a means through which to take care of loved ones and a way to strengthen the bond between them. Moreover, it was showed that the PFIS is able to explain some modern food trends such as the consumption of vegetable drinks and lactose-free milk noting a symbolic value given to them. In particular, if we consider the relationship between the four factors of the scale and consumption, we note that the social affirmation mainly characterizes the consumption of lactose-free milk while the consumption of non-dairy beverages is correlated with the emotional balance, social-affirmation and self-realization factors.

Even if further research is needed in order to give more consistency to these results, it is possible to trace some important key findings of this study which offer both scientific and pragmatic opportunities for agri-food actors (see Table 1).

A simple but important discovery is that behind some new consumption trends - such as those of lactose free milk or non-dairy beverages - there is a strong psychological component linked to a process of identity and social construction that goes beyond the simple utilitarian value given to food. These consumers, indeed, use food to rebuild themselves and to reach their own transformative project. From this perspective, some inexplicable or apparently contradictory phenomena, such as the "free-from" or vegan/vegetarian diets, can be framed as an attempt to re-gain lifestyle projects and plans. In supporting this way to look at food phenomenon, a consumer psychology glance on involvement in food can offer a key to understanding these deep symbolic processes that drive people's orientations and consumptions. It is therefore clear that to figure out the consumer perspective, psychological approach and the study of Food Involvement are essentially needed, because able to go over the surface of the phenomenon to explore deep meaning-making processes. Moreover, understanding the meaning-making processes related to food choices allow to better forecast the consumer behaviours and the implicit and subthreshold levers on which to leverage in order to promote behavioural changes.

In addition, this study created and validated a new scale that is able to measure the involvement that people have in food by considering the different psychological dimensions elicited by this phenomenon, aspects missing in the scales used so far in the literature. The use of this new scale could be very important for understanding other novel consumption trends that are related to consumers' identity and life objectives (i.e., sustainable consumption trends, such as organic food consumption or preference for fair trade markets). Based on this evidence, it is possible to believe that Food Involvement could have the role in moderating the influence between consumers' more explicit motivations and the consumptions' behaviours, working on a deeper and more elaborative level. This means that it possible to hypnotized that people with the same explicit motivation but with different levels of Food Involvement could behave in different way and make dissimilar food consumption choices.

Finally, the present study showed that people with high levels of Food Involvement follow healthier diets. This result could be very relevant for future public health policy actions. In fact, working on increasing and enhancing Food Involvement by promoting citizen participation in their food choices through educational interventions could induce citizens to change their eating habits,

making them healthier and compliant with the suggested guidelines (Jezewska-Zychowicz et al., 2020).

To conclude, this dissertation appears as a first attempt that, reflecting on the critical case of milk consumption, would underline potentialities for psychology and in particular for the Food involvement construct to understand novel consumption trends and promote consumer health.

Despite the value of this work, it has some limitations that could be improved. The first limitation is related to the systematic review carried out in the first study. It showed that the scale used so far to capture the different levels of FI, fail to achieve both theoretical robustness and methodological rigor. However, the evaluation of studies and metrics through a checklist does not distinguish between the low quality of the study and a lack of details reported in the article, and therefore, it is not always clear if the low methodological rigor assessed represents the real methodological value of the scales. Moreover, other limitations concern the population that was involved in the second and third study. Indeed, these studies are carried out only on Italian consumers; therefore, it is uncertain how valid the PFIS would be when tested on other populations and if the meanings give to FI are the same for people with different nationality. Moreover, the consumption behaviours considered in these studies are self-reported and not real ones.

Given these limitations, future research should figure out if the meanings and the value given to FI is the same for people with different nationality, showing potential differences and similarities. Moreover, it would be interesting to test the validity of the PFIS in other populations and assess the predictivity and its role in explaining novel food consumption choices. This further validation of the scale on other populations will be a future development of the present study and will be carried out in collaboration with the University of Bradford (UK) with whom the second study of this thesis was carried out. Furthermore, it is also paramount to understand if this new scale is more able to forecast some food choices than previous ones, assessing if the PFIS is more accurate and effective in evaluating FI. Finally, it is interesting to implement the analysis of observational data or the use of experimental methods as an alternative to survey methods to study real food consumption behaviours and understand the role of FI.

Table 1. Key finding and their scientific and application relevance

Study	Key findings	Scientific relevance	Potential applications
1. Assessing involvement with food: a systematic review of measures and tools	• FI is a paramount variable to understand and predict food consumption however there is a lack of a comprehensive approach to define and measure the FI that can grasp the experiential shades of the different psychological domains implied in this experience.	• Underlines the need to increase studies on FI oriented by a solid psychological analysis of the phenomenon, in order to develop a comprehensive definition and scale able to generate rigorous, comparable, and readable results.	• The study warns the actors of the food system who use these scales to assess the different levels of FI of consumers (e.g., before and after an educational intervention), highlighting how these metrics are incomplete since they capture this phenomenon only partially
2. "Food is more than just a source of nutrients": a qualitative phenomenological study on Food Involvement	• FI could be defined as the degree to which food is used to enable one's transformative project oriented towards self, other or both actors. • It is mainly determined by four psychological domains: the emotional domain; the identity domain related to self-realization and social affirmation and the domain related to the social psychological dimension.	• Enriches the available theory on FI, particularly about the psychological dimensions and the role attributed to it by consumers • Gives important insights about how to study, define and measure FI	• This study shows that if the actors of the food system want to understand and better predict consumption choices it is necessary that they comprehend the hidden motivation and meanings behind them applying a multidisciplinary approach that involves psychological principles and FI
3.Development and validation of the Psychological Food Involvement Scale (PFIS)	• PFIS has good validity and reliability and it is able to evaluate the degree to which food is used to achieve one's transformative project aimed at reaching emotional balance, social affirmation, self-realization and/or social bonding. • PFIS is able to predict dietary patterns and in particular the healthier ones • PFIS is able to explain some modern food trends such as the consumption of vegetable drinks and lactose-free milk noting a hidden symbolic value given to them.	• The study fills the lack in the literature of a scale that comprehensively measures the FI considering the social, identity and emotional dimensions • Allows evaluating, comparing, and using in predictive models the level of FI that people feel in food	• Creation of PFIS gives the possibility to agri-food actors to have an effective metric that can assess FI, allowing to better predict contemporary food consumption behaviours • Using FI as a lever to incentive behavioural change effectively toward healthy and more sustainable consumption models.

Note: FI= Food Involvement, PFIS= Psychological Food Involvement Scale

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