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Are gluten-free products healthy for non-celiac consumers? How the perception of well-being moderates gluten-free addiction

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ABSTRACT

Gluten-free products are showing an acceleration in assortment and sales growth. Nevertheless, these data should be read considering that a minimal share of the population is allergic or intolerant to gluten compared to the market share of gluten-free products. This study aims to understand why non-gluten-sensitive consumers purchase and consume gluten-free products. Through a survey, we seek to explore how the perception of well-being can contribute to the desire for gluten-free products among these consumers, potentially leading to an addiction to such products. A sample of 182 Italian consumers with no disease, such as Celiac Disease, Gluten Sensitivity, or Dermatitis Herpetiformis, was surveyed online. The empirical results of the Structural Equation Model highlight that the purchase of gluten-free products is based solely on hedonistic-emotional psychological motivations. Furthermore, care for well-being positively moderates the intention-addiction relationship leading healthy consumers to be addicted to gluten-free products. Medical studies have highlighted problems with the consumption of gluten-free products by healthy individuals. However, results evidence a growing trend among the population to consume gluten-free products for psychological and well-being reasons. These findings sparked a debate on the topic and raised important considerations for operators and policymakers.

1. Introduction

Gluten-free products (GFPs) are foods and beverages made from ingredients that do not include cereals containing gluten (such as wheat, barley, and rye) or derivatives of these cereals specially processed to remove the gluten they previously contained (Pellegrini & Agostoni, 2015). The European Union defines GFPs as foods containing not more than 20 mg/kg of gluten (EU, Regulation No 828/2014, 2014). These products are fundamental to treating people suffering from celiac disease whose diet is based on gluten-free foods (Ludvigsson & Green, 2011). Celiac disease is a genetically inherited condition that affects the immune system, causing a reaction to gluten consumption (Husby et al., 2012). Eliminating foods that contain wheat, barley, and rye fosters the alleviation of symptoms, enhances histological and serological attributes, and leads to an improved quality of life, potentially reducing mortality as well (do Nascimento et al., 2014).

Studies conducted in recent years have estimated that 1 % of the world's population suffers from celiac disease (Bradauskiene et al., 2023). It is a disease that is widespread worldwide, although with geographical differences (Singh et al., 2018) due to genetic and environmental factors, including patterns of wheat consumption (Catassi et al., 2014; Lionetti et al., 2015; Ludvigsson & Lebwohl, 2020). However, Prada et al. (2019) estimate that the American population who consume GFPs is 25 %, a much higher percentage than the number of celiac Americans. Similarly, in Italy, 6 million non-celiac people have adopted a gluten-free diet (Associazione Italiana Celiachia, 2017). This means that most consumers of GFPs have no health-related reasons to consume them.

The global GFP market reached $19.1 billion in 2022 and is expected to reach $30.5 billion by 2028 (IMARC Group, 2023). The spread of GFP sales is providing companies with a huge market, driving them to expand their selection of GFPs (Larson, 2019). Thanks to a broad assortment and an improved quality of GFPs – available in both physical stores and online – consumers can easily purchase and consume such products (Lee et al., 2007).

Increased consumption of GFPs is certainly driven by an increased

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awareness of gluten-related disorders. However, the growth of the GFP market is also due to the belief that a gluten-free diet is a healthier and more effective choice for weight management (Christoph et al., 2018; el Khoury et al., 2018; Hartmann et al., 2018; Kaminsky et al., 2020; Laszkowska et al., 2018). However, the Harvard School of Public Health (2018) states that removing gluten from the diet does not improve the health of non-celiac individuals. On the contrary, it places them at risk of nutrient deficiencies of macro and micro-nutrients. Compared to conventional products, gluten-free versions are nutritionally inferior: they contain fewer minerals, vitamins, proteins, and fibres, as well as more calories, fat, and sodium (e.g. Aguiar et al., 2023; Diez-Sampedro et al., 2019; Roman et al., 2019; Thompson, 2000; Vici et al., 2016). Accordingly, non-celiac consumers purchase and consume GFPs based on inaccurate beliefs, with no scientific basis (Cristoph et al., 2018).

In addition to low nutritional aspects, GFPs are also more expensive, with prices two to three times higher than similar standard products (Estévez et al., 2016; Panagiotou & Kontogianni, 2017). However, it has been proven that individuals without celiac disease are more willing to spend extra money to buy GFPs (Diez-Sampedro et al., 2019). Moreover, other studies showed that overall the taste of GFPs is worse than their gluten counterparts (Alencar et al., 2021; Arendt & Dal Bello, 2008; do Nascimento et al., 2014), although, the quality seems to have improved in recent years (Tóth et al., 2022).

Within this context, the scope of this study is to shed light on the reasons leading people without celiac disease to deprive themselves of gluten in their diet. This study seeks to answer the following research question:

RQ: Why do non-celiac consumers purchase and consume GFPs despite their lower nutritional quality, worse taste, and higher price?

In the literature, several studies have investigated factors that impact the adherence to a gluten-free diet (e.g. Arigo et al., 2012; Corposanto et al., 2015; Ford et al., 2012; Silvester et al., 2016; Villafuerte-Galvez et al., 2015; Xhakollari et al., 2021), considering celiac patients. For example, higher levels of education have a positive correlation with sufficient adherence. Additionally, adoption scores were found to be associated with perceptions of cost, the effectiveness of the gluten-free diet, knowledge of the gluten-free diet, and self-efficacy in adhering to the gluten-free diet (Villafuerte-Galvez et al., 2015). Others have focused on the sensorial perception of GFPs (do Nascimento et al., 2014; Laureati et al., 2012; Magano et al., 2022; Pontual et al., 2017), sometimes comparing celiac and non-celiac consumers (Capriles et al., 2023). Still others have conducted studies using eye-tracking techniques to analyse the elements of GFPs packaging that receive the most attention during the purchasing process (Puerta et al., 2022; Sielicka-Różyńska et al., 2021). After systematically reviewing the literature on factors affecting consumers' adherence to gluten-free diets, Xhakollari et al. (2019) note the lack of studies on non-celiac consumers who follow the gluten-free diet voluntarily. Christoph et al. (2018) and Xhakollari and Canavari (2019) reached the same conclusions, arguing that research on GFP should focus on the motivations behind its consumption. Furthermore, Savarese et al. (2021) stated that, since the consumption of GFPs has become a social and health phenomenon (no longer linked only to clinical needs), a greater contribution is needed from the social and humanities disciplines to study the determinants of this consumption.

This study intends to fill these gaps by focusing on non-celiac consumers and applying the Mojet model (Köster, 2009) to identify the factors that drive them to purchase GFPs. The scope of the study is to theoretically and empirically test how several factors, namely psychological, situational, and product-specific factors may lead non-celiac consumers to buy GFPs, even in the absence of medical conditions. The focus is on the purchase intention and the habit of buying GFPs, also considering the mediating effect exerted by the attention on well-being. The sample is composed of non-celiac consumers who have no celiac family members. In this way we excluded the possibility that respondents consume GFPs to avoid food contamination at home, or to simplify the management of the family diet.

The remainder of the paper is organised as follows: the next section describes the proposed model and the research hypothesis; in the third section, the study methodology is explained; while in the fourth the results are discussed; finally, the results are discussed considering previous findings and managerial implications, and further research vectors are discussed.

2. Construct definition and research hypotheses

To achieve the stated objectives, a theoretical model including the antecedents of consumption behaviour was developed. Starting from the essential factors influencing eating and drinking behaviour and food choice identified by the Mojet model (Köster, 2009), we selected those mainly suiting the research objective and the analysis's context, namely: psychological factors, situational factors, and extrinsic product characteristics. These factors – and their sub-dimensions – are expected to determine the attitude towards GFPs, which in turn should have a direct impact on the purchase intention and buying habits. Finally, a moderation effect of well-being on intention-habit relationships is assumed.

2.1. Psychological factors: Emotional and hedonic values

Psychological factors significantly influence consumer behaviour and food choice (e.g. Caso & Vecchio, 2022; Köster & Mojet, 2015) since food intake is derived from the physiological and psychological characteristics of humans (Mela, 2021). Emotional and hedonic values fall within these factors.

2.1.1. Emotional value

When people evaluate a product, their opinion is based on perceived quality, but also on the feeling of pleasure felt, that is, the emotions experienced (Sweeney & Soutar, 2001). Emotions are an important element in the consumer decision-making process: they precede and are independent of cognition (Damasio, 1994; Le Doux, 1998; Zajonc, 1980). Moreover, emotions alter attention, memory, and reasoning processes (Damasio, 2003), influencing choice behaviour. In turn, emotions are influenced by the benefits that the consumer derives from the product or service considered (Sweeney & Soutar, 2001). With regard to product choice behaviour, several studies have shown the positive effect of emotional states on attitude towards the product (e.g. Adhitiya & Astuti, 2019; Sangroya & Nayak, 2017). This link also applies to GFPs (Jung et al., 2017; Wardy et al., 2018).

Therefore, it is possible to assume that emotional value generated by the purchase of GFPs by non-celiac consumers improves their attitude towards them. Stated more formally:

H1. Emotional value positively affects attitude towards GFPs.

2.1.2. Hedonic value

The fun and playfulness experienced during a purchase action represent a hedonic value (Babin et al., 1994), an affective aspect of consumers' shopping experiences. This value is based on sensory and experiential product cues and derives from the positive feeling generated by the product (LeBlanc & Nguyen, 2001; Wirtz & Le, 2003).

Hedonic value, perceived by consumers, is related to a specific product, and is considered an important behavioural intention determinant (Dedeoğluet al., 2016; Ryu et al., 2010), especially in recent years, when consumers seek pleasure in their shopping experiences (Kand & Park-Poaps, 2010).

For food consumption behaviour, the importance of hedonic value is even greater since the consumer seeks a visceral pleasure, not only the satisfaction of a physiological need (Comil & Chandon, 2016). This is also true for GFPs: the hedonic perception positively influences one's attitude towards the product for celiac and non-celiac consumers (De Magistris et al., 2015). Therefore, the following hypothesis can be

formulated:

H2. Hedonic value positively affects attitude towards GFPs.

2.2. Extrinsic product characteristics: Utilitarian value

Extrinsic product characteristics include product attributes such as brand, label, and price that are able to increase food attractiveness and purchase intention, even though they are not part of the product's physical properties (Akdeniz et al., 2013).

Utilitarian value can be described as a comprehensive evaluation, involving both the assessment of functional advantages and the recognition of necessary sacrifices (Babin et al., 1994). The concept of utilitarian value encompasses various cognitive facets of attitude, including considerations of economic value, such as "value for money" (Zeithaml, 1988), as well as assessments of convenience and time savings (Jarvenpaa & Todd, 1997; Teo, 2001).

In this study, utilitarian value was measured with respect to product price: this variable refers to the economic sacrifice / economic convenience linked to the purchase of GFPs by consumers. For this reason, the utilitarian value is part of the extrinsic product dimension, being an element deriving from the evaluation of the product price.

Following previous empirical studies (e.g. Childers et al., 2001; Chiu & Ting, 2011; Nystrand & Olsen, 2020), it is reasonable to expect that as the utilitarian value of GFPs increases, the attitude towards them will improve. More formally:

H3. Utilitarian value positively affects attitude towards GFPs.

2.3. Situational factors: Conditional value

Situational factors refer to social signification processes of the context (Savarese et al., 2021). As Köster (2009) argues, dietary and beverage choices are significantly influenced by situational factors. Conditional value is one of these factors.

2.3.1. Conditional value

Sheth et al. (1991) define conditional value as the perceived benefit obtained from a particular situation or a defined set of conditions. It emerges when the product's usage is linked to specific circumstances (Wang et al., 2013). Perceived product utility can be influenced by various factors such as promotional discounts, product accessibility, and other selling conditions (Roh et al., 2022). Such circumstances influence the decision-making process, and particularly the purchase decision (e.g. Biswas & Roy, 2015; Drugova & Curtis, 2019; Sangroya & Nayak, 2017). It has been found that conditional values can have a positive impact on consumers' purchasing decisions by influencing their attitude towards a product (Roh et al., 2022). Therefore, it is reasonable to assume that if GFPs are offered at a promotional discount or become widely available to non-celiac consumers, they are more likely to be purchased even by those who do not have a medical requirement for them. Consequently, the following hypothesis can be formulated:

H4. Conditional value positively affects attitude towards GFPs.

2.4. Attitude – Purchase intention – Purchase habits

The attitude towards an object measures the positive or negative assessment that an individual has towards the object (Kaiser et al., 1999). Several theories, first of all the Theory of Planned Behaviour (Ajzen, 1991), hypothesise a direct relationship between attitude and behavioural intention. The connection between attitude and intention is grounded in the fundamental assumption that people are rational beings who engage in a deliberative process wherein they assess both positive and negative sentiments in order to arrive at decisions.

The attitude-intention relationship has been confirmed in different research contexts, such as energy conservation (e.g. Liu et al., 2021), consuming genetically modified foods (e.g. Akbari et al., 2019), pro-environmental behaviour (e.g. Vu et al., 2021), healthy food choices (e.g. Åstrøsm and Rise, 2001). Given the solidity of the relation and the confirmed validity in several areas, it is considered plausible to assume that the attitude of non-celiac consumers towards GFPs directly affects their intention to buy them. Formally:

H5a. Attitude towards GFPs positively affects purchase intention.

As recently shown by Schulte et al. (2017), certain foods have addictive potential. According to Ahmed et al. (2013) certain foods – particularly foods that are high in calories, fat, and sugar – contain addictive substances leading to chronic overconsumption, usually called food addiction. Schulte et al. (2017) showed that the greatest likelihood of addiction is the result of the intersection between the addictive potential of certain foods (e.g. high-fat, high-sugar), individual risk factors (e.g. genetic vulnerability or disease) and behavioural patterns of engagement (e.g. intermittent use). Recently, however, we have witnessed new forms of addiction, not strictly linked to diseases and/or eating habits. New health trends are reversing the conceptualisation of food addiction, leading consumers towards new products such as "veg" or "gluten-free" products (e.g. Colatruglio & Slater, 2014; Martinelli & De Canio, 2022). Regarding GFPs, behaviour becomes a habit when these products are purchased regularly, in a natural and obvious way. Therefore, food addiction derives from a high purchase intention and, like the intention, depends on the attitude towards the product. In other words, the better the attitude towards the product, the greater the intention to buy it, and consequently the more likely that such buying behaviour becomes an addiction. Stated more formally:

H5b. Attitude towards GFPs positively affects addiction to GFPs.

H6. Purchase intention positively affects addiction to GFPs.

2.5. Well-being: The moderator

Well-being has been defined as a multi-dimensional construct composed of different elements: quality of life (Haraldstad et al., 2019), life satisfaction (Chen et al., 2020), positive affect (Busseri, 2018), interpersonal well-being, societal well-being, and financial well-being (Sirgy et al., 2007). Among these concepts, this work revolves around the conceptualisation of physical well-being. Accordingly, well-being represents the importance that the individual attaches to their physical and physical well-being.

Well-being is a relevant concern for consumers (Reynolds-Zayak, 2004), and food products are a source of well-being. Using food as a form of medicine has been steadily gaining recognition and acceptance (Adema, 2000). Individuals are now more inclined to actively seek out foods and drinks that they believe can enhance their physical well-being. This growing trend has led to an increased demand for products known as "functional foods" and "nutraceuticals", as well as those labelled as "natural", organic, and innovative in the realm of food products (Colatruglio & Slater, 2014).

Regarding GFPs, there is a widespread belief that their consumption is beneficial for the health of non-celiac people (e.g. Christoph et al., 2018; Newberry et al., 2017). Despite having been refuted, this belief continues to be one of the main causes of consumption of GFPs by people who are not allergic or intolerant to gluten (Grand View Research, 2022). Therefore, the greater the focus on physical well-being, the greater the propensity to buy GFPs frequently, leading consumers to opt for foods that apparently promote good health. Consequently, the search for well-being leads individuals – even healthy ones – to eat gluten-free foods because they are considered healthier. By doing so, their purchase intention grows to addiction to GFPs because of the well-being care, amplifying the intention-addiction path. In light of this consideration, it is possible to hypothesise that:

H7. Physical well-being moderates the relationship between purchase intention and addiction to GFPs. Fig. 1 shows the proposed model and the research hypotheses formulated.

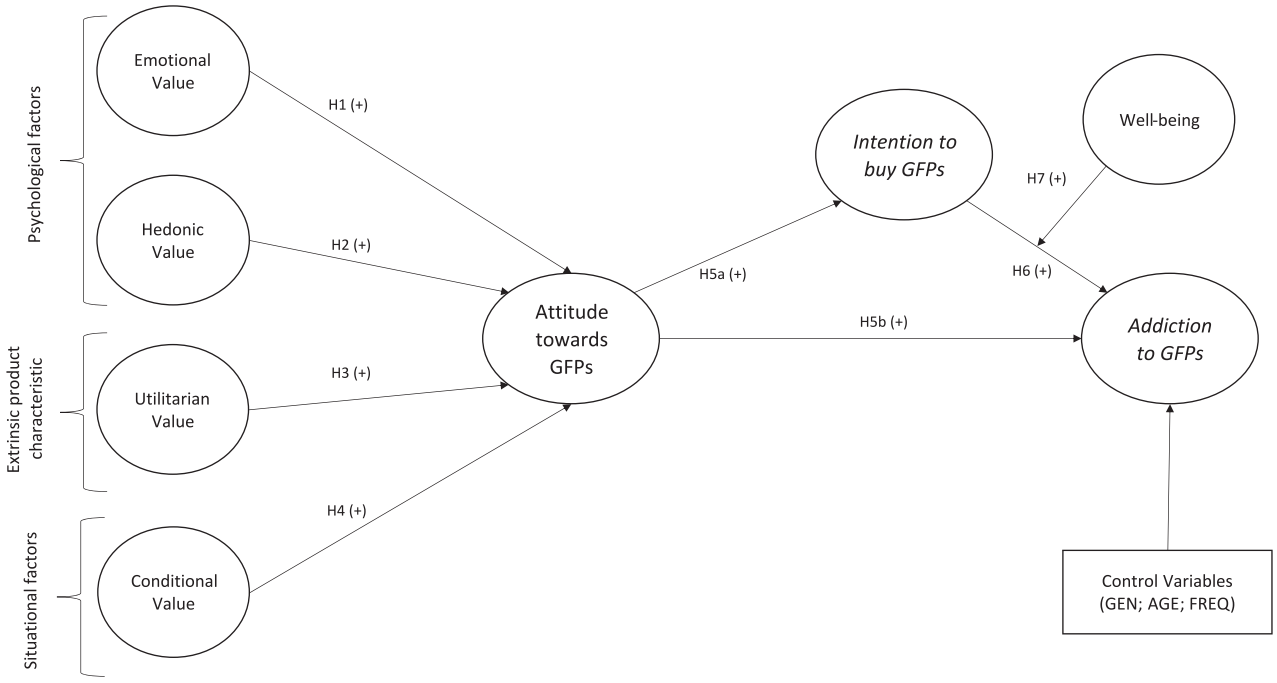

Fig. 1. Hypothesized conceptual framework. *Note:* GEN = gender; AGE = respondents' age. Hypotheses are labelled with the letter H. The hypothesised sign of the relationship is placed in brackets.

3. Methodology and data

In the following section we describe the empirical study design, data collection and analysis methods. First we present the study design and the main demographics of our respondents, then the measures implemented in the empirical analysis, and finally preliminary analyses to assess the measurement model used to develop the Partial Least Squares-Structural Equation Modelling (PLS-SEM).

3.1. Data collection and preliminary analyses

The empirical analysis is based on a structured questionnaire completed by Italian non-celiac consumers. Developed on the Google Moduli platform, the survey was launched in June 2023 with the purpose of understanding the reasons behind the purchase of GFPs by people without celiac disease. Based on a set of psychometric measures, the survey was delivered via Facebook among food consumers employing a snowball sampling technique.

The online questionnaire was designed following the procedure adopted by Sultan et al. (2020), with a first section including screening questions, a second section based on measures to empirically test the theoretical model, and the final section asking respondents for general demographics. To select the target of respondents in line with the purpose of this study, two screening questions were introduced in the first section of the survey. The first is aimed at selecting only those who purchase GFPs and the second selects those unaffected by a gluten-related disease diagnosed by a doctor, such as Celiac Disease, Non-Celiac Gluten Sensitivity, Dermatitis Herpetiformis, or other. After 3 weeks we collected a dataset of 344 complete questionnaires. After answering the screening questions, 162 respondents opted out of the survey. Thus, the valid dataset for this study comprised 182 participants, resulting in a validity rate of 52.9 %. This result partly reflects the results of the recent Eurispes Italy 2023 Report which highlights the growth of almost 2 % in the consumption of gluten-free foods (21.1 % in 2023) even for those not suffering from an intolerance (12.1 %) (Eurispes, 2023).

3.2. Measures

In this study, we utilised eight measures as described in detail in Table 2. All items were treated as reflective indicators, as suggested by the previous literature. These constructs have been well-validated in the literature and have only been partially adapted to suit the purpose of our study. The constructs measuring the emotional and conditional values were derived from Woo and Kim (2019), while hedonic and utilitarian values were derived from Ghali (2020), Mohammed (2021), and Ryu et al. (2010). The scale measuring attitude towards GFPs was derived from Rezai et al. (2014). The study by Mohammed (2021) was also used to derive the scale measuring the intention to buy GFPs. The scale measuring the addiction to consuming GFPs was adapted from Limayenm et al (2003). Finally, the care for well-being was derived from Nagar (2020). All measures were evaluated on a 7-point Likert scale, where 1 indicates strong disagreement and 7 indicates strong agreement.

At the end of the survey, we included socio-demographic questions such as age, gender, education level, income, family size, and shopping frequency of GFPs.

3.3. The sample description

A sample of 182 non-celiac consumers participated in the survey (see Table 1). Respondents to the online questionnaire were mainly women (79 %). The mean age among respondents was 34.9 years (median = 30 years; SD = 11.79; min = 18 years; max = 69 years), with two main age groups: respondents aged less than 30 years (48 % of the sample) and respondents aged between 30 and 45 years (36 % of the sample). After analysing the educational background of the sample, we found that a majority of the respondents (over 63 %) had obtained a degree, and over 90 % had a higher education diploma. The respondents' family composition showed a normal distribution. Only 23 respondents (13 %) reported buying GFPs due to a family member's gluten intolerance or allergy. On the other hand, many respondents reported buying GFPs only rarely or occasionally (88 %).

Table 1
Socio-demographic characteristics of the sample.

Variable	Category	Respondents (n)	Percentage (%)
Gender	Male	38	20.88 %
	Female	144	79.12 %
Age	< 30	87	47.80 %
	30–45	65	35.71 %
	> 45	30	16.48 %
Education level	Primary school	13	7.14 %
	High school	54	29.67 %
	University	102	56.04 %
	Postgraduate	13	7.14 %
Family members	Singles	10	5.49 %
	Couples	33	18.13 %
	3 members	50	27.47 %
	4 members	60	32.97 %
	5 or more members	29	15.93 %
Is there anyone in your family who follows a gluten-free diet?	Yes	23	12.64 %
	No	159	87.36 %
Shopping Frequency	Rarely	123	67.58 %
	Occasionally	38	20.88 %
	Frequently	11	6.04 %
	Every shopping expedition	10	5.49 %

Note: Sample size = 182 respondents.
Source: These calculations are based on our data.

3.4. Data analysis

To ensure the accuracy and dependability of the scales related to each construct, as well as to verify the theoretical causal relationships, this study utilises the PLS-SEM method. By focusing on estimating and analysing relationships among latent variables in the model, PLS-SEM enables the simultaneous consideration of all pathway coefficients with a great deal of flexibility. The proposed research model and the hypotheses were tested using the software Smart PLS 4.0 (Ringle et al., 2022). There were no missing values in the dataset. Following the procedure suggested by Hair et al. (2019) and Anderson and Gerbing (1988), confirmatory factor analysis (CFA) was used to test the unidimensionality and convergent validity of the constructs, followed by the estimation of the structural equation modelling (SEM) to measure paths among latent construct effects.

3.5. Measurement model assessment

The measurement model comprises 39 items: 37 to estimate the theoretical model and 2 control variables (i.e. gender and age). We evaluate the convergent and discriminant validity of the measurement model, first by checking the factor loadings of measures identified in the theoretical model. Factor loadings (Table 2) show scores higher than the recommended threshold of 0.70 and are significant (Chin, 2010; Hu & Bentler, 1999). All the items strongly correlated with the overall construct, indicating their internal consistency.

We assessed the measures' reliability with very high values for Cronbach's alpha – above its 0.70 cut-off (Henseler et al., 2015). To evaluate convergent validity we used the Average Variance Extracted (AVE) and Composite Reliability (CR) metrics. Both indicators exceeded the established threshold cited in the relevant literature (AVE > 0.5 and

Table 2
Statistics Descriptive of Items and Latent Constructs.

Construct/Items	Factor Loading	T-Statistics
Addiction to GFPs (ADD)		
I choose gluten-free foods out of habit	0.850	18.285
For me, choosing gluten-free foods has become a habit	0.956	80.373
For me, choosing gluten-free foods is natural	0.930	59.744
When I go shopping, it is obvious for me to choose gluten-free foods	0.946	69.633
It is my habit to choose gluten-free foods	0.953	66.809
Intention to buy GFPs (INT)		
My willingness to buy gluten-free foods is very high	0.826	23.717
In general, I am happy to buy gluten-free foods because they are good for health	0.951	132.258
I purchase gluten-free products for their health benefits	0.942	131.184
Attitude towards GFPs (ATT)		
I believe that consuming gluten-free foods allows me to have a healthy diet	0.916	50.178
I believe that consuming gluten-free foods can help reduce the risk of specific medical conditions	0.864	27.346
I believe that consuming gluten-free foods can prevent the onset of specific medical conditions	0.906	39.085
I believe that purchasing and regularly consuming gluten-free foods helps take care of my health	0.958	150.388
I believe that purchasing and regularly consuming gluten-free foods helps keep me healthy	0.963	133.252
Emotional Value (EMV)		
I like buying gluten-free products	0.914	49.407
I feel good after purchasing gluten-free products	0.973	192.039
Buying gluten-free products makes me feel good	0.965	169.887
Hedonic Value (HEDV)		
Buying gluten-free products makes me feel like a better person	0.903	45.145
Buying gluten-free foods gives me a feeling of pleasure	0.925	56.102
Buying gluten-free products seems to me to be a morally correct action	0.838	24.932
The use of gluten-free products positively influences my state of well-being	0.903	42.179
I like the idea of using gluten-free products	0.899	51.156
Using gluten-free products makes me feel at ease	0.929	78.586
Utilitarian Value (UTV)		
Buying gluten-free products is convenient	0.850	16.030
Buying gluten-free products is practical and economical	0.860	18.989
Buying gluten-free products is interesting	0.794	18.536
Conditional Value (CONV)		
I buy gluten-free products when they are on sale	0.938	73.195
I purchase gluten-free products when they are easy to find	0.938	82.649
I purchase gluten-free products during promotions	0.946	78.425
Well-being care (WBE)		
I think a lot about my physical appearance	0.884	22.380
I am generally attentive to the sensations I experience related to my physical appearance	0.797	12.687
I constantly examine my physical appearance	0.875	18.487
I am attentive to changes in my physical appearance	0.858	14.227
I am usually conscious of my physical appearance	0.710	8.521
I think about my physical appearance throughout the day	0.893	25.989
I pay attention to my physical appearance throughout the day	0.902	30.368
I'm very concerned about my physical appearance	0.813	17.219

Source: Authors' elaboration

CR > 0.7; Fornell and Larcker, 1981) as shown in Table 3. To assess discriminant validity, we employed three methods. First, the average variances extracted between each construct were higher than the squared multiple correlations for each construct pairing (Fornell & Larcker, 1981), thus confirming the discriminant validity of the constructs. Moreover, all items were found to have the highest loadings with their respective constructs.

The Heterotrait-Monotrait Ratio (HTMT) is a statistical measure that confirms the discriminant validity of the variables used in a study. The results of our analysis showed that the correlation between constructs was below the threshold of 0.9, which indicates that the measures used are acceptable (Table 4). This means that there were no significant intercorrelations between the variables, as determined by the HTMT analysis (Hair et al., 2017).

Therefore, the tests indicate the acceptance of construct reliability and discriminant validity.

To ensure the accuracy of the model, we examined its coefficient of determination (R^2) and other model fit indices, such as the goodness-of-fit value. The coefficient of determination is a measure of the model's nomological validity, explanatory power, and predictive validity, which ranges from 0 to 1. The explained variance of the variables is indicated by R^2-values. The R-square for the Addiction to GFPs ($R^2_{ADD} = 0.617$), Intention to buy GFPs ($R^2_{INT} = 0.505$), and Attitude toward GFPs ($R^2_{ATT} = 0.710$) show a good predictive ability of the empirical model being higher than 25 % (Hair et al., 2021). Therefore, the amount of variance that can be accounted for by all the variables is appropriate for conducting further analysis. According to the standardised root mean square residual (SRMR = 0.059) for the composite factor model, the model fit is acceptable (Hu & Bentler, 1999). The discrepancy between the observed and model-implied correlations is minimal.

4. Results

We utilised a bootstrap resampling procedure based on 5,000 subsamples (Hair et al., 2023) to generate standard errors and t-values, which help in evaluating the regression coefficients. This technique is commonly used for estimating measures, standard errors, t-values, and constructs' relations by averaging estimates from multiple small data samples, known as subsamples. A two-tailed PLS bootstrapping test was conducted on 5,000 subsamples to determine the significance of the effects (Dijkstra & Henseler, 2015).

Fig. 2 reports the direct effects among latent variables. Among the main motivations enhancing the attitude toward GFPs, only the psychological factors show positive and significant effects, while extrinsic product characteristics and situational factors do not. Accordingly, H1 (Emotional value → Attitude toward GFPs: β = 0.365; t-value = 4.009; p-value = 0.000) and H2 (Hedonic value → Attitude toward GFPs: β = 0.411; t-value = 4.319; p-value = 0.000) are confirmed, while H3 (Utilitarian value → Attitude toward GFPs: β = -0.061; t-value = 0.876; p-value = 0.381) and H4 (Conditional value → Attitude toward GFPs: β = 0.027; t-value = 0.330; p-value = 0.741) are rejected. Furthermore, these results demonstrate that hedonic values represent the main motivation among the psychological variables. In turn, the attitude toward GFPs shows a significant effect only on the purchase intention and not on the dependence on GFPs, leading to confirming only H5a (H5a: Attitude toward GFPs → Intention to buy GFPs: β = 0.843; t-value = 36.134; p-value = 0.000; H5b: Attitude toward GFPs → Addiction to GFPs: β = -0.002; t-value = 0.025; p-value = 0.980). However, the relationship between purchase intention and dependence on GFPs is significant and positive, as postulated for H6 (Intention to buy GFPs → Addiction to GFPs: β = 0.334; t-value = 3,741; p-value = 0.000). In light of these latest results, it is possible to state that the intention to purchase GFPs completely mediates the relationship between Attitude and Addiction. Besides the variables of main interest, gender, age, and shopping frequency were included as control variables in the structural model to control for potential demographic and behavioural characteristics of the sample. Both demographic variables included in the model as controls have no significant effect on addiction, highlighting the absence of demographic characteristics among those who, despite the absence of disease related to celiac disease, are addicted to GFPs (Age → Addiction to GFPs: β = 0.042; t-value = 0.787; p-value = 0.431; Gender → Addiction to GFPs: β = -0.128; t-value = 1.044; p-value = 0.296). The frequency of buying GFPs has a significant positive correlation with addiction, indicating that people who buy GFPs more frequently are more likely to develop an addiction to them (Frequency → Addiction to GFPs: β = 0.525; t-value = 8.906; p-value = 0.000).

The results proposed in Table 5 delve deeper into the moderation relationship hypothesized in H7. The results underscore that greater attention to well-being amplifies the relationship between intention to buy and addiction to GFPs (β = 0.139; t-value = 2.752; p-value = 0.006). Although the β is high and significant, the relevant but small f^2 value shows a significant moderation ($f^2 = 0.042$) (Cohen, 1988).

Overall, as shown in Fig. 3, the positive slope leads those high in care for well-being to be more addicted to GFPs.

5. Discussion and implications

The exponential growth in consumption of GFPs – 21,1% in 2023 compared to 19,3% in 2019 (Eurispes, 2023) – with only 1 % of the population affected by gluten-related disease (Bradauskiene et al., 2023) opens the debate on the reasons leading healthy consumers to purchase and consume GFPs. This becomes further interesting when you consider that producers and retailers pay more attention to GFPs products – the former by increasing the production of gluten-free product categories, the latter by extending the assortments and display space of GFPs in-store (Lee et al., 2007).

This study sought to understand the reasons behind the choice of GFPs by consumers not suffering from gluten-related disease, also considering the lower nutritional quality, worse taste, and higher price of GFPs.

Among the main motivations depicted in the Mojet model (Köster, 2009) driving consumers' food and beverage choices, psychological factors emerge as the unique reasons behind the buying process of GFPs by non-celiac consumers. Our structural model weighed the relevance of

Table 3
Results of convergent and discriminant validity tests.

	CRA	CR	AVE	ADD	ATT	CONV	EMV	HEDV	INT	UTV	WBE
Addiction	0.959	0.659	0.861	**0.928**							
Attitude	0.956	0.966	0.850	0.543	**0.922**						
Conditional Value	0.935	0.958	0.885	0.468	0.498	**0.941**					
Emotional Value	0.947	0.966	0.904	0.624	0.664	0.617	**0.951**				
Hedonic Value	0.953	0.962	0.810	0.667	0.667	0.669	0.764	**0.900**			
Intention	0.892	0.934	0.825	0.605	0.843	0.586	0.722	0.730	**0.908**		
Utilitarian Value	0.791	0.874	0.698	0.512	0.410	0.469	0.516	0.656	0.544	**0.835**	
Well-Being	0.943	0.952	0.711	0.223	0.304	0.271	0.285	0.329	0.329	0.289	**0.844**

Note: CRA = Cronbach's alpha; CR = Composite reliability; AVE = Average variance extracted. Off-diagonal values represent the square root of the average variance extracted (AVE) (in bold).

Table 4
Results of heterotrait-monotrait ratio of correlations (HTMT).

	ADD	AGE	ATT	CONV	EMV	FRE	GEN	HEDV	INT	UTV	WBE
Addiction											
Age	0.147										
Attitude	0.566	0.143									
Conditional Value	0.494	0.065	0.516								
Emotional Value	0.656	0.175	0.693	0.648							
Frequency	0.684	0.126	0.382	0.311	0.441						
Gender	0.061	0.164	0.144	0.096	0.142	0.077					
Hedonic Value	0.701	0.075	0.690	0.702	0.797	0.397	0.132				
Intention	0.663	0.136	0.899	0.633	0.784	0.425	0.205	0.788			
Utilitarian Value	0.584	0.066	0.445	0.518	0.565	0.215	0.117	0.745	0.623		
Wellbeing	0.217	0.070	0.319	0.284	0.300	0.028	0.201	0.338	0.358	0.302	

Note: AGE = respondents' age; GEN = respondents' gender0.

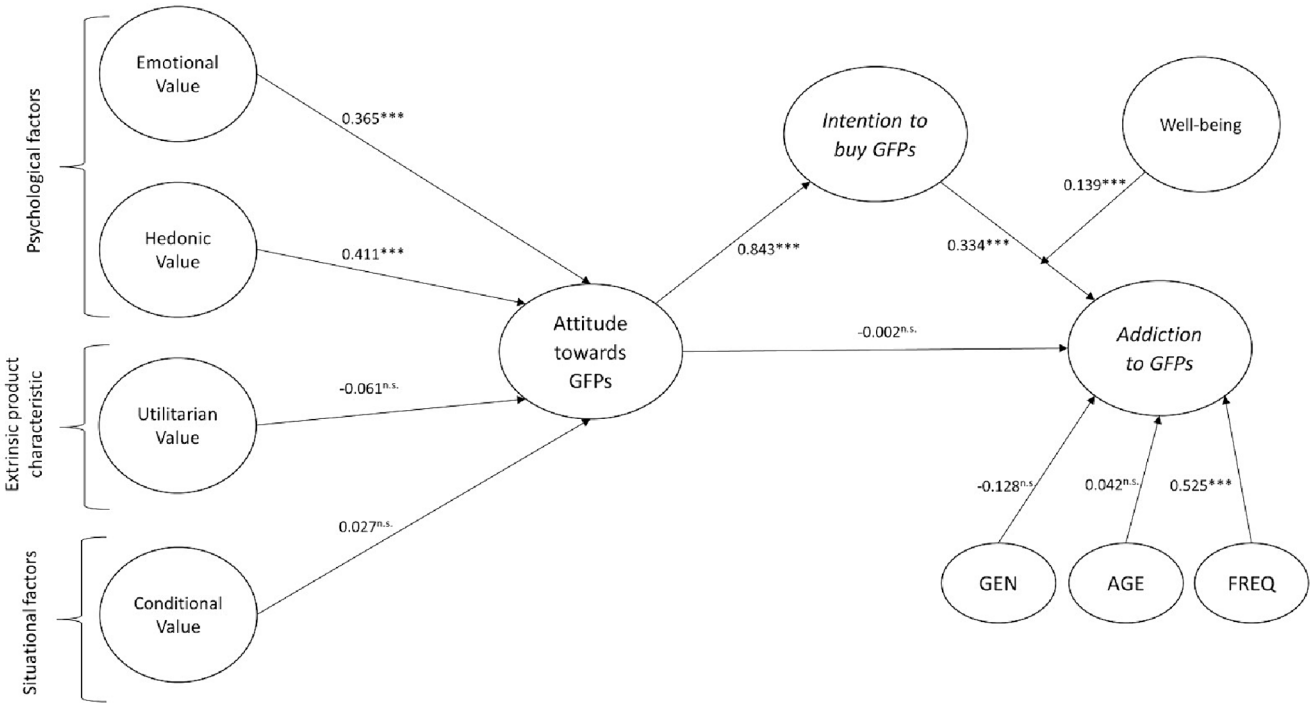

Fig. 2. Direct paths among latent constructs. *Note:* *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.10; n.s. – not significant; GEN = gender; AGE = respondents' age.

Table 5
Moderation test.

Hypotheses	Paths	Standardized Effect	T Statistics (P-Value)	F^2	Test Verification
	Moderating Effect				
H7	Well-being* intention → Addiction	0.139	2.752 (0.006)	***0.042***	***Confirmed***

the hedonic and emotional motivations. The choice of GFPs is considered an ethical and morally responsible choice, as well as capable of influencing the state of well-being and pleasure of its buyers. These findings corroborate previous results proposed by De Magistris et al. (2015), Jung et al. (2017), Wardy et al. (2018). In contrast with other foods, utilitarian values do not play a significant role in driving consumers' buying intentions of GFPs. While previous studies found a significant relevance of utilitarian values – particularly of price – in influencing food buying choice (e.g. Nystrand & Olsen, 2020), our results find a total irrelevance of the utilitarian variable when the consumer considers purchasing GFPs. On the one hand this result may spur academic debate on the role that utilitarian variables play on new trendy products (e.g. gluten-free, vegetarian and vegan, etc.), while on the other it confirms the total indifference of customers to the price of GFPs, widely recognised as more expensive than products with gluten (Estévez et al., 2016; Panagiotou & Kontogianni, 2017).

Our results reveal a finding that contradicts previous research. Specifically, we found that situational selling factors, also known as conditional values, do not have an impact on the attitudes and intentions of consumers without gluten disease when it comes to purchasing GFPs. This contrasts with a recent study by Roh et al. (2022), which found a positive relationship between conditional values, attitude, and purchase intention for organic foods. Our findings suggest that factors such as the accessibility of GFPs and their promotional activity are not influential when it comes to the purchasing behaviour of consumers without gluten disease.

Furthermore, the results of the structural equation model highlight how the purchase intention is transforming into a sort of addiction towards the purchase and consumption of GFPs. While Schulte et al.

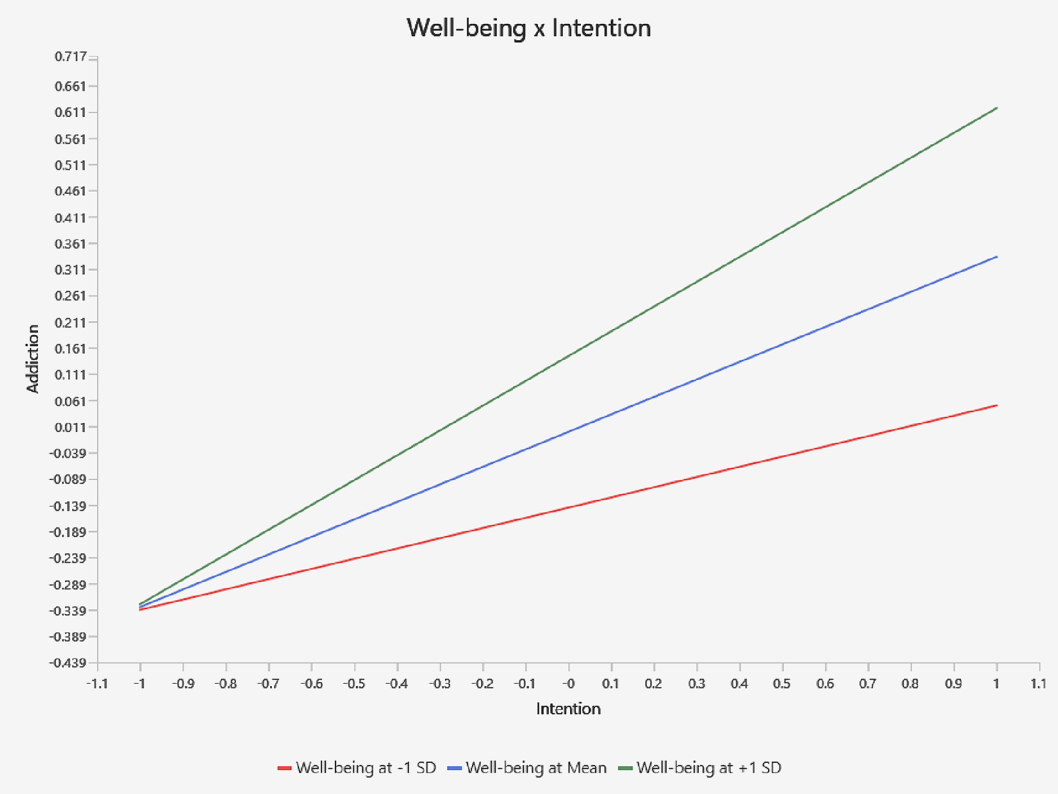

Fig. 3. Moderating effect.

(2017) show that food behavioural addiction is the result of the intersection between the addictive potential of certain foods, individual risk factors, and behavioural patterns of engagement, this study extends the perspective on food addiction by adding the health component. In light of the new health trends that are leading consumers towards free-from and veg products (e.g. Colatruglio & Slater, 2014; Martinelli & De Canio, 2022), this study contributes to the literature by highlighting how the health and well-being component can influence food addiction. Well-being is a relevant concern for consumers and food products, as foods may be seen as a form of medicine (Adema, 2000; Reynolds-Zayak, 2004). This aspect becomes increasingly relevant if we consider the positive relationship between shopping frequency of GFPs and addiction which indicates that those who purchase and consume GFPs more, develop an addiction to themselves. Indeed, "gluten avoidance may be associated with adverse effects in patients without proven gluten-related diseases" (Niland & Cash, 2018, p.82), such as loss of fibre, minerals and vitamins, among others (Diez-Sampedro et al., 2019).

Managerially, both producers and retailers involved today in extending their GFP assortment (Lee et al., 2007) should consider communication strategies that impact their customers more. As part of their Corporate Social Responsibility (CSR) strategies, they could invest in informational campaigns on the low relevance of these products for the health of non-celiac consumers. Furthermore, thanks to the development of increasingly informative and easy-to-read packaging, they should develop a label that, associated with the classic "gluten-free" label, indicates the consumers the product is aimed at. Using such a label and in-store communication it would be possible to reach the correct customer target. Other segments can be directed towards products with low gluten and sugar content developed for their health needs. As shown by Priven et al. (2015), "free-from" labels can be a powerful communication tool, but in some cases can be used to manipulate the perceived healthiness of the product. For this reason, consumers must be correctly informed about the characteristics of the product so that they can make an informed choice. At the same time, it is important to consider whether producers should work to improve the nutritional values and taste of GFPs. As numerous studies in the literature have shown, GFPs are not only nutritionally deficient (e.g., Aguiar et al., 2023; Diez-Sampedro et al., 2019; Roman et al., 2019; Thompson, 2000; Vici et al., 2016), but also taste worse than their gluten-containing counterparts (Alencar et al., 2021; Arendt & Dal Bello, 2008; do Nascimento et al., 2014). Although Tóth et al. (2022) state that the taste quality has improved in recent years, producers should continue to invest in improving these products, for the benefit of both those with a real health need and those who buy them for more hedonic and emotional reasons.

Finally, policymakers must also pay attention to the new trends of free-from products being used by healthy subjects, for health purposes only. In the long term the absence of specific nutrients could lead to a large part of the population no longer being able to metabolize these nutrients with a negative impact on public health. Thus, physicians and policymakers should cooperate to educate people about the detriments of a gluten-free diet when not required (Diez-Sampedro et al., 2019). As with medical studies, this research alerts scholars and operators about the opportunity to continue selling GFPs in the absence of a specific health-related alert.

6. Conclusions, limitations, and future research

This study conducted on non-celiac consumers shows that the attitude, purchase, and consumption of GFPs by healthy subjects is determined only by psychological reasons and not by situational or product-related factors. This study shows how products that enter the market with medical functions become incrementally interesting for healthy subjects, not as a function of product improvements or sales conditions, but solely for hedonic motivations. Furthermore, a greater attitude towards GFPs corresponds to both a greater purchase intention and a wider addiction towards GFPs. The well-being care is mistakenly leading healthy people to purchase and consume more and more GFPs with potential repercussions on their health. Assisting consumers in

evaluating the nutritional value of GFPs can help prevent potential bias and disease, while also encouraging healthier food options.

Although the study offers an alternative approach to the analysis of GFPs, especially focusing on consumers not suffering from celiac-related diseases, it has some limitations that should be addressed in future studies. First, we should understand what the minimum consumption of GFPs is, which can cause health problems for healthy users. Most of our respondents report a limited purchase and consumption of GFPs. This aspect should therefore be addressed in a multidisciplinary medical management approach. Considering the increasing interest in GFPs among individuals without gluten-related disorders (Eurispes, 2023), it would be desirable to further investigate why consumers in the absence of medical reasons choose to buy functional foods. A direct comparison between segments identified based on the frequency and quantity of GFPs purchased could provide greater insight into the true reasons behind consumer purchases of these products.

Further, a group of our survey participants have mentioned that they have family members with gluten-related health issues. It would be useful to compare this group with the previous groups to determine if any different reasons led to the purchase and consumption of GFPs. We also suggest widely exploring the motivation of those who increasingly habitually buying and consuming GFPs to support their family members. A qualitative approach could help to explore how this phenomenon affects family dynamics, as well as related purchases and consumption. Additionally, it could investigate whether frequent consumption of GFPs is leading individuals to develop intolerances themselves.

Second, this study is based on country-specific data. In future studies the phenomenon could be addressed from a multi-country perspective, to understand its scope and effects on consumers.

Finally, there is a need to explore further variables that can lead non-celiac consumers to develop an addiction to GFPs.

Ethical Statements

1) Participants gave informed consent via the statement “I am aware that my responses are confidential, and I agree to participate in this survey” where an affirmative reply was required to enter the survey. They were able to withdraw from the survey at any time without giving a reason.
2) The study was explained to consumers in the online questionnaire. They were informed that they would participate in the survey using their personal smartphone/computer, that all data will be de-identified and only reported in the aggregate. All participants acknowledged an informed consent statement in order to participate in the study.

CRediT authorship contribution statement

Cristina Zerbini: Conceptualization, Data curation, Investigation, Writing – original draft. **Francesca De Canio:** Writing – original draft, Data curation, Formal analysis, Methodology. **Elisa Martinelli:** Supervision, Writing – review & editing. **Beatrice Luceri:** Supervision, Writing – review & editing.

Declaration of competing interest

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

Data availability

The data that has been used is confidential.

References

Adema, P. (2000). Vicarious consumption: Food, television and the ambiguity of modernity. *The journal of American culture, 23*(3), 113.

Adhitiya, L., & Astuti, R. D. (2019). The Effect of Consumer Value on Attitude Toward Green Product and Green Consumer Behavior in Organic Food. *IPTEK Journal of Proceedings Series, 5*, 193–202.

Aguiar, E. V., Santos, F. G., Krupa-Kozak, U., & Capriles, V. D. (2023). Nutritional facts regarding commercially available gluten-free bread worldwide: Recent advances and future challenges. *Critical Reviews in Food Science and Nutrition, 63*(5), 693–705.

Ahmed, S. H., Avena, N. M., Berridge, K. C., Gearhardt, A. N., & Guillem, K. (2013). *Food addiction, Neuroscience in the 21st Century*. Springer.

Ajzen, I. (1991). The theory of planned behaviour. *Journal of Behavior and Human Decision Process, 50*, 197–211.

Akbari, M., Fozouni Ardekani, Z., Pino, G., & Maleksaeidi, H. (2019). An extended model of theory of planned behavior to investigate highly-educated Iranian consumers' intentions towards consuming genetically modified foods. *Journal of Cleaner Production, 227*, 784–793.

Akdeniz, B., Calantone, R. J., & Voorhees, C. M. (2013). Effectiveness of marketing cues on consumer perceptions of quality: The moderating roles of brand reputation and third-party information. *Psychology & Marketing, 30*(1), 76–89.

Alencar, N. M. M., de Araújo, V. A., Faggian, L., da Silveira Araújo, M. B., & Capriles, V. D. (2021). What about gluten-free products? An insight on celiac consumers' opinions and expectations. *Journal of Sensory Studies, 36*(4), e12664.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin, 103*(3), 411.

Arendt, E., & Dal Bello, F. (Eds.). (2011). *Gluten-free cereal products and beverages*. Elsevier.

Arigo, D., Anskis, A. M., & Smyth, J. M. (2012). Psychiatric comorbidities in women with celiac disease. *Chronic illness, 8*(1), 45–55.

Associazione Italiana Celiachia. (2017). *Comunicazione.* http://www.celiachia.it/COMUNICAZIONE/Comunicazione.aspx?SS=110&=1524.

Åstr∅sm, A. N., & Rise, J. (2001). Young adults' intention to eat healthy food: Extending the theory of planned behaviour. *Psychology and Health, 16*(2), 223–237.

Babin, B. J., Darden, W. R., & Griffin, M. (1994). Work and/or fun: Measuring hedonic and utilitarian shopping value. *Journal of consumer research, 20*(4), 644–656.

Biswas, A., & Roy, M. (2015). Green products: An exploratory study on the consumer behaviour in emerging economies of the East. *Journal of cleaner production, 87*, 463–468.

Bradauskiene, V., Vaiciulyte-Funk, L., Martinaitiene, D., Andruskiene, J., Verma, A. K., Lima, J. P., & Catassi, C. (2023). Wheat consumption and prevalence of celiac disease: Correlation from a multilevel analysis. *Critical Reviews in Food Science and Nutrition, 63*(1), 18–32.

Busseri, M. A. (2018). Examining the structure of subjective well-being through meta-analysis of the associations among positive affect, negative affect, and life satisfaction. *Personality and Individual Differences, 122*, 68–71.

Capriles, V. D., de Aguiar, E. V., Dos Santos, F. G., Fernández, M. E. A., de Melo, B. G., Tagliapietra, B. L., & Conti, A. C. (2023). Current status and future prospects of sensory and consumer research approaches to gluten-free bakery and pasta products. *Food Research International, 113389*.

Caso, G., & Vecchio, R. (2022). Factors influencing independent older adults (un) healthy food choices: A systematic review and research agenda. *Food Research International, 158*, Article 111476.

Catassi, C., Gatti, S., & Fasano, A. (2014). The new epidemiology of celiac disease. *Journal of Pediatric Gastroenterology & Nutrition, 59*(Supplement 1), S7–S9.

Chen, X., Cai, Z., He, J., & Fan, X. (2020). Gender differences in life satisfaction among children and adolescents: A meta-analysis. *Journal of Happiness Studies, 21*(6), 2279–2307.

Childers, T., Carr, C., Peck, J., & Carson, S. (2001). Hedonic and utilitarian motivations for online retail shopping behaviour. *Journal of Retailing, 77*, 511–535.

Chin, W. W. (2009). How to write up and report PLS analyses. In *Handbook of partial least squares: Concepts, methods and applications* (pp. 655–690). Springer, Berlin Heidelberg: Berlin, Heidelberg.

Chiu, J. S., & Ting, C. C. (2011). Will you spend more money and time on Internet shopping when the product and situation are right? *Computers in Human Behavior, 27*(1), 203–208.

Christoph, M. J., Larson, N., Hootman, K. C., Miller, J. M., & Neumark-Sztainer, D. (2018). Who values gluten-free? Dietary intake, behaviors, and sociodemographic characteristics of young adults who value gluten-free food. *Journal of the Academy of Nutrition and Dietetics, 118*(8), 1389–1398.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Academic press: Lawrence Erlbaum Associates.

Colatruglio, S., & Slater, J. (2014). *Food literacy: Bridging the gap between food, nutrition and well-being* (pp. 37–55). Sustainable well-being: Concepts, issues, and educational practices.

Cornil, Y., & Chandon, P. (2016). Pleasure as an ally of healthy eating? Contrasting visceral and Epicurean eating pleasure and their association with portion size preferences and wellbeing. *Appetite, 104*, 52–59.

Corposanto, C., Molinari, B., & Neuhold, S. (2015). Celiac Disease Seen with the Eyes of the Principle Component Analysis and Analyse Des Données. *Open Journal of Statistics, 5*(03), 211.

Damasio, A. (1994). *Descartes' error: Emotion, rationality and the human brain* (p. 352). New York: Putnam.

Damasio, A. (2003). Feelings of emotion and the self. *Annals of the New York Academy of Sciences, 1001*(1), 253–261.

De Magistris, T., Xhakollari, V., & Munoz, N. (2015). The effect of sensory properties on non-celiac consumers' willingness to pay for a gluten-free snack. *Economia agro-alimentare, 1*, 107–118.
Dedeoğlu, B. B., Balıkçıoğlu, S., & Küçükergin, K. G. (2016). The role of tourists' value perceptions in behavioral intentions: The moderating effect of gender. *Journal of Travel & Tourism Marketing, 33*(4), 513–534.
Diez-Sampedro, A., Olenick, M., Maltseva, T., & Flowers, M. (2019). A gluten-free diet, not an appropriate choice without a medical diagnosis. *Journal of nutrition and metabolism, 2019*.
Dijkstra, T. K., & Henseler, J. (2015). Consistent partial least squares path modeling. *MIS quarterly, 39*(2), 297–316.
do Nascimento, A. B., Fiates, G. M. R., dos Anjos, A., & Teixeira, E. (2014). Gluten-free is not enough–perception and suggestions of celiac consumers. *International journal of food sciences and nutrition, 65*(4), 394–398.
Drugova, T., Curtis, K. R., & Akhundjanov, S. B. (2020). Organic wheat products and consumer choice: A market segmentation analysis. *British Food Journal, 122*(7), 2341–2358.
El Khoury, D., Balfour-Ducharme, S., & Joye, I. J. (2018). A review on the gluten-free diet: Technological and nutritional challenges. *Nutrients, 10*(10), 1410.
Estévez, V., Ayala, J., Vespa, C., & Araya, M. (2016). The gluten-free basic food basket: A problem of availability, cost and nutritional composition. *European Journal of Clinical Nutrition, 70*(10), 1215–1217.
EU No 828/2014 (2014). OFFICIAL JOURNAL OF THE EUROPEAN UNION. Commission implementing regulation (EU) No 828/2014.
Eurispes (2023). Rapporto Italia 2023. Available at: https://eurispes.eu/ricerca-rapporto/rapporto-italia-2023/.
Ford, S., Howard, R., & Oyebode, J. (2012). Psychosocial aspects of coeliac disease: A cross-sectional survey of a UK population. *British journal of health psychology, 17*(4), 743–757.
Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research, 18*(1), 39–50.
Ghali, Z. Z. (2020). Effect of utilitarian and hedonic values on consumer willingness to buy and to pay for organic olive oil in Tunisia. *British Food Journal, 122*(4), 1013–1026.
Grand View Research. (2022). *Gluten-Free Products Market Size, Share & Trends Analysis Report By Product (Bakery Products, Dairy/Dairy Alternatives), By Distribution Channel (Grocery Stores, Mass Merchandiser)* (pp. 2022–2030). And Segment Forecasts: By Region.
Hair, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2017). Advanced Issues in Partial Least Squares Structural Equation Modeling. *SAGE*. Publications.
Hair, J., Jr, Hair, J. F., Jr, Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). A primer on partial least squares structural equation modeling (PLS-SEM). *Sage*. publications.
Hair, J., Hair, J. F., Jr, Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2023). Advanced issues in partial least squares structural equation modeling. *Sage*. publications.
Haraldstad, K., Wahl, A., Andenæs, R., Andersen, J. R., Andersen, M. H., Beisland, E., Borge, C. R., Engebretsen, E., Eisemann, M., Halvorsrud, L., & Hanssen, T. A. (2019). A systematic review of quality of life research in medicine and health sciences. *Quality of Life Research, 28*(10), 2641 2650.
Hartmann, C., Hieke, S., Taper, C., & Siegrist, M. (2018). European consumer healthiness evaluation of 'Free-from'labelled food products. *Food quality and preference, 68*, 377–388.
Harvard School of Public Health. (2018). *Diet Review: Gluten-free for weight loss*. Harvard T.H: Chan School of Public Health. https://www.hsph.harvard.edu/nutritionsource/healthy-weight/diet-reviews/gluten-free-diet-weight-loss/.
Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*, 115–135.
Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: A multidisciplinary journal, 6*(1), 1–55.
Husby, S., Koletzko, S., Korponay-Szabó, I. R., Mearin, M. L., Phillips, A., & Shamir, R. (2012). ESPGHAN Gastroenterology Committee European Society for Pediatric Gastroenterology, Hepatology, and Nutrition guidelines for the diagnosis of coeliac disease. *Journal of pediatric gastroenterology and nutrition, 54*(1), 136–160.
IMARC Group (2023) Gluten-Free Products Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028, July 2023; https://www.grandviewresearch.com/industry-analysis/gluten-free-products-market#:~:text=The%20global%20gluten%2Dfree%20products,expected%20to%20drive%20product%20demand.
Silvester, J. A., Weiten, D., Graff, L. A., Walker, J. R., & Duerksen, D. R. (2016). Living gluten-free: Adherence, knowledge, lifestyle adaptations and feelings towards a gluten-free diet. *Journal of Human Nutrition and Dietetics, 29*(3), 374–382.
Jarvenpaa, S. L., & Todd, P. A. (1996). Consumer reactions to electronic shopping on the World Wide Web. *International Journal of electronic commerce, 1*(2), 59–88.
Jung, J. H., Kim, H., & Yoon, H. H. (2017). The influence of consumption values on attitudes and purchase intentions of consumers towards gluten-free products. *Korean journal of food and cookery science, 33*(2), 218–227.
Kaiser, F. G., Wölfing, S., & Fuhrer, U. (1999). Environmental attitude and ecological behaviour. *Journal of environmental psychology, 19*(1), 1–19.
Kamiński, M., Skonieczna-Żydecka, K., Nowak, J. K., & Stachowska, E. (2020). Global and local diet popularity rankings, their secular trends, and seasonal variation in Google Trends data. *Nutrition, 79*, Article 110759.
Kang, J., & Park-Poaps, H. (2010). Hedonic and utilitarian shopping motivations of fashion leadership. *Journal of Fashion Marketing and Management: An International Journal, 14*(2), 312–328.
Köster, E. P. (2009). Diversity in the determinants of food choice: A psychological perspective. *Food quality and preference, 20*(2), 70–82.
Köster, E. P., & Mojet, J. (2015). From mood to food and from food to mood: A psychological perspective on the measurement of food-related emotions in consumer research. *Food research international, 76*, 180–191.
Larson, R. B. (2019). Examining prospective buyer attitudes toward four food product traits. *British Food Journal, 121*(8), 1936–1950.
Laszkowska, M., Shiwani, H., Belluz, J., Ludvigsson, J. F., Green, P. H., Sheehan, D., & Lebwohl, B. (2018). Socioeconomic vs health-related factors associated with google searches for gluten-free diet. *Clinical Gastroenterology and Hepatology, 16*(2), 295–297.
Laureati, M., Giussani, B., & Pagliarini, E. (2012). Sensory and hedonic perception of gluten-free bread: Comparison between celiac and non-celiac subjects. *Food Research International, 46*(1), 326–333.
LeBlanc, G., & Nguyen, N. (2001). An exploratory study on the cues that signal value to members in retail co-operatives. *International Journal of Retail & Distribution Management, 29*, 49–59.
LeDoux, J., & Bemporad, J. R. (1997). The emotional brain. *Journal of the American Academy of Psychoanalysis, 25*(3), 525–528.
Lee, A. R., Ng, D. L., Zivin, J., & Green, P. H. R. (2007). Economic burden of a gluten-free diet. *Journal of human Nutrition and Dietetics, 20*(5), 423–430.
Limayenm, M., Hirt, S. G., & Cheung, C. M. (2003). Habit in the context of IS continuance: theory extension and scale development. ECIS 2003 Proceedings. 90. https://aisel.aisnet.org/ecis2003/90.
Lionetti, E., Gatti, S., Pulvirenti, A., & Catassi, C. (2015). Celiac disease from a global perspective. *Best Practice and Research. Clinical Gastroenterology, 29*(3), 365–379.
Liu, X., Wang, Q.-C., Jian, I. Y., Chi, H.-L., Yang, D., & Chan, E.-H.-W. (2021). Are you an energy saver at home? The personality insights of household energy conservation behaviors based on theory of planned behavior. *Resources, Conservation and Recycling, 174*.
Ludvigsson, J. F., & Green, P. H. (2011). Clinical management of coeliac disease. *Journal of internal medicine, 269*(6), 560–571.
Ludvigsson, J. F., & Lebwohl, B. (2020). Three papers indicate that amount of gluten play a role for celiac disease-But only a minor role. *Acta Paediatrica, 109*(1), 8–10.
Magano, N., du Rand, G., & de Kock, H. (2022). Perception of gluten-free bread as influenced by information and health and taste attitudes of millennials. *Foods, 11*(4), 491.
Martinelli, E., & De Canio, F. (2022). Non-vegan consumers buying vegan food: The moderating role of conformity. *British Food Journal, 124*(1), 14–30.
Mela, D. J. (2001). Determinants of food choice: Relationships with obesity and weight control. *Obesity research, 9*(S11), 249S–S255.
Mohammed, A. A. (2021). What motivates consumers to purchase organic food in an emerging market? An empirical study from Saudi Arabia. *British Food Journal, 123*(5), 1758–1775.
Nagar, K. (2020). An Examination of gym supplement choice: Using the modified theory of planned behaviour. *Journal of Food Products Marketing, 26*(7), 499–520.
Newberry, C., McKnight, L., Sarav, M., & Pickett-Blakely, O. (2017). Going gluten free: The history and nutritional implications of today's most popular diet. *Current gastroenterology reports, 19*, 1–8.
Niland, B., & Cash, B. D. (2018). Health benefits and adverse effects of a gluten-free diet in non–celiac disease patients. *Gastroenterology & Hepatology, 14*(2), 82.
Nystrand, B. T., & Olsen, S. O. (2020). Consumers' attitudes and intentions toward consuming functional foods in Norway. *Food Quality and Preference, 80*, Article 103827.
Panagiotou, S., & Kontogianni, M. D. (2017). The economic burden of gluten-free products and gluten-free diet: A cost estimation analysis in Greece. *Journal of Human Nutrition and Dietetics, 30*(6), 746–752.
Pellegrini, N., & Agostoni, C. (2015). Nutritional aspects of gluten-free products. *Journal of the Science of Food and Agriculture, 95*(12), 2380–2385.
Pontual, I., Amaral, G. V., Esmerino, E. A., Pimentel, T. C., Freitas, M. Q., Fukuda, R. K., & Cruz, A. G. (2017). Assessing consumer expectations about pizza: A study on celiac and non-celiac individuals using the word association technique. *Food Research International, 94*, 1–5.
Prada, M., Godinho, C., Rodrigues, D. L., Lopes, C., & Garrido, M. V. (2019). The impact of a gluten-free claim on the perceived healthfulness, calories, level of processing and expected taste of food products. *Food quality and preference, 73*, 284–287.
Priven, M., Baum, J., Vieira, E., Fung, T., & Herbold, N. (2015). The influence of a factitious free-from food product label on consumer perceptions of healthfulness. *Journal of the Academy of Nutrition and Dietetics, 115*(11), 1808–1814.
Puerta, P., Laguna, L., Tárrega, A., & Carrillo, E. (2022). Relevant elements on biscuits purchasing decision for coeliac children and their parents in a supermarket context. *Food Quality and Preference, 98*, Article 104496.
Reynolds-Zayak, L. (2004). Understanding consumer trends can present new opportunities. *Agri-Processing Branch Business & Inovation Alberta Agriculture Food and Rural Development*.
Rezai, G., Kit Teng, P., Mohamed, Z., & Shamsudin, M. N. (2014). Structural equation modeling of consumer purchase intention toward synthetic functional foods. *Journal of Food Products Marketing, 20*(sup1), 13–34.
Ringle, C. M., Wende, S., & Becker, J.-M. (2022). *SmartPLS 4*. Oststeinbek: SmartPLS GmbH. http://www.smartpls.com.
Roh, T., Seok, J., & Kim, Y. (2022). Unveiling ways to reach organic purchase: Green perceived value, perceived knowledge, attitude, subjective norm, and trust. *Journal of Retailing and Consumer Services, 67*, Article 102988.
Roman, L., Belorio, M., & Gomez, M. (2019). Gluten-free breads: The gap between research and commercial reality. *Comprehensive Reviews in Food Science and Food Safety, 18*(3), 690–702.

Ryu, K., Han, H., & Jang, S. (2010). Relationships among hedonic and utilitarian values, satisfaction and behavioral intentions in the fast-casual restaurant industry. *International journal of contemporary hospitality management, 22*(3), 416–432.
Sangroya, D., & Nayak, J. K. (2017). Factors influencing buying behaviour of green energy consumer. *Journal of cleaner production, 151*, 393–405.
Savarese, M., Wismer, W., & Graffigna, G. (2021). Conceptualizing "free-from" food consumption determinants: A systematic integrative literature review focused on gluten and lactose. *Food Quality and Preference, 90*, Article 104170.
Schulte, E. M., Potenza, M. N., & Gearhardt, A. N. (2017). A commentary on the "eating addiction" versus "food addiction" perspectives on addictive-like food consumption. *Appetite, 115*, 9–15.
Sheth, J. N., Newman, B. I., & Gross, B. L. (1991). Why we buy what we buy: A theory of consumption values. *Journal of business research, 22*(2), 159–170.
Sielicka-Różyńska, M., Jerzyk, E., & Gluza, N. (2021). Consumer perception of packaging: An eye-tracking study of gluten-free cookies. *International Journal of Consumer Studies, 45*(1), 14–27.
Singh, P., Arora, A., Strand, T. A., Leffler, D. A., Catassi, C., Green, P. H., Kelly, C. P., Ahuja, V., & Makharia, G. K. (2018). Global prevalence of celiac disease: Systematic review and meta-analysis. *Clinical Gastroenterology and Hepatology, 16*(6), 823–836.
Sirgy, M. J., Lee, D. J., & Rahtz, D. (2007). Research on consumer well-being (CWB): Overview of the field and introduction to the special issue. *Journal of Macromarketing, 27*(4), 341–349.
Sultan, P., Tarafder, T., Pearson, D., & Henryks, J. (2020). Intention-behaviour gap and perceived behavioural control-behaviour gap in theory of planned behaviour: Moderating roles of communication, satisfaction and trust in organic food consumption. *Food Quality and Preference, 81*, Article 103838.
Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of retailing, 77*(2), 203–220.
Teo, T. S. (2001). Demographic and motivation variables associated with Internet usage activities. *Internet research, 11*(2), 125–137.
Thompson, T. (2000). Folate, iron, and dietary fiber contents of the gluten-free diet. *Journal of the Academy of Nutrition and Dietetics, 100*(11), 1389.
Tóth, M., Kaszab, T., & Meretei, A. (2022). Texture profile analysis and sensory evaluation of commercially available gluten-free bread samples. *European Food Research and Technology, 248*(6), 1447–1455.
Vici, G., Belli, L., Biondi, M., & Polzonetti, V. (2016). Gluten free diet and nutrient deficiencies: A review. *Clinical nutrition, 35*(6), 1236–1241.
Villafuerte-Galvez, J., Vanga, R. R., Dennis, M., Hansen, J., Leffler, D. A., Kelly, C. P., & Mukherjee, R. (2015). Factors governing long-term adherence to a gluten-free diet in adult patients with coeliac disease. *Alimentary pharmacology & therapeutics, 42*(6), 753–760.
Vu, D. M., Ha, N. T., Ngo, T. V. N., Pham, H. T., & Duong, C. D. (2021). Environmental corporate social responsibility initiatives and green purchase intention: An application of the extended theory of planned behavior. *Social Responsibility Journal, 18*(8), 1627–1645.
Wang, H. Y., Liao, C., & Yang, L. H. (2013). What affects mobile application use? The roles of consumption values. *International Journal of Marketing Studies, 5*(2), 11.
Wardy, W., Jack, A. R., Chonpracha, P., Alonso, J. R., King, J. M., & Prinyawiwatkul, W. (2018). Gluten-free muffins: Effects of sugar reduction and health benefit information on consumer liking, emotion, and purchase intent. *International journal of food science & technology, 53*(1), 262–269.
Wirtz, J., & Lee, M. C. (2003). An examination of the quality and context-specific applicability of commonly used customer satisfaction measures. *Journal of Service Research, 5*, 345–355.
Woo, E., & Kim, Y. G. (2019). Consumer attitudes and buying behavior for green food products: From the aspect of green perceived value (GPV). *British Food Journal, 121*(2), 320–332.
Xhakollari, V., & Canavari, M. (2019). Celiac and non-celiac consumers' experiences when purchasing glute-free products in Italy. *Economia agro-alimentare, 21*(1), 29–48.
Xhakollari, V., Canavari, M., & Osman, M. (2019). Factors affecting consumers' adherence to gluten-free diet, a systematic review. *Trends in food science & technology, 85*, 23–33.
Xhakollari, V., Canavari, M., & Osman, M. (2021). Why people follow a gluten-free diet? An application of health behaviour models. *Appetite, 161*, Article 105136.
Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American psychologist, 35*(2), 151.
Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of marketing, 52*(3), 2–22.