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Healthy food consumption in the Covid-19 era: Empirical evidence from Italian consumers choices on functional products

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Abstract

This study provides an explorative analysis of the potential appreciation manifested by 312 Italian consumers for functional confectionery products, obtained from high-amylose soft wheat flours (high-amylose confectionery products, HACPs). An online questionnaire was administered in 2021, which assessed respondents' willingness to pay (WTP) a premium price for HACPs with respect to non-functional confectionery products. Detailed information about respondents and their families was collected and put in relation with the willingness, or not, to pay a premium price for HACPs through a Binary Logit model. Two thirds of respondents were willing to pay a premium price for HACPs, that stood at +12.3%. Analysis of the results of the Binary Logit model led to highlight that respondents' WTP for HACPs is positively influenced by age, level of family income, satisfaction with the latter during the COVID-19 pandemic, habit to purchase food products on e-commerce channels, adoption of healthy eating styles and belief that functional foods can contribute to improve well-being. At the opposite, respondents' WTP is negatively influenced by family size, presence of dependent members and, interestingly, habit to practice physical activity with high frequency. Based on these findings, useful insights also in support of confectionery industry and commercial distribution are finally reported.

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Introduction

Functional foods (FFs) have been recently defined by the Functional Foods Center as "natural or processed foods that contain biologically-active compounds, which, in defined, effective, non-toxic amounts, provide a clinically proven and documented health benefit utilizing specific biomarkers, to promote optimal health, reduce the risk of chronic/viral diseases and manage their symptoms" (Martirosyan *et al.*, 2021). Therefore, FFs are foods of common use, capable of bringing beneficial effects beyond the basic nutrition, in the quantities that are normally expected to be consumed with daily diet (Diplock *et al.*, 1999).

FFs represent a rapidly growing segment in the global food market, which reached the value of $180.59 billion in 2021, and is projected to grow up to $223.95 billion in 2026, at a compound annual growth rate (CAGR) of 4.4% (The Business Research Company, 2022). Market demand of FFs has expanded over the last decades in parallel with consumers awareness about the strong link between health and diet (Siró *et al.*, 2008). The outbreak of COVID-19 pandemic in 2020 boosted this trend, modifying consumers attitudes towards health and wellness, what allows to forecast a further positive impact on the global market of FFs in the next years (KBV Research, 2021). In any case, even before the pandemic, this rising awareness had already contributed to the considerable lengthening of life expectancy in developed Countries. This characterizes in first place the elderly, more concerned with their health and attentive to the health implications of diet (Siegrist *et al.*, 2008), willing to improve their life quality also consuming FFs (Roberfroid, 2000; Gibson and Williams, 2000). In turn, the progressive aging of population increases the incidence of chronic diseases, that can be prevented through a healthy lifestyle and diet, of which FFs are increasingly part (Jew *et al.*, 2009; Barauskaite *et al.*, 2018). In any case, the interest in FFs is also growing among young people, who are motivated in the consumption of healthy foods, containing natural ingredients, useful also for body weight control (Vorage *et al.*, 2020); additionally, young people are characterized by a positive attitude towards food innovations (Tuorila *et al.*, 2001; Jeżewska-Zychowicz, 2009; Bruschi *et al.*, 2015; Kraus *et al.*, 2017). Food industry is constantly committed in widening market offer of FFs, attracted by the strong expansion of demand and the high consumers Willingness To Pay (WTP) for these products (Khan *et al.*, 2014; Moro *et al.*, 2015). However, a frequent failure of new FFs in the attempt to establish on the market was evidenced (Saguy and Moskowitz, 1999; Moskowitz *et al.*, 2009). Many others have a short life cycle, at the point that half of the profits of the food industry comes from products that are withdrawn within the first two-five years (Stein and Rodriguez-Cerezo, 2008; Moskowitz *et*

al., 2009). Probably, this is in part due to an excessive attention paid to the technical feasibility of industrial production processes, which often leads to neglect consumers needs and preferences (Van Kleef *et al*., 2005; Bleiel, 2010). In other cases, as reported by Alongi and Anese (2021) in their extensive review on FFs development, a mismatch between FFs features and consumers expectations could occur. This is consequent to an imbalance in product development, more focused on intrinsic product features (relating to nutritional aspects), than on extrinsic attributes (relating to the way in which products are presented to consumers), what makes it necessary to settle effective communication strategies. Economic research has undertaken efforts to identify the most influent characteristics of FFs, and of their potential consumers, on willingness to purchase and pay for these products, also with the aim of supporting food industry and commercial distribution in developing a market offer of FFs appreciated by consumers. With reference to WTP, Plasek and Temesi (2019) reviewed the most common survey methodologies (experimental auctions, contingent evaluation, choice experiment, in-person and online survey), and then identified the most influent factors on it. These appeared related to consumers demographic characteristics, label specification of health claims, trust in FFs and in their production technologies, prior knowledge of the products or their ingredients and common perception of the combination between the type of staple food and claimed functional properties. However, there are still few empirical studies, like the present explorative analysis, that outline the attitudes of Italian consumers towards FFs, since many of the existing ones have been conducted in the United States and in other European countries (Bentivoglio *et al*., 2021).

This study provides an explorative analysis to evaluate the potential appreciation of Italian consumers for a particular typology of FFs, i.e., functional confectionery products, obtained with flours from a soft wheat line with high-amylose starch (hereinafter, HACPs). Within the global market of FFs, the sub-segment of functional confectionery products is still very narrow, as it reached a value of $1.8 billion in 2021 (1% of the total value of FFs market), despite over a decade of steady growth; however, it is forecasted to grow at a CAGR of 9.1% in the period 2022-2029, more than double that expected for the market of FFs as a whole, and to reach a value of $2.98 billion by 2029 (Data Bridge Market Research, 2022). With reference to the Italian context, recent market research by Euromonitor International (2022) has evidenced how people, also under the pressure of COVID-19 pandemic, are orienting towards healthier food options mainly represented by FFs, even for staple breakfast food and snacks. At least in part, this could overturn the reluctance that Italian consumers have always manifested towards FFs. The latter is evidenced by the fact that, still few years ago, Italy accounted

for only 11% of the Western-European market of FFs (Vicentini *et al*., 2016). This has always been related to peculiarities in culture and food traditions (Castellini *et al*., 2002; Annunziata and Vecchio, 2011), frequently healthier in themselves than those adopted in other Countries, as well as to an underestimation of the health benefits achievable from FFs (Van Trijp and Van der Lans, 2007). With specific reference to HACPs, a WTP analysis is even more interesting, since confectionery products are intrinsically less healthy than others (e.g., yogurt, cereals and fruit juices), and they could be seen less credible as FFs, negatively affecting willingness to buy and to pay (Ares and Gámbaro, 2007; Annunziata and Vecchio, 2011; Siegrist *et al*., 2015).This appears with evidence when considering the level of WTP for HACPs quantified in this study, much lower than that expressed for other FFs, object of similar studies, commonly deemed to be healthier. For instance, in face of an average premium price of +8% for HACPs, Palmieri *et al.* (2021) detected through an online questionnaire a WTP up to +50% (or more), on average, for functional pasta featuring prickly pear, with respect to the price of conventional pasta. Again, Palmieri *et al.* (2022) found that 75% of respondents to an online questionnaire were willing to pay a premium price up to +50% (or more) for functional eggs enriched with Omega-3, with respect to the price of conventional eggs. Vecchio *et al*. (2016), conducting an experimental auction, highlighted a WTP of +36.5% for functional yogurt with respect to conventional yogurt (whether additional information was provided to consumers about its properties). Similarly, Moro *et al*. (2015), through a stated choice experiment, evidenced an average premium price of +42% for a yogurt enriched with Catechins, with respect to conventional yogurt.

In order to evaluate WTP for HACPs, an online questionnaire was disseminated. The latter detected essential information on personal and family characteristics, economic and social conditions, lifestyle, health state and attitudes of purchase and consumption of respondents. The variables obtained from the questionnaire were used to estimate a Binary Logit model, allowing to evaluate their influence on WTP for HACPs. On the one hand, the findings from this study will support the confectionery industry in developing HACPs that effectively meet consumer needs; on the other, they will provide useful insights to distribution operators for marketing strategies aimed to ensure adequate commercial feedback to these products.

1. Materials and methods

1.1. *Characteristics of the soft wheat genotype and of the confectionery products*

HACPs will be obtained from flours of a non-transgenic soft wheat line with high amylose starch (Patent numbers: US20140212567, EP20120195780). Confectionery industry is currently developing production protocols that will make it possible to obtain different types of HACPs like biscuits, croissants, plum cake and muffins with a similar taste to non-functional ones, but potentially able to bring all the benefits associated with the high-amylose content. The latter improves resistance of starch to digestion, with positive effects on glycemic indices and benefits for the digestive system (Newberry *et al*., 2018). In their extensive review, Bird and Regina (2018) put in evidence that the high content of amylose, and consequently of resistant starch, could contribute to reduce the risk of developing diseases such as type II diabetes, cardiovascular disease and colon cancer.

1.2. *Questionnaire: structure, dissemination and variables obtained*

The questionnaire assessed respondents' appreciation for HACPs quantifying their willingness to pay a premium price over the basic price of non-functional confectionery products (biscuits, croissants, plum cake and muffins). Respondents involved were adults (over 18 years old) and were asked to choose a single premium price level among the proposed ones, jointly considering all product types.

Opting for online dissemination was necessary, due to the restrictions in force to face COVID-19 pandemic in the six months during which the questionnaire was administered (March-September 2021). Despite the loss of representativeness towards population (the next paragraph assesses some corrective actions put in place to overcome this limitation), the online method proves effective for collecting a high number of answers and a wide variety of information in a relatively short time (McCullough, 1998).

First, a brief introduction specified the aims of the research, provided respondents with the main information on HACPs and the potential health benefits obtainable from their regular consumption, in place of non-functional confectionery products.

Then a total of 28 questions were proposed, all with mandatory answer and with different types of answering (single choice between two or more options, multiple choice, ordinal scale choice, free answer in numerical or text format), organized into five distinct sections, as specified below.

- Section 1 (1 question): information on the frequency of consumption of non-functional confectionery products (biscuits, croissants, plum cake and muffins).
- Section 2 (3 questions): level of the premium price willed to pay for HACPs, i.e., no premium, +5%, +10%, +20%, +30%, +50% over the basic price range of non-functional confectionery products (2.40-4.00 €, assessed through direct surveys in the large-scale retail trade), and certainty level about the choice (sure, fairly sure, uncertain).
- Section 3 (12 questions): basic information on respondent and his/her household (age, gender, territorial area of residence in Italy, level of education[1], working condition, composition of the family unit, title of possession of the main home, family economic conditions and level of satisfaction with the latter).
- Section 4 (6 questions): information on respondent's lifestyle and health state (adoption of alternative diet, frequency of physical activity, presence of diet-related disorders and diseases, or other disorders and diseases).
- Section 5 (6 questions): information on food purchase and consumption habits (responsible for food shopping in the family, main channel of food purchase, meals eaten during the day, benefits deemed to be achieved from FFs, frequency of consumption of FFs, reasons for consumption of FFs).

A first draft of the questionnaire was personally disseminated to 30 respondents with different age, gender, level of education, working condition and income, to carry out a pilot test (complying with the privacy legislation, these answers were not considered in the analysis, since not anonymously collected). The final version of the questionnaire was shared for anonymous answer on the Microsoft Office Forms platform. Questionnaire answer was advertised by word of mouth and via social media, also through paid ads. The dissemination phase ended in September 2021) and yielded 312 valid answers.

Table 1 reports in detail the variables obtained from the questionnaire, also specifying their type and range of variation.

1. With reference to this aspect, it was opted for not considering BSc in the same way as MSc, since questionnaire answer was initially advertised by word of mouth also in the university setting; thus, almost all who declared to held a BSc were actually students attending MSc courses.

Table 1 - Variables obtained from the questionnaire

Variable description	Variable type	Variable range
Willingness to pay a premium price for HACPs and certainty level		
Willingness to pay a premium price	Ordinal	6 levels from 0% to +50%
Choice certainty level	Ordinal	3 levels from 1 (uncertain) to 3 (sure)
Personal information and other general characteristics		
Gender: female	Binary	1, yes; 0, no
Age	Discrete	≥ 18 years
Level of education: MSc and above	Binary	1, yes; 0, no
Working condition: permanent employees/retirees	Binary	1, yes; 0, no
Characteristics of family unit and satisfaction about income		
Number of family members	Discrete	>0
Presence of dependent family members	Binary	1, yes; 0, no
Number of dependent family members	Discrete	≥0
Full ownership of family home (no mortgage)	Binary	1, yes; 0, no
Family yearly income level	Ordinal	1 (<15,000 €) – 5 (>60,000 €)
Satisfaction about family income (COVID-19 effect)	Ordinal	1 (not at all satisfied) – 4 (fully satisfied)
Lifestyle and health state		
Adoption of healthy eating styles	Binary	1, yes; 0, no
Frequency of physical activity	Ordinal	1 (never) – 5 (daily)
Suffering from diet-related disorders/diseases	Binary	1, yes; 0, no
Suffering from other disorders/diseases	Binary	1, yes; 0, no
Food purchase and consumption habits		
Channel of food purchase: traditional shopping	Binary	1, yes; 0, no
Channel of food purchase: e-commerce	Binary	1, yes; 0, no
Consumption of confectionery products	Index	0.2 (never) – 1 (daily)
Consumption of FFs	Index	0.2 (never) – 1 (daily)
Benefits obtainable from consumption of FFs		
Well-being	Binary	1, yes; 0, no
Protection against severe diseases	Binary	1, yes; 0, no
Protection against food disorders	Binary	1, yes; 0, no
Motivations for consumption of FFs		
Attracted by advertising	Binary	1, yes; 0, no
Attracted by label indications	Binary	1, yes; 0, no
Experiencing health benefits	Binary	1, yes; 0, no
Experiencing pleasure	Binary	1, yes; 0, no
Preventing health problems	Binary	1, yes; 0, no
Other motivations	Binary	1, yes; 0, no

More than half of the variables obtained were binary (dummies), widely used to deal with qualitative traits. Others were discrete, like those related to some characteristics of respondents and of their families. The ordinal variables allowed to assess on an ordered scale respondents' WTP and certainty level, economic conditions and frequency of physical activity. Finally, frequency of consumption of confectionery products and FFs was quantified computing two indexes, in which frequencies of consumption of all the different product types (expressed by respondents on a five-level ordered scale) were jointly considered in a weighted average.

1.3. *Representativeness of respondents towards population*

The degree of representativeness of respondents towards the characteristics of Italian population, as described by the National Institute of Statistics (ISTAT), was gradually checked during the dissemination phase. The reference datasets are contained in the I. Stat database (http://dati.istat.it/), annually updated by ISTAT until 2020. The database provides information about Italian population and families, aspects of citizens' daily life and their opinion regarding various aspects of life. The three-year period 2017-2019 was considered as a reference, since the 2020 data were not yet available in all the datasets. Data referred to 2020 were instead considered to compare respondents' satisfaction about family economic conditions, since in the questionnaire it was specifically asked to express the satisfaction in the previous 12 months, thus referring to the year 2020, in which COVID-19 pandemic broke out. Divergences of respondents' characteristics from population were gradually smoothed by creating paid ads on social media, which advertised questionnaire answer to the least represented slices of the population for age, gender and level of education. However, as better specified in §2.1, the way in which questionnaire was disseminated (online) and its answer advertised, together with the relatively limited number of answers obtained and the concentration of respondents in central Italy, do not allow to generalize results to the whole Italian population. In any case, the good degree of similarity of respondents' characteristics with the population allow to provide useful insights to be confirmed with further analyses at a larger scale.

1.4. *Specification of the econometric model*

In order to identify respondents' characteristics that most affect their willingness, or not, to pay a premium price for HACPs, quantifying their impact, a Binary Logit model was estimated. Binary Logit models are

appropriate to use when the dependent variable (response) is expressed in a binary form, assuming one of only two possible states, like the presence or absence of an attribute of interest (Rodríguez, 2007): in this case the model predicts respondents' probability to be willing to pay a premium price for HACPs, regardless the actual level of the premium. The necessary simplification of the questionnaire, in order to make online answer feasible in a short time, as well as the relatively limited number of answers collected, did not allow to choose other estimation methods (e.g., ordered choice) accounting for the WTP level actually expressed by respondents with enough statistical robustness.

Therefore, the dependent variable (respondent's WTP) was binary (1, yes; 0, no), built on the homonym ordinal variable (WTP) listed in table 1. The independent variables (regressors) were also presented in table 1, and can be grouped as follows:

- PERS: personal information and other general characteristics of respondents (the variable of the Country of birth was not considered, since most of the respondents declared they were born in Italy).
- FAM: characteristics of respondent's family unit and satisfaction about family income.
- LIFHE: respondent's lifestyle and health state.
- CONS: respondent's food purchase and consumption habits (confectionery products and FFs).
- BENEF: benefits deemed obtainable by respondents from consumption of FFs.
- MOTIV: respondents' motivation for consumption of FFs.

An additional instrumental variable (CER) was introduced as a regressor in the model, relating to the certainty level about WTP choice.

The mathematical formulation of the Binary Logit model used in this study is represented in the following equation (1):

$$\begin{aligned} \boldsymbol{WTP} &= \text{logit}[\text{P}(\text{y} = 1)] \\ &= \beta_0 + \beta_1 \boldsymbol{CER} + \beta_2 \boldsymbol{PERS} + \beta_3 \boldsymbol{FAM} + \beta_4 \boldsymbol{LIFHE} + \beta_5 \boldsymbol{CONS} \\ &+ \beta_6 \boldsymbol{BENEF} + \beta_7 \boldsymbol{MOTIV} + \varepsilon_I \end{aligned} \quad (1)$$

In which β_0 represents the intercept, β_1 the coefficient related to the level of certainty in the choice, β_2 the coefficients related to personal characteristics, β_3 those related to the characteristics of the family unit, β_4 those related to lifestyle and health, β_5 those related to food purchase and consumption habits, β_6 those related to the benefits deemed obtainable from consumption of FFs, β_7 those related to the motivations for consumption of FFs.

Model estimation was performed using the statistical software EViews®12 University Edition (HIS Markit Ltd). Estimation method was based on

Maximum Likelihood principle (Quadratic hill climbing/Eviews legacy) and the software automatically computed coefficient covariance matrix using second derivatives.

In order to correctly interpret the coefficient of each regressor and its marginal effect, the odds ratio (OR) was calculated according to the following equation (2):

$$OR = e^{\beta_i}$$

The OR quantifies the percentage change determined in the dependent variable, in this case the probability of being willing to pay a price premium for HACPs, in response to a unit percentage change of each regressor, keeping all the others constant. OR values can range from zero to infinity. Values below one (associated to negative coefficients) indicate changes in the probability of being willing to pay a premium price less than proportional to the unit change of the regressor, while values greater than one (associated to positive coefficients) indicate changes in this probability more than proportional to the unit variation of the regressor. Instead, values equal to one indicate that no effect of the regressor exists on the probability of being willing to pay a premium price.

2. Results and discussion

2.1. *Respondents' characteristics*

Table 2 compares the characteristics of respondents to those of the population residing in Central Italy and Italy, as described by ISTAT, with reference to personal information, characteristics of the family units and satisfaction about family income.

Overall, the characteristics of respondents are quite in line with those of the population residing in the two territorial areas of Italy and Central Italy, what leads to be confident with the validity of the indications provided by this study. However, the way in which data was collected, together with the relatively small number of responses the questionnaire received, do not allow to generalize its findings. In any case, also recent studies conducted in the Italian context for different FFs (Bentivoglio *et al.*, 2021; Paffarini *et al.*, 2021; Palmieri *et al.*, 2021; Palmieri *et al.*, 2022) showed some limitations in representing the characteristics of population, which however is not the goal of explorative analyses.

Table 2 - Comparison among respondents' characteristics and population

		Sample	Central Italy	Italy
Personal information and other general characteristics				
Gender				
Female	%	57.1	52.3	51.9
Age	years	45.3	45.4	44.8
20-39	%	36.2	26.1	27.1
40-59	%	42.0	38.1	37.7
60 and older	%	21.8	35.8	35.2
Level of education: MSc and above	%	54.8	18.8	15.5
Working condition				
Permanent employees	%	33.7	26.7	24.8
Retirees	%	12.2	17.8	17.8
Characteristics of family unit and satisfaction about income				
Number of family members	n.	3.1	2.3	2.3
1	%	10.3	34.9	32.7
2	%	23.7	27.8	27.2
3	%	26.3	19.2	19.4
4	%	29.2	13.6	15.3
5 or more	%	10.6	4.5	5.3
Families with dependent members	%	35.3	43.5	44.7
Number of dependent members	n.	0.63	0.667	0.711
0	%	64.7	56.5	55.3
1	%	15.7	23.4	22.6
2	%	12.5	17.0	17.8
3 or more	%	7.1	3.1	4.3
Average family income	€	34,399	32,967	31,517
Satisfaction about family income (COVID-19 effect)	1-4	2.86	2.53	2.54
Very satisfied	4 %	4.8	4.6	4.7
Fairly satisfied	3 %	77.2	54	54.4
Little satisfied	2 %	17.0	31.4	31.3
Not at all satisfied	1 %	1.0	9.9	9.7

In this study, the main divergence from the population lies in the level of education: at a major extent, respondents held a MSc or post-graduate qualifications, compared to less than 20% in the population, and this might at least in part motivate the differences in average family income, and satisfaction about it. Smoother divergences concern gender distribution (with a slight prevalence of women), age (on average elder than population), percentage breakdown into age groups (with a lower frequency of over-60s and a concentration in the 20-59 years age group). This contributes to motivate differences in working condition (with a higher frequency in the sample of permanent employees and a lower frequency of retirees), and explains why more than half of respondent's family units includes three or four components, in face of only one third in the population.

Table 3 reports respondents' WTP and certainty level.

Table 3 - Willingness to pay of respondents

Number of respondents		**n.**	**312**
Willingness to pay a premium price for HACPs and certainty level			
Respondents willing to pay		%	65.1
	+5%	n.	80
	+10%	n.	60
	+20%	n.	45
	+30%	n.	15
	+50%	n.	3
Respondents willing to pay with certainty		%	68.9
Average premium price (only respondents willing to pay)		%	+12.3
Average premium price (all respondents)		%	+8.0%

About two thirds of the 312 respondents declared to be willing to pay a premium price for HACPs. It is worth to highlight that, as expected, the number of respondents willing to pay decreases as the level of premium price increases. Considering only respondents willing to pay, the premium price averages at +12.3%, while it decreases to +8.0% considering all respondents. The latter could be relevant for food industry and commercial distribution, though lower than premiums estimated for other FFs commonly believed to be healthier (Palmieri *et al.*, 2022; Palmieri *et al.*, 2021; Pappalardo and Lusk, 2016; Vecchio *et al.*, 2016; Moro *et al.*, 2015). This evidence confirms the findings of Siegrist *et al.* (2015), Annunziata and Vecchio (2011) and

Ares and Gámbaro (2007) about the strong interaction existing between the specific FF and the credibility of its functional properties in the eyes of consumers, which limits respondents' WTP in the case of HACPs. However, it is also important to consider that 68.9% of respondents willing to pay a premium price declared to be certain of this choice: this leads to believe that what was declared in the questionnaire may frequently translate into concrete purchase intentions and WTP. Acquiring information on respondents' certainty level about WTP choice was precisely aimed at reducing the potential gap, highlighted by Furno *et al.* (2016), between the declared WTP and the one that will be manifested at the time of purchase.

2.2. *Main results of the econometric model*

Table 4 describes, in the first section, the characteristics of respondents and of their families that most affect willingness to pay a premium price for HACPs, as evidenced by the Binary Logit model, the related effect, and level of significance, as well as the Odds Ratio (OR), which allows to correctly interpret the effects. In the second section, the detailed output of the model is reported.

Table 4 - Significant variables and detailed estimation output of the Binary Logit model

Significant variables

Variable description	Effect	Significance	OR
Certainty level	+	***	3.42
Age	+	**	1.03
Number of family members	–	***	0.64
Presence of dependent family members	–	***	0.08
Family income level	+	***	1.49
Satisfaction about family income (COVID-19 pandemic)	+	***	3.46
Adoption of healthy eating styles	+	**	1.92
Frequency of physical activity	–	*	0.84
Channel of food purchase: e-commerce	+	***	3.53
Well-being	+	**	3.39

*** p≤0.01; ** p≤0.05; * p≤0.1

Detailed estimation output

Independent variables (regressors)		Coefficient	Std. Error	z-Statistic	Prob.
	C	-9.45	2.12	–4.47	0.000
CER	CER	1.23	0.16	7.58	0.000
PERS	FEM	–0.14	0.37	–0.4	0.692
	AGE	0.03	0.01	2.02	0.043
	MASDE	–0.15	0.35	–0.42	0.673
	PERRET	0.58	0.4	1.46	0.145

Table 4 - continued

FAM	FAMSIZE	–0.44	0.14	–3.13	0.002
	DEPMEM	–2.51	0.56	–4.45	0.000
	INC	0.4	0.12	3.35	0.001
	INCSAT	1.24	0.4	3.12	0.002
	HOMOWN	0.08	0.35	0.22	0.827
LIFHE	HEALTYEATING	0.65	0.32	2.02	0.044
	PHYSACT	–0.17	0.1	–1.62	0.100
	DIETPAT	–0.05	0.36	–0.14	0.888
	OTHPAT	0.57	0.42	1.34	0.179
CONS	TRADSHOP	–0.18	0.42	–0.44	0.662
	ECOMSHOP	1.26	0.62	2.05	0.040
	CONFECT	2.14	1.38	1.55	0.121
	FUNCT	–1.3	1.57	–0.83	0.407
BENEF	WELLBEING	1.22	0.59	2.07	0.038
	SEVERE	0.62	0.46	1.33	0.185
	FOODISOR	0.02	0.39	0.04	0.969
MOTIV	ADVERT	–0.63	0.82	–0.76	0.445
	LABEL	0.36	0.67	0.54	0.588
	BENEF	–0.14	0.39	–0.36	0.716
	PLEASURE	0.19	0.39	0.49	0.623
	PREVENT	–0.28	0.44	–0.64	0.519
	OTH	–0.11	0.55	–0.21	0.835

McFadden R-squared	0.343	Mean dependent var	0.651
S.D. dependent var	0.480	S.E. of regression	0.387
Akaike info criterion	1.030	Sum squared resid	42.4
Schwarz criterion	1.370	Log likelihood	–132.6
Hannan-Quinn criter.	1.160	Deviance	265.3
Restr. deviance	403.8	Restr. log likelihood	–201.9
LR statistic	138.5	Avg. log likelihood	–0.425
Prob (LR statistic)	0.000		

First, the presence of choice certainty level among the variables that positively influence respondents' WTP for HACPs, as well as the magnitude of its effect (OR: 3.42), suggests that future information campaigns and marketing strategies might play a crucial role, if aimed at dispelling any possible doubt about the beneficial effects on health achievable through a regular consumption of FFs (and HACPs, consumed in place of non-functional confectionery products). Taking up the considerations made by Annunziata and Vecchio (2011), the direct involvement of competent public institutions (e.g., the Ministry of Health, medical research institutions, etc.) in such campaigns is desirable, since commonly these are seen more credible in conveying health information than private entities.

The only significant variable in the group of personal information is respondents' age, which, albeit slightly (OR: 1.03), affects in a positive way WTP at its increasing. This is in line with previous findings about consumers' willingness to pay (Moro *et al*., 2015; Vecchio *et al*., 2016; Karelakis *et al*., 2020), and to purchase FFs (Ares *et al*., 2009; Baglione *et al*., 2012; Cavaliere *et al*., 2015). As also stated by Topolska *et al*. (2021), this evidence confirms that, with aging, consumers pay greater attention to a healthy diet and to the benefits achievable from FFs consumption. However, other studies (e.g., Vorage *et al*., 2020) put in evidence a higher interest of young people towards FFs, while still others found no association of age with consumption of FFs (Moutinho *et al*., 2022), to the point that Baker *et al*. (2022), in their review on consumer acceptance towards FFs, had to conclude that literature findings were controversial in this sense. In any case, the need to address targeted information campaigns emerges, to raise awareness about health benefits achievable from HACPs also among young consumers. In fact, taking up the conclusions of Vorage *et al*. (2020), there is room for a spread in the consumption of FFs (and even more of HACPs) also in this market segment.

With reference to respondents' family units, increase in size (OR: 0.64) and in particular the presence of dependent members (OR: 0.08) strongly affect in a negative sense WTP, clearly due to the lower income available per-capita, at the same level of family income, compared to smaller families with a higher share of independent members. However, also in this regard literature evidence is controversial, as reported by Baker *et al*. (2022), with some Authors confirming these findings, while others maintaining that households with a high number of members are more likely to consume FFs. Probably, household size in itself is not indicative enough, and needs to be contextualized considering other aspects, like the presence of children and teenagers, and family income level. In any case, s HACPs should be made affordable also to consumers with large families and dependent members, through proper marketing strategies.

Looking at the economic factors, respondents' family income level positively influences their WTP for HACPs (OR: 1.49). This confirms the findings of previous studies on other FFs (Vecchio *et al*., 2016; Kavoosi-Kalashami *et al*., 2017), and is also fully reflected in the literature collected by Baker *et al*. (2022); besides, results of this explorative analysis add the evidence that WTP is strongly increased also by respondents' satisfaction with family income level in the COVID-19 era (OR: 3.46).

Moving on to consider respondents' lifestyle, the adoption of healthy eating styles (i.e., alternative diet, or the habit of eating frequent light meals) has a positive influence on WTP (OR: 1.92), as expected. An interesting finding is that the frequent practice of physical activity negatively affects

respondents' WTP (OR: 0.84). This is in contrast with previous literature evidence collected by Zanchini *et al.* (2022) in their review about lifestyle, psychological and socio-demographic drivers in FFs choice, but two complementary explanations could be provided. First, respondents who lead a sedentary life might believe to compensate the lack of physical activity consuming FFs; second, physically active respondents might choose of not consuming confectionery products (and consequently HACPs), underestimating in this case the complementarity of the benefits achievable from practicing a frequent physical activity and from consuming FFs, even if in the form of confectionery products.

Analysing respondents' food purchase and consumption habits, the only significant variable, which strongly increases respondents WTP (OR: 3.53), is the custom of purchasing food products through e-commerce channels, confirming the findings of Zhang *et al.* (2018) in relation to the WTP of Chinese consumers for safe vegetables. This suggests that the web could represent a crucial channel also for conveying information on HACPs, beyond their commercial distribution. This habit has certainly reinforced as a consequence of the restrictions imposed in Italy to face the COVID-19 pandemic, and will probably be destined to persist and consolidate in the future. Another innovative distribution channel, represented by the vending machines, which is gaining more and more importance for FFs shopping particularly in Italy (Henke and Sardone, 2020), was not considered in the questionnaire: in fact, we felt that, thought frequently adopted by many people, its contribution to consumers food expense would have been in any case limited. On the other side, the absence of any significant influence on WTP by respondents' habit to shop food through traditional purchase channels could suggest a reduced identifiability on the shelves of FFs.

Finally, with reference to the benefits deemed obtainable from consumption of FFs, respondents' belief to improve well-being is the only significant variable, and has a makedly positive effect on WTP (OR: 3.39). This reflects the considerations made by Baker *et al.* (2022), who report that beliefs about well-being improvement are determinant for FFs acceptance. However, no other possible benefit from FFs consumption, including the prevention from severe diseases or diet-related disorders, significantly affects respondents' WTP for HACPs, as well as no particular motivation for consumption of FFs proves influent. Again, this is probably due to the specific typology of FF object of this study, commonly considered as not so healthy, and therefore less credible in preventing such diseases. In any case, taking up the conclusions of Idda *et al.* (2008) and Del Giudice *et al.* (2009) for the Italian context, this evidence put the stress on the fundamental role of motivational analysis in designing consumer-oriented marketing strategies, whose output should be kept into careful consideration by food industry and commercial distribution.

4. Conclusions

The findings of this study confirm previous evidence by Annunziata and Vecchio (2011) with reference to the Italian market of FFs, suggesting that an investment in extensive information and communication campaigns on FFs and on HACPs could prove essential also for the affirmation of these products on the market. Equally important could be the direct commitment in these campaigns of public institutions, more trustworthy in conveying health information in the eyes of consumers than private entities. Furthermore, to maximize their effectiveness, it will be necessary to design such campaigns carefully considering the real purchase motivations expressed by consumers and addressing distinct messages to the different age groups. Then, with the constant support of scientific community, they will have to aim at spreading awareness about the role that FFs can play also in long-term prevention strategies of severe diseases. In this regard, a basic concept to convey pertains the synergy among benefits obtainable from a regular consumption of FFs (and also of HACPs in place non-functional confectionery products) and those deriving from a healthy lifestyle. Taking up the conclusions of Alongi and Anese (2021), this has also direct implications on public health, since adopting a healthy diet, of which FFs should be an integral part, is the first step towards limiting the onset of non-communicable chronic diseases, thus reducing healthcare costs. In this sense, the development of a specific regulatory framework for FFs, still lacking both at European and Italian level, and their recommendation by health and food policies will be of great importance.

The web can offer potentially unlimited spaces for actions that improve consumers' knowledge of FFs and HACPs, thus promoting their consumption. In this sense, online purchasing platforms could be set up or expanded, in which all the main product categories and brands are hosted in dedicated sections. Nonetheless, traditional shops could also represent a very effective channel of information and distribution, provided that these products are easily identifiable on the shelves. At least in large supermarkets and hypermarkets, dedicated sectors could be set up to facilitate the identification and purchase of these products; information material could also be made available in place to better orient less experienced consumers in their choice.

Further important actions to support the spread of FFs and of HACPs consumption reside in market offer diversification strategies, that could be adopted by food industry and commercial distribution for meeting consumers' needs and preferences, also accounting for household income constraints. For instance, "basic" product lines could be developed with more accessible prices and more convenient formats for large families, to encourage consumption also by consumers with lower incomes.

To conclude, we believe that this explorative analysis of the WTP for HACPs in the Italian context provides some useful information and interesting insights to understand consumers behavior towards these products, and in this resides its main contribution to the advancement of the state of art of economic research on FFs. Possible future developments consist in broadening the horizon of the analysis, increasing the number of respondents involved and diversifying their provenience. Anyway, despite its intrinsic limitations, the online questionnaire proved to be an effective tool in allowing a good number of respondents to be reached in a short time; in addition, its employment proved essential during the COVID-19 pandemic, when health contingencies would have substantially prevented this analysis from being carried out.

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Appendix

Table A.1 - Variables employed in the Binary Logit model

Group	Name	Description
	Willingness to pay a premium price for HACPs and certainty level	
	WTP	**Willingness to pay a premium price (binary)**
CER	CER	Choice certainty level
	Personal information and other general characteristics	
PERS	FEM	Gender: female
	AGE	Age
	MASDE	Level of education: Master's degree
	PERRET	Working condition: permanently employed/retired
	Characteristics of family unit and satisfaction about income	
FAM	FAMSIZE	Number of family members
	DEPMEM	Number of dependent family members
	INC	Family yearly income bracket
	INCSAT	Satisfaction about income (COVID-19 effect)
	HOMOWN	Full ownership of family home (no mortgage)
	Lifestyle and state of health	
LIFHE	HEALTYEATING	Adoption of healthy eating styles
	PHYSACT	Frequency of physical activity
	DIETPAT	Suffering from diet-related disorders/diseases
	OTHPAT	Suffering from other disorders/diseases
	Food purchase and consumption habits	
CONS	TRADSHOP	Channel of food purchase: traditional shopping
	ECOMSHOP	Channel of food purchase: e-commerce shopping
	CONFECT	Frequency of consumption of confectionery products
	FUNCT	Frequency of consumption of FFs
	Benefits obtainable from consumption of FFs	
BENEF	WELLBEING	Well-being improvement
	SEVERE	Protection against severe diseases
	FOODISOR	Protection against food disorders
	Motivations for consumption of FFs	
MOTIV	ADVERT	Attracted by advertising
	LABEL	Attracted by label indications
	BENEF	Experiencing health benefits
	PLEASURE	Experiencing pleasure
	PREVENT	Preventing health problems
	OTH	Other motivations

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