Available online at www.centmapress.org

INTERNATIONAL JOURNAL ON FOOD SYSTEM DYNAMICS

Int. J. Food System Dynamics 11 (3), 2020, 189-201

DOI: http://dx.doi.org/10.18461/ijfsd.v11i3.49

Exploring the Interplay of Risk Attitude and Organic Food Consumption

Elisa Giampietri, Giuseppe Bugin, and Samuele Trestini

University of Padova, Department of Land, Environment, Agriculture and Forestry, Viale dell'Università 16, 35020 Legnaro (Padova), Italy.
elisa.giampietri@unipd.it; giuseppe.bugin@studenti.unipd.it; samuele.trestini@unipd.it

Received January 2020, accepted June 2020, available online July 2020

ABSTRACT

This exploratory study seeks to advance the research on consumers' preference for organic food eating by investigating the potential association between organic food consumption (OC) frequency and the individual risk attitude. Moreover, inspired by the literature, we investigate also the association between OC and the perceived OC related health improvement (i.e. the avoidance of health risks), subjective trust toward the certification, social norms and several lifestyle factors. Based on a direct survey of 223 Italian college students, a lottery task was used to characterize the individual risk attitude and a simultaneous equation model was estimated. This study marks a beginning by showing a significant relationship between being risk averse and a high organic food eating, offering a hint for future research avenues in the organic domain.

Keywords: *organic food consumption; risk attitude; lottery; healthy diet; consumer preference.*

1 Introduction

The organic sector has been rapidly growing during the last years, becoming important for both farmers and food retailers worldwide (McFadden and Huffman, 2017). In 2017, organic farming covered 7% of the total utilised agricultural area in EU-28, showing an increasing trend for the future (Eurostat, 2019): following Spain, Italy is the second country with the largest organic area (14.9% of the total agricultural land; +6.3% compared to 2016) (FIBL, 2019). Due to the increased demand for organic products (EC, 2019), this market is considered one of the most promising in the overall agri-food sector. Since the demand is the driver for the future of the market (Vukaspvič, 2016), nowadays the growing consumer trend toward organic food purchase attracts a great attention from researchers. In recent years, an extensive scientific literature on consumer preferences flourished, showing that the organic choice largely depends on the individuals' perceptions, especially when dealing with credence attributes (Darby and Karni, 1973) as the organic produce. So far the literature detailed many perceived factors influencing the organic choice: among others, environmental protection (Aertsens et al., 2009), future orientation (Chekima et al., 2019), and trust and personal values (Nuttavuthisit and Thøgersen, 2017). However, the literature confirms that one of the strongest reasons for consumers to buy organic food relies in their perception that these are healthier (i.e. in terms of nutritive and natural properties) than conventional food. In agreement with other authors that they cited, Hidalgo-Baz et al. (2017) and Hurtado-Barroso et al. (2019) recently stated that this perceived healthiness is mainly due to the absence of chemical pesticides and synthetic fertilizers and additives. Accordingly, food safety increases consumers' utility and affects their preference for organic food when choosing what to buy between organic and conventional products. Nevertheless, the general idea that organic consumption can improve human health remains a perception, actually (Mie et al., 2017): in other words, the overall higher healthiness is uncertain both because the lack of certain scientific demonstration to prove it, and because of the uncertainty linked to the organic (credence) products by nature. Nowadays, the question of why people consume or do not consume organic food is still not fully understood (Hansen et al., 2018) and represents a relevant issue for researchers and marketing managers. In particular, so far less research has addressed the role of risk attitude. Indeed, risk is ubiquitous in decision-making and subjects show differing attitudes toward it: hence, we assume that even for organic food consumption (OC) the subjective risk attitude may have a role and its inclusion as a key reason to consume organic food seems useful to fill the gap in this understanding.

To advance the research on this highly relevant issue, this study seeks to search for the potential association between the individual risk attitude and the OC weekly frequency; to do this, it is of primary interest to estimate the underlying risk preference of individuals. Similarly, inspired by the literature, we investigate also the association between the perceived health benefits (i.e. health risk reduction as prevention of certain diseases) from OC on the OC weekly frequency, beyond some other factors. It is worth to highlight that this exploratory research does not attempt to provide practical implications, but rather to generate a hint for future research avenues in the organic domain, e.g. showing the possibility to consider risk attitude for the organic consumers' profiling.

The structure of the paper is the following: the first paragraph presents a literature review on factors affecting OC and, based on this, the research aim; the second paragraph describes data and methods; finally, the paper provides the results and a discussion of these, followed by a conclusion.

2 Background

In the most recent decades, an extensive literature investigated the determinants of consumers' preference for OC. According to many authors, consumers choose organic food especially in relation to recognized health (Kushwah et al., 2019) and environmental (Hashem et al., 2018) benefits. In addition to these, scholars have emphasized the role of subjective concern for animal welfare (Hasselbach and Roosen, 2015), taste and sensory aspects (Husic-Mehmedovic et al., 2017), safety concerns (e.g. lack of harmful substances as synthetic pesticides) and nutritional value (Nandi et al., 2017), and the support to local farmers (Nikolić et al., 2014). Furthermore, the literature shows that having a higher level of education (Lockie et al., 2002), being female (Padel and Foster, 2005) and having children at home (Hughner et al., 2007) are positively correlated to OC. Also, many authors identified some common barriers to organic purchasing as the higher food price (McCarthy et al., 2016; Janssen, 2018) or the products' availability on the market (Buder et al., 2014).

Noticeably, since food production is unobservable by consumers, as a matter of fact they need to trust the organic certification; in particular, trust is a function of credible information (McCluskey, 2000) provided

by third-party certifiers. At the same time, skepticism and low confidence in certification schemes envisage a notable barrier to OC (Bryła, 2018).

Furthermore, the literature shows that subjects are susceptible to social pressure (i.e. social norms) to perform the organic eating choice, especially in relation to people who are relevant for them as family or close friends (Du et al., 2017): if the individual believes that people that are important for him have a positive attitude toward OC, he is more inclined to buy organic.

Consistently with Suciu et al. (2019) who consider focusing on consumer lifestyle as a recommended research interest in the organic sector, evidence from the literature suggest a positive association between OC and people's eating habits that are notoriously healthy, as fruit and vegetables eating (Pelletier et al., 2013) or having a vegetarian diet (Tung et al., 2015). In particular, Denver et al. (2019) show that those individuals that start buying organic food are former consumers of fruit and vegetables.

The literature also highlights that the size of the household can be an explanatory variable, showing that small households are more likely to choose organic (Aguirre Gonzalez, 2009). Income and budget constraints are also identified as determinants of OC as they influence the willingness to pay (WTP) for organic products (Aschemann-Witzel and Zielke, 2017). Even if the literature found that high-income consumers are more likely to buy organically grown products, showing also a higher WTP (van Loo et al., 2011), we can find mixed findings actually (Hughner et al., 2007). Also, De Magistris and Gracia (2008) found that OC is lower as much as the importance that consumers attach to price when shopping food is higher.

As before mentioned, nowadays any scientific evidence documents that organic products are better for human health, although health benefit represents the strongest argument for OC (Aertsens et al., 2009), generally speaking. A recent paper by Ditlevsen et al. (2019) shows that the higher purity and quality, the better taste and the absence of pesticides are principal health dimensions that consumers associate with organic products. Furthermore, some authors argued that the consumption of organic products is positive from a public health point of view (Johansson et al., 2014), while some others revealed that a prime motive for OC is the own health improvement (i.e. the avoidance of health risks) (First and Brozina, 2009).

Interestingly, to the best of our knowledge, studies that examine the relationship between risk attitude and food preference are those of Lusk and Coble (2005) and Lawless et al. (2015). Both studies estimated the individual risk preference of subjects through a lottery task[1] and investigated its association with the consumers' propensity to consume a genetically modified food (the former), and the preference for health-oriented (e.g. nutraceutical) products (the latter). Nevertheless, as regards consumers' preferences for organic food products, that are considered potentially risk avoiding by people, the literature analysing the role of the individual attitude toward risk is scant: the investigation typically stops at analysing the role of the individual self-reported risk perception. Indeed, risk is considered ubiquitous in people's decision-making process that is characterized by uncertainty. Furthermore, risk attitudes are heterogeneous: the literature shows that women are more risk averse than men in many risk domains (Charness et al., 2018); also, the individual risk aversion can be both negatively (von Gaudecker et al., 2011) and positively (Harrison et al., 2007) correlated with the level of education.

To fill this research gap, as a novel contribution of this paper we analyse whether risk attitude contributes to OC frequency. In addition, inspired by the seminal paper by Lusk and Coble (2005) which analysed both the role of risk attitude and risk perception, we investigate the association between the perception of health risk reduction (linked to a frequent OC) and the OC frequency. To do this, we separated this perception into two categories: on one hand the perceived health risk reduction for the individual and his family (pro-self-concern), on the other hand health benefits for the population (concern for others). Accordingly, the literature suggests that these two views may co-exist and influence the individual's choice (Kareklas et al., 2014). Finally, further to the above, this study builds on previous literature on OC (as previously described) and analyses whether other factors (e.g. trust toward the organic certification, social norms, lifestyle information) affect consumers' OC frequency.

[1] Moschini and Hennessy (2001; page 95) stated that: "the choice problem under uncertainty can be thought of as a choice among distributions (lotteries), with risk-averse agents preferring distributions that are less risky".

3 Material and methods

During spring 2019 we conducted direct interviews using the convenience sampling approach among college students in the city of Padova (Italy) and 223 fully completed questionnaires were collected. As regards the choice of a sample of college student, some authors argue that this does not necessarily serve as a limitation (Depositario et al., 2009). However, the non-representativeness of our sample prevents the generalizability of findings. More in depth, people were randomly recruited around the university district and pre-briefed about the study purpose, then we administered a structured questionnaire to the volunteers who agreed to complete it. The questionnaire was pretested in order to ensure it was comprehensible, and consisted of several sections: in the first we measured the weekly consumption frequency of organic products (org_c) and asked to list the three mostly consumed organic food categories. In the second section we asked to self-assess, through a 7-point Likert scale[2] (1 = totally disagree; 7 = totally agree), the agreement with different statements related to: i) the perceived health risk reduction effect for the individual and his family by a frequent OC (own_risk); ii) the perceived health risk reduction for the entire population by a frequent OC (gen_risk); iii) trust toward organic certification schemes (s_tru); iv) the perception that people who are important and taken into account by the individual perceive health benefits from a frequent OC, namely social norms (sn). It is worth noting that both own_risk and gen_risk derived from Lusk and Coble (2005) with adjustments. In addition, in the third section we measured the risk attitude of the interviewees through a lottery task. Finally, the last section investigated three behaviours under uncertainty (i.e. risky behaviours) as smoking (smo), practicing extreme sports (spo), and drinking alcohol (alc), and socio-demographic and lifestyle information as: gender, education (edu), number of family members (fam), income level (inc), living at family home (hom), having a (even part-time) job (job), daily fruit and vegetables consumption frequency (f&v), and being vegetarian (veg).

In the literature, a variety of experimental methods have been developed to elicit the individuals' risk attitude (risk_att) and generally the researcher chooses which to utilize also considering the characteristics of the sample. Here, we used a lottery game with a single choice between gambles, as developed by Eckel and Grossman (2008): indeed, compared to more complex although commonly used methods as the multiple price list (Holt and Laury, 2002), our choice represents a simpler and more intuitive elicitation method (Dave et al., 2010) and provides an accurate measure of risk aversion, especially for subjects with low levels of mathematical proficiency[3]. The lottery task was presented with a brief description where each respondent was asked to imagine having 50€ to play heads or tails (50% chance), assuming this payoff is the amount that a university student usually receives from the family as a weekly budget to spend on average; in particular, we used this context setting that was very intuitive for college students in order to make the lottery task more easily comprehendible and to minimize possible errors in decision making. Between gambles 1-6, respondents were asked to choose only once (figure 1): with the exception of gamble 1, for each bet the possible outcomes were two (low and high payoff) with the same probability to occur (50%). Notably, the most risk-averse subjects were expected to choose the first bets (Charness et al., 2013). Risk attitude was measured by using the Arrow-Pratt Coefficient of Relative Risk Aversion (CRRA) (Charness et al., 2013): assuming it, the utility function is defined as $U(w)= w^{(1-r)}/(1-r)$, where r is the coefficient of relative risk aversion and w is wealth; in particular, we calculated the range of r in the function above mentioned.

[2] Although sometimes single-item measures are criticized in terms of reliability, in some cases their use is superior than multiple-item measurements (Gardner et al., 1998): this choice is highly advantageous if the questionnaire contains many variables as in our case, and we preferred that respondents paid more attention and time to the lottery, as we focused on the measure of risk attitude. Also, data were collected among students who seemed rushed to conclude the interview as soon as possible in the pre-test.

[3] To this purpose, our sample was very heterogeneous: students were enrolled in both scientific and humanistic courses.

Gamble	Payoff	Probability	Choice
1	50€ vs 50€	50 vs 50	☐
2	40€ vs 70€	50 vs 50	☐
3	30€ vs 90€	50 vs 50	☐
4	20€ vs 110€	50 vs 50	☐
5	10€ vs 130€	50 vs 50	☐
6	0€ vs 150€	50 vs 50	☐

Figure 1. Gamble task for the measure of risk attitude

To solve the endogeneity of risk_att which was revealed through the Durbin-Wu-Hausman test, a simultaneous equation model with three-stage least squares (3SLS) estimation procedure (Greene, 2008) was used to study the endogenous variables risk_att$_i$ and OC frequency (org_c$_i$). The two equation system is specified as follows:

$$org\_c_i = \alpha_0 + \alpha_1 risk\_att_i + \alpha_2 own\_risk_i + \alpha_3 gen\_risk_i + \alpha_4 s\_tru_i + \alpha_5 sn_i + \alpha_6 f\&v_i + \alpha_7 veg_i + \alpha_8 inc_i + \alpha_9 fam_i + \alpha_{10} job_i + \alpha_{11} r\_smo_i + \alpha_{12} r\_alc_i + \alpha_{13} r\_spo_i + \varepsilon_1 \quad (1)$$

$$risk\_att_i = \beta_0 + \beta_1 sex_i + \beta_2 edu_i + \beta_3 hom_i + \varepsilon_2 \quad (2)$$

The first equation includes risk attitude and the two types of perceived health risk reduction (own_risk$_i$ and gen_risk$_i$) as explanatory variables for the individual *i*, in line with our research aim. Moreover, we included certain explanatory variables chosen based on the existing literature as: trust (s_tru$_i$), social norms (sn$_i$), income level (inc$_i$), having a job (job$_i$), the number of family members (fam$_i$), fruit and vegetables consumption (f&v$_i$), and being vegetarian (veg$_i$). Finally, inspired by the literature on risk attitude and based on our search for potential interesting associations, in equation 1 we also introduced some interactions between risk attitude and the three investigated risky behaviours (r_smo$_i$; r_alc$_i$; r_spo$_i$) as explanatory variables: to this purpose, it is worth noting that we did not have *a priori* expectations for the association about these interactions. Turning to the second equation, this includes the following exogenous variables, i.e. gender (sex$_i$), educational level (edu$_i$), and living at family home (hom$_i$). To conclude, ε_1 and ε_2 are random error components.

4 Results

Table 1 shows the sample descriptive statistics. Among the organic products that are most frequently purchased by the subjects of our sample (figure 2), we find vegetables (25%) and fruits (14%), that are commonly the first food groups that consumers buy organic (EPRS, 2016), followed by eggs (12%), and cereals derivatives (9%).

Table 1.
Sample descriptive statistics (N = 223)

Variable category	Description	Mean	S.D.	N. obs	%
Age in years (age)		22.45	2.50		
Number of family members (fam)		3.89	0.74		
Gender (sex)	1 = female			105	47.1
	0 = male			118	52.9
Education level (edu)	1 = secondary school			150	67.3
	2 = bachelor degree			52	23.3
	3 = master degree			20	9.0
	4 = doctoral degree			1	0.4
Family income (€/month) (inc)	1 = less than 2,500			36	16.1
	2 = 2,500			102	45.7
	3 = more than 2,500			85	38.1
Having a job besides studying (job)	1 = yes			115	51.6
	0 = no			108	48.4
Living at home with own parents (hom)	1 = yes			194	87.0
	0 = no			29	13.0
Being smoker (smo)	1 = yes			95	42.6
	0 = no			128	57.4
Practicing extreme sports (spo)	1 = yes			25	11.2
	0 = no			198	88.8
Consuming alcohol heavily (alc)	1 = yes			107	48.0
	0 = no			116	52.0
Being vegetarian (veg)	1 = yes			6	2.7
	0 = no			217	97.3
Daily consumption of fruit and vegetables (f&v)	1 = yes			145	65.0
	0 = no			78	35.0
Perceived knowledge of organic production (1 = "an organic product is produced without synthetic pesticides") (kno)	1 = correct answer			128	57.4
	0 = otherwise			95	42.6
Weekly organic food consumption frequency (org_c)	0 = never			49	22.0
	1 = at least once			142	63.7
	2 = every day			32	14.3

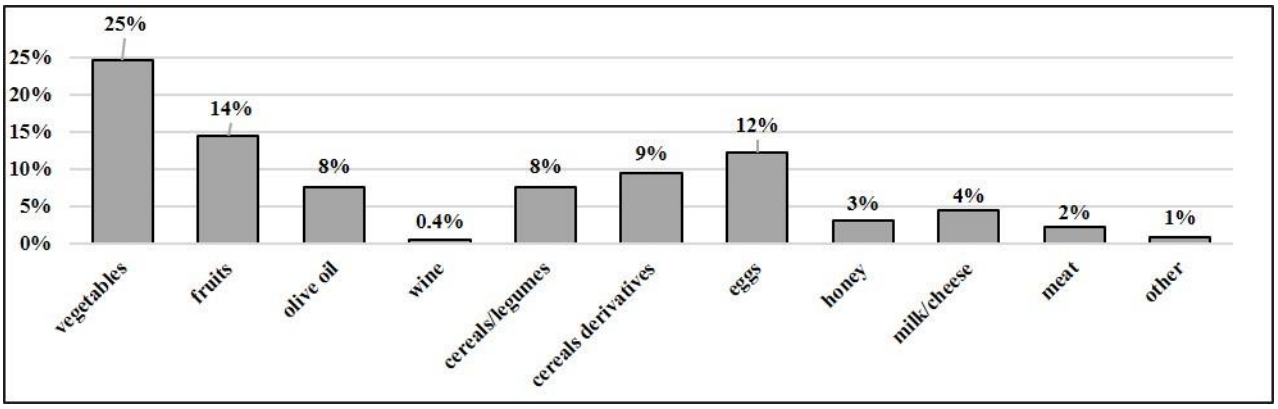

Figure 2. Most frequently purchased organic food products

As regards the Likert scales (table 2), the average scores for each of these are always above or equals to the mean: the interviewees claim that they can reduce health risks both for themselves and their family (own_risk) and for the population (gen_risk) through a frequent OC during the week. Also, respondents trust organic certification schemes (s_tru) and agree that people who are relevant to them (family and friends) believe that they should frequently eat organic to reduce the own health risks (sn).

Table 2.
Description of Likert scale variables (1 = totally disagree; 7 = totally agree)

Item	Code	Mean	S.D.
By eating organic food instead of conventional products frequently during the week, my family and I could reduce own health risks.	own_risk	5.04	1.43
Generally speaking, people could reduce their health risks by eating organic food instead of conventional products frequently during the week.	gen_risk	5.04	1.35
I trust in organic certification.	s_tru	4.35	1.58
People that are important to me (e.g. family, close friends) think that I should frequently eat organic food instead of conventional products, in order to reduce my own health risks.	sn	4.10	1.68

As regards risk attitude (table 3 and figure 3), the elicitation technique that we used confirms that the vast majority of consumers are risk averse (92%).

Table 3.
CRRA ranges and relative percentage of respondents

Gamble	Low payoff (€) (50%)	High payoff (€) (50%)	Expected payoff (€)	Risk*	CRRA ranges
1	50	50	50	0	r>1.7
2	40	70	55	15	0.8<r<1.7
3	30	90	60	30	0.5<r<0.8
4	20	110	65	45	0.4<r<0.5
5	10	130	70	60	0.3<r<0.4
6	0	150	75	75	0.2<r<0.3

* Note: Standard deviation of the expected payoff.

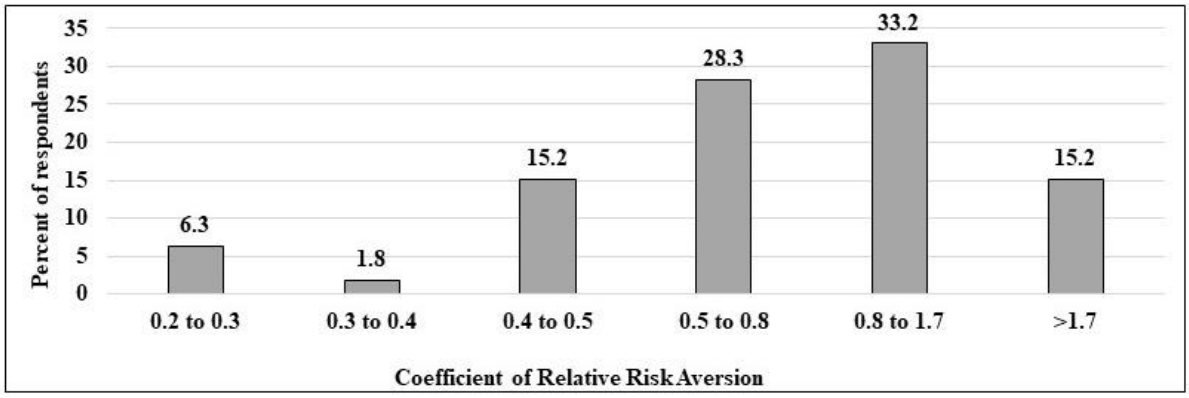

Figure 3. Distribution of the individuals' CRRA

Table 4 shows a negative and significant correlation between the risky behaviours and the endogenous variable risk attitude, with the exception of practicing extreme sports.

Table 4.
Correlation between risky behaviours (smo, alc, spo) and risk_att

	smo	spo	alc	risk_att
smo	1			
spo	.039	1		
alc	.407**	.057	1	
risk_att	-.162*	-.045	-.216**	1

Note: ** and * indicate significant Pearson correlation at 1% and 5% level, respectively.

As shown in table 5, the estimated linear three-stage least square regression model explained risk attitude up to 5% (risk_att) and the organic consumption behaviour up to 7%. It is worth specifying that statistical calculations (e.g. p-values and confidence intervals) have no inferential content but are descriptive only (Berry, 2017; Hirschauer et al., 2019). In particular, the results suggest that a high OC frequency (org_c) is positively associated with risk_att (α = 0.627 at 10% level), showing that the more risk averse individuals in our sample eat organic food frequently during the week. Moreover, we found a significant and positive association between gen_risk and OC frequency (α = 0.098 at 5% level); as opposite, the results report no significant effect for own_risk. Also, findings show a significant and positive relationship between org_c and both trust (α = 0.074 at 5% level) and social norms (α = 0.062 at 5% level). As regards the eating habits, the results show a positive association between org_c and the daily fruit and vegetables eating habit (α = 0.160 at 5% level), as opposite to being vegetarian. Furthermore, we find that the higher is the number of family members and the higher is OC frequency (α = 0.088 at 10% level). Conversely, we find no significant relationship between OC frequency and both job and inc variables, and similarly for the interactions between risk attitude and risky behaviours. Regarding the explanatory variables of risk attitude, the results show that the association between being female and being risk averse is significant (β = 0.201 at 1% level), while we did not find any significant relationship between OC frequency and both edu and hom.

Table 5.
Three-stage least-squares estimation results

Equation	**N. obs**	**Parms**	**RMSE**	**R^2**	**χ^2**	**P-value**
org_c	223	13	.5771686	0.0680	100.45	0.0000
risk_att	223	3	.4333248	0.0486	14.54	0.0023
Dependent variable: org_c	**Coef.**	**Std. Err.**	**P-value**	**[95% Conf. Interval]**		
risk_att	0.627	0.321	0.051	-0.002	1.257	
own_risk	-0.031	0.036	0.393	-0.101	0.039	
gen_risk	0.098	0.039	0.012	0.022	0.175	
s_tru	0.074	0.029	0.011	0.017	0.131	
sn	0.062	0.024	0.012	0.014	0.109	
f&v	0.160	0.080	0.047	0.002	0.318	
veg	0.289	0.227	0.203	-0.156	0.734	
inc	-0.013	0.054	0.804	-0.118	0.092	
fam	0.088	0.051	0.082	-0.011	0.187	
job	-0.076	0.078	0.325	-0.228	0.076	
r_smo	-0.011	0.110	0.920	-0.227	0.205	
r_alc	-0.080	0.128	0.532	-0.331	0.171	
r_spo	-0.060	0.160	0.707	-0.373	0.253	
cons	*-0.813*	*0.275*	*0.003*	*-1.353*	*-0.273*	
Dependent variable: risk_att	**Coef.**	**Std. Err.**	**P-value**	**[95% Conf. Interval]**		
sex	0.201	0.058	0.001	0.088	0.315	
edu	0.055	0.041	0.174	-0.024	0.135	
hom	0.023	0.081	0.775	-0.136	0.182	
cons	*0.551*	*0.099*	*0.000*	*0.356*	*0.747*	

Note: Endogenous variables: org_c; risk_att. Exogenous variables: own_risk; gen_risk; s_tru; sn; f&v; veg; inc; fam; job; r_smo; r_alc; r_spo; sex; edu; hom.

5 Discussion

Our study marks a beginning by showing that there is a significant relationship between being risk averse (namely, a characteristic of those who tend to avoid risks in a general sense) and a higher OC frequency on a weekly base. Accordingly, the literature places health benefits (e.g. avoidance of health risks) as a key motive of OC, as previously mentioned. In line with this, a second interesting evidence is the positive association between being concerned with the general OC's effect of health risks reduction (i.e. lower exposure to certain diseases for the population) and a high OC frequency. These results are somehow comparable to what Thøgersen (2011) argued: by choosing organic products, consumers express their concern for the common good (i.e. the environmental concern in his study). Indeed, this can be intrinsically considered a pro-social choice. However, in our study the altruistic consumption consideration refers to the health benefits for the population, instead of environmental concerns.

Moreover, our result is consistent with Kareklas et al. (2014) that, by comparing self-benefits (related, among others, to the perceived nutritional value and natural content of organic food) versus other-benefits (related to environmental concerns) as relevant motives driving OC, ascertained that altruistic concerns (i.e., the societal impact) have a greater influence on organic consumers than egoistic ones (i.e., the personal impact). Since there is no scientific demonstration about the overall higher healthiness of organic food, we can suppose that the health concerns associated to OC are actually very nuanced for consumers, although highly motivating: thus, we assume that it can be easier to assign health benefits to the population in general (pro-others) than to one or more individuals (pro-self). To this purpose, future research could help to evaluate which factor has a stronger effect among these two.

Not surprisingly, in our sample we also found a positive relationship between the subjective trust toward the organic certification scheme and OC frequency, being consistent with Nuttavuthisit and Thøgersen (2017). This supports the hypothesis that the organic demand could be increased by strengthening the transparency and the reliability of third-party certifiers among consumers, e.g. through information campaigns, and that it is extremely important that trust is not betrayed by flaws in the certification system. Accordingly, the more trustworthy the certification schemes, the more likely the organic value proposition to be achieved by consumers, with a supposed demand increase for these certified products.

Moreover, the positive association between social pressure and OC frequency contributes to the current literature (Higgs and Thomas, 2016): this widely suggests that relevant people's belief actually represents a guide for the individual's eating behaviour, even for the organic intake (Du et al., 2017). Relevant people can be both close friends and family members; as regards these latter, Kranjac et al. (2017) recently showed that taking care of the family is a driving factor for the purchase of organic food indeed.

Regarding the positive association between having a daily fruit and vegetables intake and the OC frequency, this perfectly reflects what found by the literature that associates a healthy diet to OC (Denver et al., 2019), implying that consumers are firmly convinced of their "healthy eating related lifestyle" and behave coherently (i.e. assuming a healthier diet) with their increased health awareness.

Finally, a second line of results regards the determinants of risk attitude. Recently, based on a sample of college students in Italy, Coletta et al. (2018) found that females are more risk averse than men, and similarly that subjects with a higher education level are less risk prone. With respect to this, we can only confirm the association between gender and risk attitude.

6 Conclusion

Nowadays, consumers' demand for organic food is increasing worldwide, even if no conclusive evidence on its healthier beneficial effect exist: this confirms what suggested by the recent literature, that is an increased importance of the role of credence characteristics in consumers' eating preference (Fernqvist and Ekelund, 2014; Del Giudice et al., 2018). In parallel with this, the research on what motivates and what hinders the organic demand to predict future organic market's outcomes is still an open issue for scientists and marketing managers. Against this backdrop, this study marks a beginning: by estimating the underlying risk preference of individuals, implications for future research in the field of organic consumption arise from finding a significant association between the individual attitude toward avoiding risks in a general sense and a high organic food consumption frequency during the week, which they might consider a healthy eating choice and a risk avoiding strategy. This positive association supports the recent increased consumer demand for a more transparent and effective risk communication that justifies the current effort of the authorities to improve it (Veflen et al., 2017; Eurobarometer Report, 2019).

Furthermore, we found that a high OC frequency is associated with a high individual perception of health benefits (i.e. health risk reduction for the population) from OC; this also deserves a more detailed assessment: indeed, this dependency could be harnessed in the promotion of organic food, whose policy support is promising for improving the sustainability of the agri-food sector from a policy perspective, as shown by the more recent proposal for the EU Common Agricultural Policy reform[4]. To sum up, what this article shows is that both risk attitude and perceived health benefits (i.e. perceived health risk reduction) are relevant factors to consider when studying the organic food choice, in order to provide interesting policy implications. For instance, if consumers' OC decision is strongly influenced by risk attitude, probably the effect of policy campaigns built to encourage OC are less effective in changing it; conversely,

[4] See the recent Farm to Fork strategy of the Green Deal.

consumers' perceptions[5] are more likely to change, e.g. due to information and educational campaigns. In this sense, it is good that further research investigates which factor, between risk attitude and risk perception, strongly influences OC to drive policy interventions to encourage OC among people. To conclude, this paper presents some limitations as the non-representativeness of the sample and the use of a lottery that was not incentivized; however, we confirm that our study is exploratory, thus we make no claims for the results' generalization. Notwithstanding a promising research opportunity paved by this work, i.e. the organic consumers' segmentation based on their risk profiling, further confirmatory analysis on a larger and more representative sample of consumers are necessary in order to provide useful information for organic producers and firms.

Acknowledgements

The authors acknowledge the editor and the anonymous referees for their constructive comments, and also the students who voluntarily participated in this research.

Authors' contributions

This paper derives from a full collaboration of the authors. In particular: E. Giampietri (EG) and S. Trestini (ST) conceived the research idea and designed the questionnaire for the survey; G. Bugin (GB) conducted the survey; GB and EG analysed the literature; EG analysed and interpreted data and wrote the paper. ST supervised the execution of the entire study.

References

Aertsens, J., Verbeke, W., Mondelaers, K., and Van Huylenbroeck, G. (2009). Personal determinants of organic food consumption: a review. *British Food Journal*, **111** (10): 1140-1167.

Aguirre Gonzalez, J.A. (2009). Market trends and consumer profile at the organic farmers' market in Costa Rica. *British Food Journal*, **111** (5): 498-510.

Aschemann-Witzel, J., Zielke, S. (2017). Can't buy me green? A review of consumer perceptions of and behavior toward the price of organic food. *Journal of Consumer Affairs*, **51** (1): 211-251.

Berry, D. (2017). A p-value to die for. Journal of the American Statistical Association, 112 (519): 895-897.Bryła, P. (2018). Organic food online shopping in Poland. *British Food Journal*, **120** (5): 1015-1027.

Buder, F., Feldmann, C., and Hamm, U. (2014). Why regular buyers of organic food still buy many conventional products: product-specific purchase barriers for organic food consumers. *British Food Journal*, **116** (3): 390-404.

Charness, G., Eckel, C., Gneezy, U., and Kajackaite, A. (2018). Complexity in risk elicitation may affect the conclusions: a demonstration using gender differences. *Journal of Risk and Uncertainty*, **56** (1): 1-17.

Charness, G., Gneezy, U., and Imas, A. (2013). Experimental methods: Eliciting risk preferences. *Journal of Economic Behavior & Organization*, **87**: 43-51.

Chekima, B., Chekima, K., and Chekima, K. (2019). Understanding factors underlying actual consumption of organic food: the moderating effect of future orientation. *Food Quality and Preference*, **74**: 49-58.

Coletta, A., Giampietri, E., Santeramo, F.G., Severini, S., and Trestini, S. (2018). A preliminary test on risk and ambiguity attitudes, and time preferences in decisions under uncertainty: towards a better explanation of participation in crop insurance schemes. *Bio-based and Applied Economics*, **7** (3): 265-277.

Darby, M.R., Karni, E. (1973). Free competition and the optimal amount of fraud. *The Journal of Law and Economics*, **16** (1): 67-88.

Dave, C., Eckel, C.C., Johnson, C.A., and Rojas, C. (2010). Eliciting risk preferences: When is simple better? *Journal of Risk and Uncertainty*, **41** (3): 219-243.

[5] Interestingly, some authors showed that the public perception of benefits seems to remain rather constant over time even after a negative shock (see for instance Visschers and Siegrist, 2013); in this case, one might presume a role of the perceived health benefits from OC in stabilizing the demand for organic food in the event of a hypothetical food scandal.

Del Giudice, T., Cavallo, C., and Vecchio, R. (2018). Credence attributes, consumers trust and sensory expectations in modern food market: is there a need to redefine their role? *International Journal on Food System Dynamics*, **9** (4): 307-313.

De Magistris, T., Gracia, A. (2008). The decision to buy organic food products in Southern Italy. *British Food Journal*, **110** (9): 929-947.

Denver, S., Nordström, J., Christensen, T. (2019). Is an increase in organic consumption accompanied by a healthier diet? A comparison of changes in eating habits among Danish consumers. *Journal of Food Products Marketing*, **25** (5): 479-499.

Depositario, D.P.T., Nayga, R.M. Jr, Wu, X., and Laude, T.P. (2009). Should students be used as subjects in experimental auctions? *Economics Letters*, **102** (2): 122-124.

Ditlevsen, K., Sandøe, P., and Lassen, J. (2019). Healthy food is nutritious, but organic food is healthy because it is pure: the negotiation of healthy food choices by Danish consumers of organic food. *Food Quality and Preference,* **71**: 46-53.

Du, S., Bartels, J., Reinders, M., and Sen, S. (2017). Organic consumption behavior: a social identification perspective. *Food Quality and Preference*, **62**: 190-198.

Eckel, C., Grossman, P.J. (2008). Forecasting risk attitudes: an experimental study using actual and forecast gamble choices. *Journal of Economic Behavior and Organization*, **68** (1): 1-17.

EPRS (2016). Human health implications of organic food and organic agriculture. Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2016/581922/EPRS_STU(2016)581922_EN.pdf (accessed 9 September 2019).

Eurobarometer Report (2019). Food safety in the EU. Available at: http://www.efsa.europa.eu/en/corporate/pub/eurobarometer19

European Commission - EC (2019). Organic farming in the EU A fast growing sector. EU Agricultural Markets Briefs No. 13. Available at: https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/market-brief-organic-farming-in-the-eu_mar2019_en.pdf (accessed 30 May 2019).

Eurostat (2019). Organic farming statistics. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php/Organic_farming_statistics (accessed 11 September 2019).

Fernqvist, F., Ekelund, L. (2014). Credence and the effect on consumer liking of food: a review. *Food Quality and Preference*, **32**: 340-353.

FIBL (2019). The world of organic agriculture. Statistics and emerging trends 2019. Available at: https://shop.fibl.org/CHen/mwdownloads/download/link/id/1202/?ref=1 (accessed 27 August 2019).

First, I., Brozina, S. (2009). Cultural influences on motives for organic food consumption. *EuroMed Journal of Business*, **4** (2): 185-199.

Gardner, D.G., Cummings, L.L., Dunham, R.B.,and Pierce, J.L. (1998). Single-item versus multiple-item measurement scales: an empirical comparison. *Educational and psychological measurement*, **58** (6): 898-915.

Greene, W.H. (2008). Econometric Analysis: Pearson education.

Hansen, T., Sørensen, M.I., and Eriksen, M.L.R. (2018). How the interplay between consumer motivations and values influences organic food identity and behaviour. *Food Policy*, **74**: 39-52.

Harrison, G.W., Lau, M.I., and Rutström, E.E. (2007). Estimating risk attitudes in Denmark: a field experiment. *Scandinavian Journal of Economics*, **109** (2): 341-368.

Hashem, S., Migliore, G., Schifani, G., Schimmenti, E., and Padel, S. (2018). Motives for buying local, organic food through English box schemes. *British Food Journal*, **120** (7): 1600-1614.

Hasselbach, J.L., Roosen, J. (2015). Motivations behind preferences for local or organic food. *Journal of International Consumer Marketing*, **27** (4): 295-306.

Hidalgo-Baz, M., Martos-Partal, M., and González-Benito, Ó. (2017). Assessments of the quality of organic versus conventional products, by category and cognitive style. *Food Quality and Preference*, **62**: 31-37.

Higgs, S., Thomas, J. (2016). Social influences on eating. Current Opinion in *Behavioral Sciences*, **9**: 1-6.

Hirschauer, N., Grüner, S., Mußhoff, O., and Becker, C. (2019). Twenty steps towards an adequate inferential interpretation of p-values in econometrics. *Journal of Economics and Statistics*, **239** (4): 703-721.

Holt, C.A., Laury, S.K. (2002). Risk Aversion and Incentive Effects. *American Economic Review*, **92** (5):1644-1655.

Hughner, R.S., McDonagh, P., Prothero, A., Shultz, C.J., and Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *Journal of Consumer Behaviour: a International Research Review,* **6** (2-3): 94-110.

Hurtado-Barroso, S., Tresserra-Rimbau, A., Vallverdú-Queralt, A., and Lamuela-Raventós, R.M. (2019). Organic food and the impact on human health. *Critical Reviews in Food Science and Nutrition*, **59** (4): 704-714.

Husic-Mehmedovic, M., Arslanagic-Kalajdzic, M., Kadic-Maglajlic, S., and Vajnberger, Z. (2017). Live, Eat, Love: life equilibrium as a driver of organic food purchase. *British Food Journal*, **119** (7): 1410-1422.

Janssen, M. (2018). Determinants of organic food purchases: Evidence from household panel data. *Food Quality and Preference*, **68**: 19-28.

Johansson, E., Hussain, A., Kuktaite, R., Andersson, S.C., and Olsson, M.E. (2014), Contribution of organically grown crops to human health. *International Journal of Environmental Research and Public Health*, **11** (4): 3870-3893.

Kareklas, I., Carlson, J.R., and Muehling, D.D. (2014). "I eat organic for my benefit and yours": egoistic and altruistic considerations for purchasing organic food and their implications for advertising strategists. *Journal of Advertising*, **43** (1): 18-32.

Kranjac, M., Vapa-Tankosic, J., and Knežević, M. (2017). Profile of organic food consumers. *Economics of agriculture*, **64** (2): 497-514.

Kushwah, S., Dhir, A., Sagar, M., and Gupta, B. (2019). Determinants of organic food consumption. A systematic literature review on motives and barriers. *Appetite*: 104402.

Lawless, L.J., Drichoutis, A.C., Nayga Jr, R.M., Threlfall, R.T., and Meullenet, J.F. (2015). Identifying Product Attributes and Consumer Attitudes that Impact Willingness to pay for a Nutraceutical-Rich Juice Product. *Journal of Sensory Studies*, **30** (2): 156-168.

Lockie, S., Lyons, K., Lawrence, G., and Mummery, K. (2002). Eating 'green': motivations behind organic food consumption in Australia. *Sociologia Ruralis*, **42** (1): 23-40.

Lusk, J.L., Coble, K.H. (2005). Risk perceptions, risk preference, and acceptance of risky food. *American Journal of Agricultural Economics*, **87** (2): 393-405.

McCarthy, B., Liu, H.B., and Chen, T. (2016). Innovations in the agro-food system: adoption of certified organic food and green food by Chinese consumers. *British Food Journal*, **118** (6): 1334-1349.

McCluskey, J.J. (2000). A game theoretic approach to organic foods: An analysis of asymmetric information and policy. *Agricultural and Resource Economics Review,* **29** (1): 1-9.

McFadden, J.R., Huffman, W.E. (2017). Willingness-to-pay for natural, organic, and conventional foods: the effects of information and meaningful labels*. Food Policy*, **68**: 214-232.

Mie, A., Andersen, H.R., Gunnarsson, S., Kahl, J., Kesse-Guyot, E., Rembiałkowska, E., Quaglio, G., and Grandjean, P. (2017). Human health implications of organic food and organic agriculture: a comprehensive review. *Environmental Health*, **16** (1): 111.

Moschini, G., Hennessy, D.A. (2001). Uncertainty, risk aversion, and risk management for agricultural producers, Handbook of Agricultural Economics. In: Handbook of Agricultural Economics, 1, eds. Gardner B.L., Rausser G.C. Elsevier:88-153.

Nandi, R., Bokelmann, W., Gowdru, N.V., and Dias, G. (2017). Factors influencing consumers' willingness to pay for organic fruits and vegetables: empirical evidence from a consumer survey in India. Journal of Food Products Marketing, 23 (4): 430-451.

Nikolić, A., Uzunović, M., and Spaho, N. (2014). Lifestyle pattern underlying organic and traditional food consumption. *British Food Journal*, **116** (11): 1748-1766.

Nuttavuthisit, K., Thøgersen, J. (2017). The importance of consumer trust for the emergence of a market for green products: the case of organic food. *Journal of Business Ethics*, **140** (2): 323-337.

Padel, S., Foster, C. (2005). Exploring the gap between attitudes and behaviour: understanding why consumers buy or do not buy organic food. *British Food Journal*, **107** (8): 606-625.

Pelletier, J.E., Laska, M.N., Neumark-Sztainer, D., and Story, M. (2013). Positive attitudes toward organic, local, and sustainable foods are associated with higher dietary quality among young adults. *Journal of the Academy of Nutrition and Dietetics*, **113** (1): 127-132.

Suciu, N.A., Ferrari, F., and Trevisan, M. (2019). Organic and conventional food: comparison and future research. *Trends in Food Science & Technology*, **84**: 49-51.

Thøgersen, J. (2011). Green shopping: for selfish reasons or the common good? *American Behavioral Scientist*, **55** (8): 1052-1076.

Tung, S.J., Tsay, J.C., and Lin, M.C. (2015). Life course, diet-related identity and consumer choice of organic food in Taiwan. *British Food Journal*, **117** (2): 688-704.

van Loo, E.J., Caputo, V., Nayga Jr, R.M., Meullenet, J.F., and Ricke, S.C. (2011). Consumers' willingness to pay for organic chicken breast: evidence from choice experiment. *Food Quality and Preference*, **22** (7): 603-613.

Veflen, N., Storstad, O., Samuelsen, B., Langsrud, S., Hagtvedt, T., Ueland, Ø., Gregersen, F., and Scholderer, J. (2017). Food scares: Reflections and reactions. *International Journal on Food System Dynamics*, **8** (2): 155-164.

Visschers, V. H.M., Siegrist, M. (2013). How a Nuclear Power Plant Accident Influences Acceptance of Nuclear Power: Results of a Longitudinal Study before and after the Fukushima Disaster. *Risk Analysis*, **33** (2): 333-347.

von Gaudecker, H.M., van Soest, A., and Wengstrom, E. (2011). Heterogeneity in risky choice behavior in a broad population. *American Economic Review*, **101** (2): 664-94.

Vukaspvič, T. (2016). Consumers' perceptions and behaviors regarding organic fruits and vegetables: marketing trends for organic food in the twenty-first century. *Journal of International Food & Agribusiness Marketing*, **28** (1): 59-73.