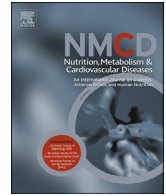




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SHORT COMMUNICATION

COVID-19 disease and nutritional choices: How will the pandemic reconfigure our food psychology and habits? A case study of the Italian population

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Abstract *Background and aims:* In Italy, the spread of the novel coronavirus (SARS-Cov-2) required lifestyle changes that have affected food choices and people's health condition. We explore people's perception of the role of food consumption as a preventive measure and how it reconfigures consumption habits.

Method and results: We conducted an online survey of a representative sample of 1004 Italian citizens. Around 40% of the population perceive that strengthening the immune defences through nutrition is not important to reduce the risk of coronavirus disease 2019 (COVID-19) infection. People with lower levels of perceived importance are slightly younger and have a less healthy lifestyle. They are less worried about the emergency. During the last months, they have bought less food supplements and also intend to decrease their purchase in the next 6 months. *Conclusion:* In COVID-19 pandemic, scholars underline the importance of having a strong immune system. However, the Italians who attribute less importance to food that helps the immune system seem to differ negatively in their psychological attitude towards the emergency and food consumption. Today, Italians are asked to engage in preventive food practices to protect against possible chronic diseases; exploring their perceptions is important to orient them towards this change.

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Introduction

Many governmental and institutional bodies are concerned that the novel coronavirus (SARS-Cov-2), which caused the respiratory disease called coronavirus disease 2019 (COVID-19), is challenging people's diets and healthy lifestyles. The

population may be at risk to develop chronic diseases, particularly in the most hit countries like Italy [1]. Despite the effort to share reliable information about proper diet and lifestyle [2], people's psychological orientation – especially towards their health and food consumption – seem to be neglected. Italy is entering 'phase 2' of disease management, with relatively fewer restrictions, but people are still required to reduce movement, work from home when possible, and practice social distancing. All these disruptive events are changing people's approach to food

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purchases. Recent studies highlighted that the COVID-19 emergency had a deep psychological impact on the population, which also affected food consumption [1,3,4]. During quarantine, it is possible that people switch from a healthy diet to an unhealthy one, as a way to cope with stressful events [5]. For example, people could search for more 'comfort foods', such as foods rich in sugar, carbohydrates or fats [6–8]. Our country has been a stronghold of the Mediterranean diet, known to be a protective factor for chronic disease development [9], but this is now at risk. Having a well-functioning immune system enables humans to resist infections [10] and prevents chronic conditions [11], as reported by very recent studies in the Italian territory [12,13]. In parallel, social scientist have investigated the impact of the pandemic in terms of wellbeing and on mental health [14], but not understanding the impact of this emergency on people's psychological orientation towards health and food consumption. Our research is aimed at understanding people's attitudes about the role of food as a preventive measure during the COVID-19 pandemic and its relation to their health orientation, and how this may reconfigure their immediate and future food consumptions.

Method

Research data were collected via a questionnaire of a representative sample of the Italian population with sex, age, profession, size of the centre and geographical area extracted by stratified sampling. The survey was conducted using a CAWI (computer-assisted web interviewing) methodology between 12 and 18 May 2020. The sample consisted of 1004 subjects randomly selected from the consumers' panel managed by Norstat srl (<https://norstat.it/>). In this article, we report the first results from a wider research about the COVID-19 disease influences on the Italians lifestyles and orientations. We explored the differences between those who believe that strengthening immune defences through nutrition is important to reduce the risk of contracting COVID-19 disease and those who believe otherwise, based on the socio-demographic variables and a set of ad hoc items. These two groups were created considering the answers given to the question, 'I think strengthening the immune defenses through nutrition is important to reduce the risk of COVID-19 disease contagion'. Those who declared that they disagreed totally, disagreed, or neither agreed nor disagreed with this affirmation (the first three points on the Likert scale) were grouped together (Group 1, N = 403). Those who agreed or totally agreed with it (the last two points on the Likert scale) also were grouped together (Group 2, N = 601). Ad hoc items were used to identify differences between the two groups in health orientation (concern about COVID-19 disease emergency, information about health, health management under stress, consciousness about the importance of health for the future); food consumption relevance, motivation, habits and intentions to purchase (see [supplementary materials](#)); healthy lifestyle and socio-

Table 1 Demographic profiles of the sample (N = 1004).

	n	%
1. Gender		
Male	493	49.1
Female	511	50.9
2. Age		
18–24	101	10.1
25–34	163	16.3
35–44	215	21.4
45–54	228	22.7
55–59	109	10.8
60–70	188	18.7
3. Education		
Elementary	3	.3
Junior high	123	12.2
Senior high	602	60.0
College or university	276	27.5
4. Geographic area		
North–West	264	23.6
North–East	187	18.6
Centre	198	19.7
South and Islands	355	35.4
5. Income level (€)		
Until 600	63	6.2
601–900	66	6.5
901–1200	106	10.5
1201–1500	152	15.1
1501–1800	116	11.6
1801–2500	143	14.3
2501–3500	105	10.4
More than 3501	103	10.3
Missing	150	15.0
6. Profession		
Entrepreneur/freelancer	124	12.4
Manager/middle manager	38	3.8
Employee/teacher/military	193	19.2
Worker/shop assistant/apprentice	211	21.0
Housewife	151	15.0
Student	53	5.3
Retired	79	7.9
Unoccupied	155	15.4
7. Inhabited centre size		
Until 10,000 inhabitants	314	31.3
10/100,000 inhabitants	443	44.1
100/500,000 inhabitants	109	10.9
More than 500,000	130	12.9
Missing	8	.8

Table 2 Frequency distribution of people's perception of nutrition and immune defences (N = 1004).

	n	%	Mean (SD)
<i>I think strengthening immune defences through nutrition is important to reduce the risk of COVID-19 infection</i>			3.7 (±.92)
Totally disagree (1)	23	2.2	
Disagree (2)	53	5.3	
Neither agree nor disagree (3)	327	32.6	
Agree (4)	404	40.2	
Totally agree (5)	197	19.7	

demographic variables. To determine the subjects' levels of healthy lifestyle, four items were totalled (see [supplementary materials](#)). From these questions, an 'index of healthy life-style' was created, ranging from 0 to 4, where 0 represents a low healthy lifestyle and 4 a high healthy lifestyle. The differences between the two groups were analysed using Student's t-test. Finally, a contingency table was used. Pearson's chi-square test was carried out to reject the null hypothesis that data regarding the future consumption of food rich in vitamins and antioxidants are randomly distributed across the two groups. To verify this assumption, standardized residuals were inspected⁽²⁰⁾. All analyses were performed with IBM SPSS 20 (release 20.0.0.0).

Results

The demographic profile of the sample is presented in detail in [Table 1](#).

The results show that about 40% of the population perceive that strengthening the immune defences through nutrition is not important to reduce the risk of COVID-19 disease infection (see [Table 2](#)).

People who had lower levels of perceived importance are significantly younger than those with higher scores (average age 42.25 vs 45.92), but no differences are seen in other socio-demographic variables. They are significantly less concerned about the COVID-19 disease emergency (7.3 vs 7.7) and they do not believe this emergency will impact their level of consciousness about the importance of health for the future. At the same time, they have trouble managing their health in stressful situations. Regarding food consumption habits, they do not consider strengthening of the immune system as a future motivation for food purchase. Consequently, in the next 6 months, they do not have the intention to reinforce their immune system through food consumption and they have the intention to reduce the consumption of food rich in vitamins and antioxidants (see [Table 3](#)).

Table 3 Groups' comparison on socio-demographic ad hoc variables.

Dependent variables	Groups		
	Group 1 (N = 403)	Group 2 (N = 601)	
Age [t(830.673) = -4.063; p < .001; d = .26]	42.3 (14.31)	45.9 (13.58)	
Healthy lifestyle index [t(857.043) = -1.997; p < .050; d = .14]	2.28 (.99)	2.41 (.98)	
Concern about COVID-19 emergency [t(1002) = -3.112; p < .010; d = .20]	7.27 (2.07)	7.68 (2.04)	
Information about health [t(1002) = -5.701; p < .001; d = .37]	3.34 (.84)	3.65 (.84)	
Effective health management under stress [t(816.421) = -5.819; p < .001; d = .37]	3.63 (.78)	3.91 (.73)	
Level of consciousness about the importance of health for the future [t(1002) = -5.922; p < .001; d = .38]	3.73 (.75)	4.03 (.82)	
Nutrition as a self-expression [t(1002) = -6.869; p < .001; d = .49]	4.63 (1.12)	5.19 (1.19)	
Purchase of food supplements in the last month [t(987) = -3.283; p < .010; d = .22]	2.53 (1.37)	2.83 (1.44)	
Strengthen of the immune system as motivation for food purchase in the next 6 months [t(1002) = -10.986; p < .001; d = .72]	4.57 (1.14)	5.39 (1.15)	
Intention to strengthen the immune system through food consumption in the next 6 months [t(1002) = -13.497; p < .001; d = .88]	3.30 (.84)	4.03 (.82)	
Intention to buy food rich in vitamins and antioxidants in the next 6 months Chi-square = 12.961 (df = 2), p < .010	Group 1 (N = 403)	Group 2 (N = 601)	
Will decrease	Counting	11	4
	% of column	3.3%	.8%
	Std res.	2.1	-1.7
Will remain stable	Counting	274	397
	% of column	82.0%	77.5%
	Std res.	.6	-.5
Will increase	Counting	49	111
	% of column	14.7%	21.7%
	Std res.	-1.8	1.4

Note: (1) values in cells are means; (2) Standard errors are reported in brackets; (3) d = Cohen's d; (4) cells with an absolute value of std. res > 2 are marked in bold; (5) Std res = standard residues; (6) df = degrees of freedom.

Discussion

Since 4 May, Italy is in ‘phase 2’ of COVID-19 disease management. Now more than ever, people are asked to contribute to getting the emergency under control and preventing possible diseases, including through food consumption. Recent data suggest that in Italy, the risk of food misconduct during this quarantine is high [13]. Our results suggest that almost half of the Italian population does not perceive that strengthening the immune system through food consumption could help them limit COVID-19’s disease contagion. Among these, those who attribute less importance to food as prevention differ in terms of their psychological attitude towards health and food, which seems to represent a different approach to food consumption. Covid-19 and relative fallouts seem to have polarized people’s psychological attitudes towards health and influenced their food selection, potentially increasing the risk for food misconduct. Studies in the psychological field highlighted how this pandemic has been particularly stressful and traumatic for the Italian population, and how – on the other hand – it could be the beginning of a deep reconfiguration of daily habits and food practices [7,8]. It is important to understand people’s psychological orientation in order to find the right levers to guide them through positive changes. Recent studies in the Italian context have discussed that people in stressful or emotionally overwhelming situations can be keener to consume unhealthy food [1,3,7]. Also, in our study, people who are less likely to consider food as a way to prevent the COVID-19 disease contagion appear more overwhelmed by the emergency in managing their health. In addition, the spread of much – and sometimes confusing – information about the role of nutrition (i.e. vitamins D or C intake) [15,16] in disease prevention could have exacerbated the general disorientation about food choices, as also suggested by others [6,17].

The study has limitations: it was conducted through the CAWI method, which was the only possible way to collect data with a representative and large sample during lockdown. Nevertheless, through this method, higher educated and unemployed people are slightly overrepresented.

Understanding psychological reactions [18] to food consumption may assist experts and policy makers to orient communication and educational campaigns that aim to disseminate effective and correct information, to strengthen individuals’ positive motivation towards healthy food consumption and to change their at-risk food behaviours for the sake of disease prevention.

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Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.numecd.2020.10.013>.

References

- [1] Mattioli AV, Ballerini Puviani M, Nasi M, Farinetti A. COVID-19 pandemic: the effects of quarantine on cardiovascular risk. *Eur J Clin Nutr* 2020;74:852–5. <https://doi.org/10.1038/s41430-020-0646-z>.
- [2] FAO. *Maintaining a healthy diet during the COVID-19 pandemic*, vol. 2; 2020.
- [3] Di Renzo L, Gualtieri P, Cinelli G, Bigioni G, Soldati L, Attinà A, et al. Psychological aspects and eating habits during COVID-19 home confinement: results of EHLIC-COVID-19 Italian online survey. *Nutrients* 2020;12:2152. <https://doi.org/10.3390/nu12072152>.
- [4] Pellegrini M, Ponzo V, Rosato R, Scumaci E, Goitre I, Benso A, et al. Changes in weight and nutritional habits in adults with obesity during the “lockdown” period caused by the COVID-19 virus emergency. *Nutrients* 2020;12. <https://doi.org/10.3390/nu12072016>.
- [5] Torres SJ, Nowson CA. Relationship between stress, eating behavior, and obesity. *Nutrition* 2007;23:887–94. <https://doi.org/10.1016/j.nut.2007.08.008>.
- [6] Mattioli AV, Sciomer S, Cocchi C, Maffei S, Gallina S. Quarantine during COVID-19 outbreak: changes in diet and physical activity increase the risk of cardiovascular disease. *Nutr Metab Cardiovasc Dis* 2020;30:1409–17. <https://doi.org/10.1016/j.numecd.2020.05.020>.
- [7] Bracale R, Vaccaro CM. Changes in food choice following restrictive measures due to Covid-19. *Nutr Metab Cardiovasc Dis* 2020;30:1423–6. <https://doi.org/10.1016/j.numecd.2020.05.027>.
- [8] Scarmozzino F, Visioli F. Covid-19 and the subsequent lockdown modified dietary habits of almost half the population in an Italian sample. *Foods* 2020;9:675. <https://doi.org/10.3390/foods9050675>.
- [9] Romagnolo DF, Selmin OI. Mediterranean diet and prevention of chronic diseases. *Nutr Today* 2017;52:208–22. <https://doi.org/10.1097/NT.0000000000000228>.
- [10] Lanham-New SA, Webb AR, Cashman KD, Buttriss JL, Fallowfield JL, Masud T, et al. Vitamin D and SARS-CoV-2 virus/COVID-19 disease. *BMJ Nutr Prev Heal* 2020. <https://doi.org/10.1136/bmjnph-2020-000089>. <https://doi.org/10.1136/bmjnph-2020-000089>.
- [11] Christ A, Lauterbach M, Latz E. Western diet and the immune system: an inflammatory connection. *Immunity* 2019;51:794–811. <https://doi.org/10.1016/j.immuni.2019.09.020>.
- [12] Caccialanza R, Laviano A, Lobascio F, Montagna E, Bruno R, Ludovisi S, et al. Early nutritional supplementation in non-critically ill patients hospitalized for the 2019 novel coronavirus disease (COVID-19): rationale and feasibility of a shared pragmatic protocol. *Nutrition* 2020;74:110835. <https://doi.org/10.1016/j.nut.2020.110835>.
- [13] Muscogiuri G, Barrea L, Savastano S, Colao A. Nutritional recommendations for CoVID-19 quarantine. *Eur J Clin Nutr* 2020;74:850–1. <https://doi.org/10.1038/s41430-020-0635-2>.
- [14] Rajkumar RP. COVID-19 and mental health: a review of the existing literature. *Asian J. Psychiatr.* 2020;52:102066. <https://doi.org/10.1016/j.ajp.2020.102066>.
- [15] Moscadelli A, Alhora G, Biamonte MA, Giorgetti D, Innocenzio M, Paoli S, et al. Fake news and covid-19 in Italy: results of a quantitative observational study. *Int J Environ Res Public Health* 2020;17:5850. <https://doi.org/10.3390/ijerph17165850>.
- [16] Rovetta A, Bhagavathula AS. COVID-19-related web search behaviors and infodemic attitudes in Italy: infodemiological study. *J Med Internet Res* 2020;6:e19374. <https://doi.org/10.2196/19374>.
- [17] Allington D, Duffy B, Wessely S, Dhavan N, Rubin J. Health-protective behaviour, social media usage, and conspiracy belief during the COVID-19 public health emergency. *Psychol Med* 2020:1–7. <https://doi.org/10.1017/S003329172000224X>.
- [18] Ahmad A, Mueller C, Tsamakis K. Covid-19 pandemic: a public and global mental health opportunity for social transformation? *BMJ* 2020;369:m1383. <https://doi.org/10.1136/bmj.m1383>.