Risk Perception and COVID-19 During Lockdown: Evidence from an Italian Sample

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Abstract

    This paper investigates how a specific extraordinary event such as the COVID-19 pandemic is perceived among individuals. Upsetting the taken-for-granted practices of people's everyday life, the pandemic caused negative emotional responses, mainly the feeling of concern about its aftermath on health and social and economic aspects. However, these responses are not equally spread among social groups. Some of them are more associated with states of panic and anxiety, according to their socially defined and transmitted roles and identities. This paper focuses on a specific element of the perception of the COVID-19 pandemic, *i.e.* risk, based on a survey conducted in Italy (N = 1,704) during the last three weeks of lockdown (26th of April 2020 – 17th of May 2020). The analyses aim to detect patterns in socio-demographic variables in COVID-19 risk perception in the Italian population during lockdown, also accounting for their variation over time. In fact, the analyses suggest that approaching and being aware of the loosening of lockdown measures (18th of May 2020) may have decreased the perceived risk. Results prove consistent with findings from previous research.

Keywords: COVID-19, risk perception, sociology of health and illness.

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1. Introduction

This study investigates patterns of socio-demographic determinants of COVID-19 concern, aiming to contribute to the sociological debate on epidemics and pandemics. Conrad and Barker (2010) define a pandemic not only as a biological phenomenon, but also as a social one. From this perspective, the COVID-19 pandemic is socially and culturally framed. The cultural significances ascribed to it are negotiated in the social and cultural context in which individuals are embedded, structured in value clusters, attitudes and worldviews that have a prominent effect on individuals' everyday practices and reveal taken-for-granted or hidden social aspects, *e.g.* inequalities and marginalization (Dingwall *et al.*, 2013; Lupton, 2021).

Starting from this cultural constructionist perspective, elaborated in the next section, this study focuses on a specific element of pandemic definition, *i.e.* risk perception, analyzing data from an Italian sample collected during the first lockdown (9th of March 2020 – 17th of May 2020). The concept of risk perception pertains to fear and anxiety related to the pandemic itself, its economic, social and psychological meaning, manifested as concern about the COVID-19 virus itself. An emotional state thus defined is a constant presence among individuals, but it is not shared equally among social groups. Previous studies, related to different risk areas such as natural disasters and economic crises, have observed that socio-demographic characteristics (*e.g.* age, gender and social class) are associated with differences in risk perception. Except for a few studies (*e.g.* Strong, 1990), little attention has been paid to large-scale epidemics and pandemics. Moreover, the COVID-19 pandemic constitutes an unprecedented event, considering its extent and the level of health and well-being risks it poses (Shao, Hao, 2020). Accordingly, the research questions guiding the study are the following:

- Which individual socio-demographic characteristics were associated with COVID-19 risk perception in Italy during lockdown?
- With what intensity and which direction are these variables associated?

In the analyses provided, specific attention is paid to the time factor. As discussed in section 3, the data collection period ranges from the last week of April 2020 to the day before the "reopening" of almost all activities on the 18th of May 2020. Italians experienced a first loosening of lockdown measures on the 4th of May 2020, according to the Ministerial Decree enacted at the end of April 2020, and were aware of the imminent "reopening" (see Lanciano *et al.*, 2020 for an accurate schematization of the three Phases set by the Italian government to cope with the COVID-19 emergency). Therefore, approaching the end of such a demanding and extreme decision by the government might have affected the public's risk perception. This led to a third research question:

what changes can be identified in the aforementioned associations between the weeks before and after the Italian government's announcement of the loosening of lockdown measures?

Until now, few studies have provided a thorough investigation of how the Italian public, one of the hardest hit populations worldwide, perceived this phenomenon during its hardest period, according to its socio-demographic features. The aftermath of such an event not only pertains to health and economy, the two main topics in the public debate, but their emotional response is also a matter of interest. Analyzing emotional response enables the identification of which social groups were more concerned about the virus. Sociological literature concerning pandemics and epidemics usually considers social differences while examining the response policies, *i.e.* how these are defined and their targets (Conrad, Barker, 2010; Monaghan, 2020; Motta Zanin *et al.*, 2020; Lupton, 2021). Despite a continuous "uncertainty" characterizing modern societies, extraordinary events highlight how socially-constructed roles ascribe different sets of expected practices and emotional responses to social groups (Lupton, 1999). Moreover, concern about the pandemic has proven to be related to mental problems: the greater the worry, the higher the likelihood of showing anxiety and depression symptoms (*e.g.* Codagnone *et al.*, 2020; Nelson *et al.*, 2020; Lanciano *et al.*, 2020; Terraneo *et al.*, 2021). Besides the limitations, discussed in the last section, the results can start a debate focused on the factors liable to shape different levels of risk perception among Italians. We will start by introducing the more general literature strand and the specific theoretical framework adopted to interpret the COVID-19 pandemic in this work, *i.e.* social constructionism. From this perspective, risk perception does not rely on how humans see and assess risks through their cognitive abilities, but is shaped by social factors. Then in section 2, we will turn to the theoretical accounts of the factors that determine individual differences. We will focus on socio-demographic factors, referring to previous findings by other authors about both COVID-19 and previous pandemics and epidemics. The next section (3) introduces the dataset and the methodological framework, and the following one (4) presents the results.

2. A "weak" socio-cultural perspective of risk perception

Concern about a pandemic is a central research topic for the strand of literature which some scholars define as the "sociology of pandemics": a sub-field of "medical sociology" or "sociology of health and illness", which focuses

explicitly on infectious disease outbreaks. The main approaches of this branch[1] will now be introduced, placing this paper in the constructionist approach. Starting from this theoretical framework, we will then examine the analytical perspective adopted to conceptualize "risk".

The sociological accounts of pandemics and epidemics are divided into seven strands of literature: socio-materialism, political economy, social history, post-colonialism, risk theory, post-structuralism, and social constructionism. Both social-historical and post-colonial studies centre on "Othering" and the resulting stigmatization processes. Analyzing the identification of social groups as "infectors", historical and colonial relationships among groups are recalled as explanatory factors (Lupton, 2021). Political economy, by contrast, addresses the macro-political aspects of inequality, aiming to detect the socio-economic structures affecting the differences in health risks among groups (Monaghan, 2020; Lupton, 2021). Post-structural Foucauldian theories point out how power relationships affect society's responses to diseases: the aim of managing and organizing both people and their behaviour may be achieved by providing narrative accounts on the human body as well (Lupton, 2021). The accounts in "risk society" literature, whose main author is Beck (1992), start from "risk" concept and analyze how it is linked to social, cultural and economic processes. These approaches also take into account the discursive aspect (Ungar, 2001; Lupton, 2021). Far from these perspectives, socio-materialism is more interested in detecting how the interactions between individuals and their surrounding environment (concerning both living and non-living beings) generate the spread of diseases (Lupton, 2021). To conclude, social constructionism views health and illness as socially-defined conditions with social consequences (Bury, 1986; Conrad, Barker, 2010; Monaghan, 2020; Lupton, 2021). Elements such as narratives, "Othering" and "risk" are inherent to this approach, highlighting similarities with the previously stated approaches. Since the focus is on how the COVID-19 pandemic is perceived by the public, this paper fits into the "sociology of pandemics" through a constructionist theoretical approach. This approach will now be developed, concentrating on one of its main topics – the perception of risk.

The concept of epidemics and pandemics as social phenomena can be traced back to Strong's (1990) landmark analysis of the AIDS epidemic in the Eighties. Since a new disease cannot be conceived according to the existing interpretative schema (cognitive maps) adopted in everyday life, thus causing an exceptional state, the author focuses on values, beliefs and cultural significances in general that people associate with the disease itself. Within this approach,

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[1] Readers interested in the theoretical debate may refer to Lupton (2021). The presentation provided is largely based on this reference.

both framing processes and public responses are considered. Agents and institutions compete in providing their frame of the social phenomenon, on which social mobilization and government actions to defeat the disease are based. These actors gain consent with those social groups which assume them to be "authorized" to define the disease. Dingwall *et al.* (2013: 169) call the defining process "the social production of new diseases": the social order constituted by the relationships between individuals and between them and the surrounding biological environment is threatened by a phenomenon which is given a name and classified and to which a causal element is ascribed[2]. However, these narratives and their contents are not only constructed. Since these codified messages are received by a "public", the social constructionist approach also focuses on how the "public" itself receives and responds to them[3] (Staniland, Smith, 2013; Dingwall *et al.*, 2013; Monaghan, 2020). Strong (1990) elaborated the theoretical perspective of the social constructionist interpretation of diseases. His ideal-typical model accounts for both the competing framing processes[4] and the public psycho-social reactions (manifest in everyday life interactions). Recurring elements are detected, despite the differences between countries and over time, about the perceived health risks. These are framed, for example, as fear, uncertainty and panic (Strong, 1990; Dingwall *et al.*, 2013; Monaghan, 2020). Many authors point out how frames are constructed, based on existing inequalities, conflicts, stratifications, previous politicized issues and political agendas, having a concrete after-effect on society and its organization (Monaghan, 2020).

Following the constructionist paradigm, this paper focuses on public perception of pandemics, the core element being "risk". Such a concept has been accounted for by social sciences from several perspectives, which Lupton (1999) assumes as being placed on a continuum whose opposing poles are realist and constructionist. Since this paper's theoretical approach is based on social

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[2] Eisenberg (1977) differentiates between the biological condition, the "disease", and the social significances associated to it, the "illness". This social dimension has consequences on how diseases are experienced and on individuals' behaviour. Starting from this distinction, Conrad and Barker (2010) defines this approach "social constructionism of illness". See Trifiletti *et al.* (2021) for an analysis of an Italian sample of the association between risk perception and actual behaviour during the COVID-19 pandemic.

[3] According to Staniland and Smith (2013), framing analysis of diseases is constituted by three elements or phases: production, text and consumption. In analyzing the H1N1 flu of 2009, the authors distinguish between "framing the flu", "flu frames", and "audience and flu frames".

[4] The role played by the mass media is also considered in the literature (Staniland, Smith, 2013; Monaghan, 2020; Motta Zanin *et al.*, 2020).

constructionism, we have adopted the second interpretative key. Differently from the main realist analytical proposal (cognitivism), constructionism views risks as social facts, acknowledging the "subjectiveness" of people's evaluations. In opposition to the rational-choice paradigm[5], socio-cultural perspectives do not consider "risk" to be an "objective" fact, defined according to technical and scientific knowledge to which people respond: the symbolic significances generated in the social world play a relevant role in structuring the knowledge, interpretation and even practices of risk. Indeed, the socio-cultural, economic and political contexts of embeddedness, as well as social groups of belonging, mediate the individual's perceptions and responses to other individuals, objects and events. Nevertheless, there exists a wide array of positions in constructionist literature. According to Lupton (1999), these pertain to two versions of the same perspective, both contending the non-"objective" nature of risks: a "strong" version, according to which any identification of a risk is historically, socially and politically determined, and a "weak" version, which assumes a risk definition grounded on rationalistic calculations, but focuses on socio-cultural and political processes shaping the perceptions and responses to it. The "strong" constructionist approach focuses on the constant constructed and negotiated definitions of risk by adopting qualitative methods, whereas the "weak" one assumes that a specific object has already been socially defined as a risk, and analyses how perception of it is culturally mediated.

This paper aims to investigate the perception of a new disease, COVID-19, by a specific "audience", Italians during lockdown, through a quantitative analysis of primary data. Accordingly, the constructionist perspective employed follows its "weak" version. Starting from the assumption that the concept of risk is socially defined, we will develop psychometric models focusing on the socio-demographic factors affecting the perception of risk.

3. Socio-demographic determinants of risk perception

Since the core topic of the interpretation and perception of epidemics and pandemics is risk, the research focuses on how it differs among the individuals who form the "public", *i.e.* according to their various characteristics. The emotional responses, constituted by panic and anxiety, are transmitted through

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[5] Indeed, cognitivism aims to develop statistical models capable of detecting the "heuristics" people employ to elaborate information and evaluate a risk. Slovic and Peters (2006) provide a thorough distinction between the affective (emotional) and the cognitive (rational) perceptions and actions on risk.

social interactions, just as the virus is[6]. However, these perceptions concern both epidemiological information about the disease and socially-structured health outcomes (Monaghan, 2020): these are responses which do not spread in the same way among social groups. Therefore, this paper adopts an audience-oriented outlook, directing attention towards people's responses to the pandemic (Staniland, Smith, 2013). Since these are based on risk perception and its emotional consequences (Strong, 1990; Staniland, Smith, 2013), an accurate definition of "risk" and its constituting elements is needed. As mentioned above (section 1), the "weak" constructionist perspective leads the process of definition.

Relying on the concept of the COVID-19 pandemic as a source of uncertainty which "undermines people's basic sense of safety and increases distress symptoms" (Kimhi *et al.*, 2020: 3), this paper recalls the differentiation between the actual "danger" and the socially constructed "risk" proposed by Slovic (1999). Apart from the competitive nature of the process of risk assessment and its reflection of suppliers and consumers values and interests in both frames, risk perception has a multidimensional nature (Slovic, 1999; Shao, Hao, 2020). It firstly pertains to physical harm, but it is also the result of psychological, social, cultural and institutional processes shaping interpretations of both the specific event and the hazards associated with it (Kasperson *et al.*, 2003). Worry about health and the social and economic aftermath on the self, relevant others, the nation and the entire world is based on risk perception, differing between experts and laypeople (Slovic, 1987; Lupton, 1999; Kroencke *et al.*, 2020). In their actual and likely occurrence, these consequences are ultimately expressed through an evaluation of concern about the phenomenon, ranging from highly concerned to not at all. Saying that illnesses are socially constructed means stating that they are defined and understood according to historically and culturally situated sets of values and beliefs (Lupton, 1999, 2021). Their competing frames spread over a social environment are based on both biological and socio-economic elements, disclosing power relations and inequalities characterizing the context and the taken-for-granted in everyday life (Conrad, Barker, 2010; Lupton, 2021). Since the concept of "risk" is an element of the social constructions of crises, it is therefore tied to such relations and

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[6] Starting from the interactionist tradition, Strong (1990) proposes a typology of epidemics aimed at studying the framing process of diseases (or other types of crises), its competitive nature and subsequent societal mobilization. He detects three intertwined types of psycho-social epidemics – "of fear", "of explanation and moralization", and "of action or proposed action". These are focused on elements such as uncertainty about the danger of the disease and its means of transmission, and the possible consequences of the proposed interventions.

inequalities: the interpretations and perceptions of such crises are founded on cultural significances, shaped by socialization processes and social interactions embedded in social, cultural, economic and political contexts (Lupton, 1999). Accordingly, socio-demographic factors, denoting belonging to social groups and contexts, play a role in determining the "subjective" risk perception.

Despite the COVID-19 pandemic being a new phenomenon, the findings of previous studies of the "sociology of pandemics", based on feelings of concern, allow us to hypothesize several socio-demographic characteristics associated with its assessment. Firstly, a consistent outcome in psychometric risk analyses pertains to the so-called gender gap[7]: women appear to be significantly more concerned than men for their health and safety. A wide array of theoretical accounts have proposed explanations for this difference, mainly focusing on differences in socialization processes. For example, Slovic (1999: 692) stated that "women have been characterized as more concerned about human health and safety because they give birth and are socialized to nurture and maintain life". In general, such statements pertain to a more broad assessment: "members of social groups that are less powerful tend to be more concerned about risks than members of powerful social groups" (Lupton, 1999: 24).

This assumption is consistent with evidence of the higher level of concern associated with older ages: during events such as a pandemic, older people face higher likelihoods of health aftermaths (Shao, Hao, 2020). The same finding is usually detected for ethnic minorities (Slovic, 1999; Dingwall *et al.*, 2013; Shao, Hao, 2020).

Besides power, social status also influences people's risk assessment (Lewis *et al.*, 2019). It is inherent to factors such as education attainment, income and social class. However, a common pattern is not found: more affluent and educated people are provided with material and immaterial resources which can be responsible for being both more or less concerned about the pandemic's aftermath than the lower social strata of the population (Shao, Hao, 2020).

Previous findings on risk perception about the COVID-19 pandemic underline a further determinant – the area of residence. Works such as Nelson *et al.* (2020) and Motta Zanin *et al.* (2020) observed a varying grade of worry according to the level of infection in the area in which people live: where the infection rates were higher, the level of concern also resulted higher. This seems to be associated with a higher likelihood of direct experience of the virus.

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[7] Lupton (1999) provides some examples of this gender gap, concerning several topics. Lewis *et al.* (2019) underlines its consistency regarding climate change risk assessment. Lanciano *et al.* (2020) have already assessed gender differences in COVID-19 risk perception.

The relationships between risk perception and socio-demographic factors have proved to be reliable among different emerging diseases or, more broadly, threatening events (Dingwall *et al.*, 2013; Kimhi *et al.*, 2020). The first analyses focusing on a few national contexts confirm this for the COVID-19 pandemic too[8]. Consequently, this paper aims to provide further insights in this direction, analyzing data from an Italian sample. As already mentioned, particular interest is also given to the temporal dimension: "as the pandemic progresses, it would be of interest to examine whether personal perceived risks would decrease as documented in a large epidemic of mosquito-borne disease" (Shao, Hao, 2020: 6).

According to both "strong" and "weak" social constructionist perspectives, the socio-cultural significances ascribed to a pandemic are spatially and temporally situated (Lupton, 2021). As a consequence, the results must be interpreted as restricted to the Italian context and the lockdown period. Besides this, since the literature shows similarities among different outbreaks and countries, the discussion (section 4) will consider comparison with previous findings.

4. Dataset and method

This study is based on data collected by the research project "The Politics and the Challenge of the COVID-19 Pandemic" ("La Politica e la Sfida della Pandemia COVID-19"). A survey was conducted through CAWI methodology during the last three weeks of the closures by the Italian government (26th of April 2020 – 17th of May 2020). The topics covered range from economic and political spheres to the pandemic in general, focusing on people's opinions during an extraordinary event. Due to the interest in political issues, invitations to join the survey were given to Italian voters (*i.e.* Italian adult citizens, at least 18 years old, having the right to vote), achieving 1,825 respondents[9]. Notwithstanding the total number of responses, the self-selected nature of the sample requires weighting the data to reference population benchmarks on

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[8] Shao and Hao (2020) provide a broad analysis of risk perception according to a wide set of variables. As concerns economic factors, papers such as Codagnone *et al.* (2020) and Nelson *et al.* (2020) observe higher levels of worry among people undergoing employment instability, financial strain and economic losses during lockdown.

[9] The questionnaire was proposed online using the software Qualtrics, which provided a direct link to the survey. The link was disseminated via social media, obtaining a self-selected sample. In order to exclude from the analyses those respondents not entitled to vote, the two questions focused on voting behaviour were provided with the option "Not entitled to vote". The analyses were performed with Stata software.

several socio-demographic dimensions. Since the invitational focus is on the Italian electorate, the weights are computed with respect to the official statistics on its distribution, according to gender and area of residence, provided by the Ministry of the Interior, replicating the distribution of the cross-classification of these two variables[10]. This weighting operation means excluding from the analyses those respondents who do not comply with the reference population, *i.e.* those who are not yet 18 years old and/or do not have the right to vote.

Besides the weighting computation, this study focuses on the survey section pertinent to the pandemic, which was opened by a question about the respondent's perceived concern about the virus. Despite the multi-faceted nature of risk perception, one parsimonious item was proposed, observable in TABLE 1. It is worthwhile underlining that only 5.3% of respondents stated that they were not at all concerned about the virus, while most of them were somewhat worried. The respondents' perceived worry about the virus constitutes the dependent variable in this paper. Being constructed as a four-point Likert scale, it can be assumed as a quasi-cardinal variable: accordingly, it can be adopted as a continuous one. Doing so, its range of values is rescaled between zero and one, with a mean computed on the total sample of 0.64 (SD = 0.27).

TABLE 1. Frequency distribution of risk perception variable. Weighted data.

Generally speaking, how much are you concerned about the virus?	Count (unweighted)	Count (weighted)	Percentage (weighted)
Not at all	80	91	5.3%
Not really	339	342	20.1%
Somewhat	892	884	51.9%
Very much	292	387	22.7%
Total	1,704	1,704	100.0%

The associations between the dependent variable and the socio-demographic characteristics of respondents are assessed, observing how the mean of risk perception differs according to the attributes defined by the categories taken on by the independent variables. TABLES 2, 3 and 4 show the results of bivariate linear regression models between the risk perception and, respectively, gender, age and residence area. In agreement with the aforementioned findings in the literature (section 2), women state a higher grade of concern than men on average, as do older people (whose COVID-19 mortality rate is higher than the rest of the population) compared to younger

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[10] The six-monthly inquiry of the Italian electoral body until the 31st of December 2019 was held as the reference statistics. Source:
https://dait.interno.gov.it/elezioni/rilevazione-semestrale.

ones. As concerns residence area (TABLE 4), the North-West of Italy, one of the worst hit territories in the world, is associated with the highest mean of risk perception. By contrast, both the North-East and the Center show lower averages of concern than that of the total sample (0.64).

TABLE 2. Mean of risk perception (rescaled between zero and one) between men and women. Weighted data.

Gender	Count (unweighted)	Count (weighted)	Percentage (weighted)	Risk perception (mean)
Men	992	821	48.2%	0.61
Women	712	883	51.8%	0.67

TABLE 3. Mean of risk perception (rescaled between zero and one) among age classes. Weighted data.

Age (classes)	Count (unweighted)	Count (weighted)	Percentage (weighted)	Risk perception (mean)
18-34	549	553	32.5%	0.63
35-64	943	953	55.9%	0.63
65+	212	198	11.6%	0.73

TABLE 4. Mean of risk perception (rescaled between zero and one) among residence areas (NUTS 1). Weighted data.

Residence area (NUTS 1)	Count (unweighted)	Count (weighted)	Percentage (weighted)	Risk perception (mean)
North West	783	447	26.2%	0.69
North East	358	323	18.9%	0.62
Center	239	332	19.5%	0.60
South and Islands	324	602	35.4%	0.64

With regard to respondents' social status, education and social class are considered. These two variables are applied through, respectively, ISCED 3 classification and 8-class Oesch's (2006) schema. TABLES 5 and 6 provide the means computed for both these categories. Concerning education, the respondents declaring an upper-secondary level of education show the lowest mean of risk perception, while the ones with the lowest level of education show the highest perception. This can be related to different material and immaterial resources, which are both linked to educational attainment and prominent in facing the pandemic and its economic and social consequences. Moving on to social class[11], only three groups show levels of risk perception higher than the

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[11] The unemployed, retired, those unable to work and students are codified according to their last job or the job of one of their family members. We also analyzed the risk perception mean according to the respondents' employment status, observing no

mean computed on the total sample: production workers (0.66), clerks (0.65) and socio-cultural professionals (0.71). This third group is related to the highest mean and includes the jobs most exposed to the virus, being based on interpersonal interactions, among which those most involved in the fight against the virus and the pandemic (medical doctors and nurses).

TABLE 5. Mean of risk perception (rescaled between zero and one) among levels of education (ISCED 3). Weighted data.

Education level (ISCED 3)	Count (unweighted)	Count (weighted)	Percentage (weighted)	Risk perception (mean)
Secondary or lower	123	111	6.5%	0.70
Upper-secondary	709	686	40.3%	0.62
Post-secondary or tertiary	872	907	53.2%	0.64

TABLE 6. Mean of risk perception (rescaled between zero and one) among social classes. Weighted data.

Social class	Count (unweighted)	Count (weighted)	Percentage (weighted)	Risk perception (mean)
Self-employed professionals and large employers	221	216	12.7%	0.59
Small business owners	282	303	17.8%	0.62
Technical professionals	143	124	7.3%	0.61
Production workers	230	203	11.9%	0.66
Managers	139	127	7.4%	0.64
Clerks	335	332	19.5%	0.65
Socio-cultural professionals	232	260	15.3%	0.71
Service workers	122	139	8.1%	0.60

Apart from the socio-demographic factors introduced in section 2, a further element is considered in the analyses: the direct experience of infection. The respondents were asked to indicate whether they themselves, any of their relatives or close acquaintances had been infected. TABLE 7 highlights a higher mean of concern among those who stated direct experience.

TABLE 7. Mean of risk perception (rescaled between zero and one) between the respondents who had and who had not direct experience of infection. Weighted data.

Direct experience of infection	Count (unweighted)	Count (weighted)	Percentage (weighted)	Risk perception (mean)
No	753	857	50.3%	0.62
Yes	951	847	49.7%	0.66

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differences both among its categories and as concerns the regression coefficients presented in the next section.

To conclude, the period of data collection has not been overlooked as having a role in affecting people's emotional response to the pandemic. This pertains to the last three weeks of the Italian closures, and it is noteworthy that, according to the Ministerial Decree (DPCM) of the 26th of April 2020, first movements were authorized from the 4th of May 2020 and a first hypothesis of a "reopening" date was set (18th of May 2020). TABLE 8 shows that awareness of the imminent "reopening" in Phase 2 together with the closeness to that moment shaped a steep decline in the mean over the three weeks of data collection, ranging from 0.69 until the 3rd of May (end of Phase 1) to 0.58 in the third one. Considering this variable as a strong element of variance for risk perception, it is dichotomized between before and after the actual activation of the measures in the aforementioned Ministerial Decree. Indeed, a survey analysis of risk perception about the COVID-19 virus during lockdown must take into account the contextual and institutional features of the precise moment of data collection.

As such, the association between the dependent and the independent variables is analyzed separately according to the period of response, whether prior or subsequent to the enactment of the first "reopening" measures by the Italian government. In this way, it is possible to observe not only the patterns of risk perception, but also how they differ between the two time periods. TABLE 9 shows the mean value of risk perception according to the data collection period: the mean decrease between the two periods considered is 0.09 (SE = 0.01). In the next section, the data is weighted according to the same reference statistics previously shown, but computed for each sub-sample[12].

TABLE 8. Mean of risk perception (rescaled between zero and one) among data collection period. Weighted data.

Data collection period	Count (unweighted)	Count (weighted)	Percentage (weighted)	Risk perception (mean)
26/04/2020 - 03/05/2020	812	727	42.7%	0.69
04/05/2020 - 10/05/2020	299	318	18.6%	0.64
11/05/2020 - 17/05/2020	593	659	38.7%	0.58

TABLE 9. Mean of risk perception (rescaled between zero and one) between prior to and after the 4th of May 2020. Weighted data.

Direct experience of infection	Count (unweighted)	Count (weighted)	Percentage (weighted)	Risk perception (mean)
26/04/2020 - 03/05/2020	812	727	42.7%	0.69
04/05/2020 - 17/05/2020	892	977	57.3%	0.60

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[12] The total number of the sample is still equal to 1,704 cases. However, weighting in a different way than before (according to the two defined sub-samples) means obtaining a different frequency distribution.

The aim of this study concerns the identification of socio-demographic variable patterns of COVID-19 risk perception in the Italian population during lockdown. Considering the contextual and institutional specificities of this country during the pandemic, *e.g.* the severity of the spread of the virus and the large number of Ministerial Decrees, not considering "when respondents answered the survey" would be misleading. Therefore, pattern detection is developed separately between the days prior and subsequent to the activation of the first authorizations of movement on the 4th of May 2020. Consequently, separated linear regression models have been applied for the two data collection periods, keeping risk perception as the dependent variable and all the other factors as independent.

5. Results

The two linear regression models have been performed separately according to the two sub-samples defined by the dichotomous variable presented in TABLE 9. The resulting different patterns are shown in TABLE 10 and FIGURE 1, which plots the predicted average scores for each category of the independent variables with their 95% confidence intervals.

Starting from the socio-demographic variables, the results confirm the hypothesized differences in risk perception between genders: in both models, women are significantly more concerned about the virus than men are. However, this difference is almost halved passing to the second collection period (from +0.07 to +0.04). Similarly, the association between risk perception and age is still evident: older people are more worried, and the difference from the youngest age class decreases in the second model (from +0.11 to +0.09). So far, a higher homogenization of the differences among social groups has been seen, but this does not apply to the respondents' area of residence. In the first data collection period, the highest mean of risk perception is associated with people living in the North-West, while the lowest mean with those living in the North-East. By contrast, in the second model, despite the North-West still being the area with the highest mean and its (lower) difference from the North-East still significant, the Center respondents state the lowest grade of concern.

The remaining two socio-demographic variables show interesting associations with the dependent one. Until the 3rd of May 2020, no significant differences are detected. After the authorization of the first movements, instead, the respondents declaring an upper-secondary level of education are significantly less concerned than the others. At the same time, there is one social class emerging as the most worried: socio-cultural professionals. This class includes doctors and nurses, and, more generally, people employed in

specialized tasks involving interpersonal relationships, the main means of COVID-19 transmission. This could be due to the earlier homogeneous risk perception among social classes before the first "reopening" measures. After this pledge from the government to soften lockdown, the general lowering of concern about the pandemic seems not to have affected the most engaged and at-risk individuals.

TABLE 10. Linear regression models for risk perception. Weighted data. *p<0.10, **p<0.05, ***p<0.01. Standard error in brackets.
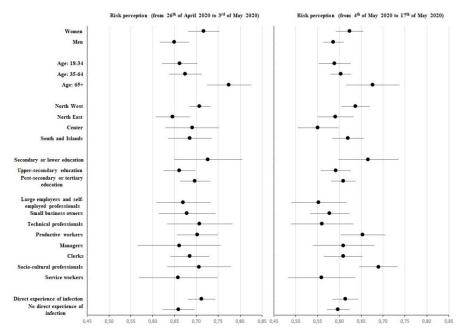
	Risk perception (from 26th of April 2020 to 3rd of May 2020)		Risk perception (from 4th of May 2020 to 17th of May 2020)	
	β	*SE*	*β*	*SE*
Women	0.07***	(0.02)	0.04*	(0.02)
Age (ref. 18-34)				
35-64	0.01	(0.03)	0.01	(0.02)
65+	0.11***	(0.03)	0.09**	(0.04)
Residence area (ref. North West)				
North East	-0.06***	(0.02)	-0.05*	(0.03)
Center	-0.02	(0.03)	-0.09***	(0.03)
South and Islands	-0.02	(0.03)	-0.02	(0.03)
Education level (ref. Secondary or lower)				
Upper-secondary	-0.07	(0.04)	-0.07**	(0.04)
Post-secondary or tertiary	-0.03	(0.04)	-0.06	(0.04)
Social class (ref. Clerks)				
Self-employed professionals and large employers	-0.01	(0.04)	-0.06	(0.04)
Small business owners	-0.01	(0.04)	-0.03	(0.03)
Technical professionals	0.02	(0.04)	-0.05	(0.04)
Production workers	0.02	(0.03)	0.05	(0.03)
Managers	-0.02	(0.05)	0.00	(0.04)
Socio-cultural professionals	0.02	(0.04)	0.08**	(0.03)
Service workers	-0.03	(0.05)	-0.05	(0.05)
Direct experience of infection	0.05**	(0.02)	0.02	(0.02)
Constant	0.67***	(0.05)	0.66***	(0.05)
R²	0.07		0.06	
N	812		892	

The first column pertains to the data collection period prior to the first authorizations to movements, whereas the second column pertains to the period after it.

Finally, the direct experience of infection is shown to be a prominent determinant of risk perception in the first model. Indeed, the mean difference between who did and did not state knowing anyone infected is positive and significant (+0.05). Among the respondents in the second data collection period, instead, the difference, despite being positive, is not significant. A change in how the experience of infection is perceived can be assumed: since it becomes more and more ordinary over time, *i.e.* a less and less extraordinary

event in individuals' everyday life, it becomes less able to increase people's concern about the virus as well.

FIGURE 1. Risk perception predicted average score (with 95% confidence intervals). The x-axis refers to the dependent variable, the y-axis refers to the categories of the independent variables. The figure shows the average score (with 95% confidence intervals) on the dependent variable for each category of every independent variable.

6. Concluding remarks and limitations

This paper investigates the perception of risk associated with the COVID-19 pandemic during the first Italian lockdown. The socio-demographic patterns detected prove consistent with previous findings on both current and past pandemics and epidemics. This seems to hold true despite the differences among countries and between pandemics and epidemics over time.

The differences between women and men support the hypothesis of distinct socialization processes concerning the interpretation of crisis events (*e.g.* Slovic, 1999). At the same time, older people are shown to be more concerned than the younger age groups (Dingwall *et al.*, 2013): this may be due to their higher infection fatality rates. Area of residence is a prominent factor too, and

its pattern follows the geographical levels of infection (Nelson *et al.*, 2020; Motta Zanin *et al.*, 2020). Indeed, the North-West regions show the highest average of perceived risk. All the effects reveal an attenuation over time. However, despite these regularities between the two time spans considered, Central Italy is shown to have been less worried getting closer to the end of the lockdown measures, and other variables also show different patterns. Social status factors do not indicate any statistically significant difference in the first period, whereas a different result emerges after the 3rd of May 2020: socio-cultural professionals are the most concerned during the second time span. Indeed, according to Oesch's (2006) schema, this class includes people engaged in interpersonal tasks, *i.e.* with a higher likelihood of infection. An opposite pattern is identified as regards the direct experience of infection: this factor is only statistically significant in the first period of data collection. It is hypothesized that the attenuation of its effect on risk perception is due to the rising ordinary character of the infection. Generally speaking, the feeling of worry decreases on average with the awareness of the end of the lockdown.

Apart from the non-representativeness of the sample, a further limitation pertains to the focus on a single country. However, we underline the aforementioned analogies in epidemic and pandemic perception among countries and over time in previous studies, and the closeness of our results to similar analyses of different national contexts. Further analyses should focus on examining the changing patterns of risk perception over time, and should pay attention to other contextual features such as the role of "political entrepreneurs" in shaping interpretative frames of the COVID-19 pandemic.

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