

# A nation-wide survey on emotional and psychological impacts of COVID-19 social distancing

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**Abstract. – OBJECTIVE:** Social distancing is crucial in order to flatten the curve of COVID-19 virus spreading. Isolation, scarcity of resources and the lack of social contacts may have produced a negative impact on people's emotions and psychological well-being. This study aims to explore the reasons and the ways through which social distancing generates negative emotions in individuals who experienced the lockdown. To a larger extent, the objective is to check the existence of relations between negative emotions and the satisfaction of basic needs.

**MATERIALS AND METHODS:** In Italy 140,656 online interviews were collected from March 22 to April 2, 2020. Data analysis was carried out using mono and bivariate statistical analysis, K-means clustering and the Principal Components Analysis (PCA). The parameters for the identification of six clusters were: the intensity of the respondent's basic emotions and the layers of Maslow's hierarchy of needs.

**RESULTS:** The majority of people involved in an emergency situation, implying a collapse of social contacts, experience some kind of emotional reactions. In our study, we found a correlation between basic emotions and Maslow's hierarchy of needs. In times of crisis, the most basic needs are the physiological ones. Fear, anger and sadness are predominant in all population groups; anger and disgust mainly appear when people are exposed to the risk of not being able to meet subsistence needs, thus perceiving a lack of economic security.

**CONCLUSIONS:** The well-known Maslow's theory of human needs seems to fit well with the outbreak of negative emotions in the context of COVID-19. This study demonstrates the existence of links between negative emotions and primary needs that mainly refer to the first three levels of Maslow's pyramid. As a result of COVID-19 worldwide pandemic, many people have been sucked into the bottom layers of the

pyramid. This change in individual basic needs has triggered a relevant transformation in individual emotional status and a shift towards negative emotions.

*Key Words:*

COVID-19, Survey, Social distancing, Lockdown, Quarantine, Psychosocial effect, Basic emotions.

## Introduction

Governments around the world are responding to COVID-19 sanitary emergency by imposing severe social distancing measures. Social distancing may be considered a global phenomenon as it is currently considered the best defence against the spread of COVID-19 virus. The most evident effects of social distancing are the radical upheaval in people's habits and lifestyles, as well as tremendous side-effects on labour market organisation and job retention. In terms of interpersonal interactions, social distancing has a Janus-faced effect: on the one hand outdoor social interactions are drastically cut off, but on the other hand there is an increasing number of hours of cohabitation. This deep change in behaviour has shifted people's attention to the need for safety and protection, while affecting their emotions.

In the last decades, several psychological and psychophysiological studies<sup>1-3</sup> have confirmed the innate and universal nature of emotions and their expressions. Paul Ekman, starting from the studies of Charles Darwin on the innatism of the expression of emotions in humans and animals<sup>4</sup>,

has identified six basic emotions: anger, disgust, fear, happiness, sadness, and surprise<sup>5,6</sup>. Other authors, as Robert Plutik<sup>7</sup>, identified four pairs of polar opposite emotions: joy-sadness, anger-fear, trust-distrust, surprise-anticipation. Regardless of whether basic emotions are 6/8 or a lower/ or higher number, the authors, urged by Paul Ekman, tried to put together the main knowledge on the subject in the article “What Scientists Who Study Emotion Agree About”<sup>8</sup>. The study has showed a high level of agreement about five emotions: anger, fear, disgust, sadness, and happiness, while shame, surprise and embarrassment were less relevant. From these considerations comes out the list of basic emotions selected as object of this study during the sanitary emergency caused by the COVID-19 pandemic.

On March 9<sup>th</sup>, 2020, according to the Italian Council of Ministers’s #IStayHome decree, Italy has imposed social distancing as a measure to limit the spread of contagion. Following the implementation of the lockdown, the Institute for Research on Population and Social Policies of the National Research Council of Italy (CNR-IRPPS), in partnership with the Istituto Nazionale di Geofisica e Vulcanologia (INGV) and the Fondazione Movimento Bambino ONLUS research team, set up the “Ongoing Social Changes-COVID-19 Observatory” (OSC-COVID-19). The general objective of the observatory is the analysis and monitoring of the psychological and social effects undergone by population during the COVID-19 emergency. The specific objectives of the observatory are focused on interpersonal, psychological and economic dimensions of social distancing. Thus, the observatory carries out national surveys aimed at identifying those variables and situations that may affect changes in emotions during a lockdown.

The hypothesis is that social distancing and the issues related to the lockdown generate negative basic emotions. We also hypothesised the existence of relations among negative basic emotions and the attention paid by people to basic needs, as defined in Maslow’s hierarchy theory of needs<sup>9</sup>. According to Maslow, during emergencies emotions may refer mainly to the first three levels of the pyramid of needs: physiological, safety, love and (social) belongingness. Several scientific theories look at the primacy of survival in explaining attitudes and behaviours of populations. Most of the biological tendencies and psychosocial matters of individuals are oriented towards survival, personal and group

concerns<sup>10</sup>. During emergencies, psychological support interventions are mostly based on similar considerations. Zheng et al<sup>11</sup> supported this theory also in relation to the onset of psychiatric disorders caused by stressful events. According to their re-interpretation of Maslow’s hierarchy of needs, everything is less important than personal, financial, health and well-being security, even physiological needs. Therefore, they depict a scenario where security concern is the main reason for mental disorders, such as anxiety, phobia, depression and post-traumatic stress disorder (PTSD). Fear and anger, however, are opposite aspects: fear shuns danger while anger fights against it. When facing an unexpected event, these emotions emerge accordingly.

Maslow’s theory of human needs seems to perfectly adapt to the situation deriving from COVID-19 pandemic, allowing the connection and integration of individual psychological aspects to the social context. This article focuses on the intensity of negative basic emotions as one of the social distancing effects. Our analytical perspective aims to combine individual psychological observations with social and economic investigation.

## Materials and Methods

We carried out a web-survey through an online statistical App on the CNR-IRPPS server. The questionnaire consisted of 37 questions, including 13 structural variables (i.e., gender, age, level of education, occupation, etc.). The questionnaire was divided into four areas of interest. The first one is about respondents’ Social and Personal Information; the second one considers Interaction under conditions of Social Distancing/Cohabitation. The third area is about Trust and Opinions towards public organisations and authorities, gender stereotypes and prejudices, religious beliefs and political orientations. Finally, the fourth area, Emotions and Resilience, relates to self-assessment, basic emotions and resilience. A simple question was asked in order to investigate the intensity of the respondents’ emotions, avoiding the usage of more complex sets of questions. The analysis of basic emotions was carried out using primarily the collected structural information, but also the rest of the available dataset. Therefore, no statistical validation was required since no indicators have been obtained from the data.

The invite to participate to the survey was diffused through the CNR-IRPPS website and the related institutional social accounts (Twitter, LinkedIn, Facebook and Instagram). It was also diffused through non-institutional channels (WhatsApp and other personal social profiles). The result is a non-probabilistic statistical sample.

Before starting the survey, we tried to find out potential barriers that could make difficult to some population groups to participate to the study. We thought that some vulnerable segments of the population might be excluded, as for example people with low educational level and the elderly. Therefore, we encouraged these groups to participate to the survey by advertising the study in environments and amongst groups closer to these more vulnerable social groups. Given the research objectives, the lockdown conditions and the sensitivity of the population to the research topic, the adopted channels of submission of the questionnaire resulted to be very effective. To be noted that in the last yearly national report on the use of Internet\*, 94% of Italian population owns a smartphone and it is possible to estimate that the majority of the people aged between 13 and 65 years fall into this category. Overall, 140,656 interviews have been collected in Italy. A very large number that allows to explore the data in different ways. The collection started on March 22, 11 days after the beginning of lockdown, and ended on April 2<sup>nd</sup>.

The anonymity assurance of data adopted during the collection process did not allow to detect the device from which the answers were provided. However, it is easy to guess that the preferred device used among the respondents was the smartphone. In fact, the questionnaire was mainly diffused among the population through the traditional and messaging-based social networks. This diffusion channel is also the reason why many answers have been collected in a very short amount of time and touching a wide spectrum of respondents in terms of age and social background. In addition to that, many studies<sup>12-14</sup> have shown that there is no significant evidence of a reduction in the quality of data in relation to the device used for the response. Therefore, we consider data collected on smartphones and tablets to be of the same quality as those collected via a personal computer.

*A priori* we could not control the sample representativeness of the Italian population, though we monitored it during the questionnaires' collection. Although in the survey dataset all popu-

lation groups were present, some imbalances still remained between the composition of the Italian population and the survey results. For this reason, the sample has been re-proportioned, and after the weighting procedure, it resulted balanced according to the demographic structure of Italian population.

In the data analysis process, we started from a descriptive mono and bivariate statistical analysis, followed by a multidimensional data analysis<sup>15</sup>. A data mining perspective was adopted<sup>16</sup> in order to profile respondents on the basis of their basic emotions. A K-means algorithm<sup>17</sup> was applied to obtain a partition into groups, by using a non-hierarchical procedure, due to the large dimension of the sample<sup>18</sup>. K-means clustering aims to split out the  $n$  observations as quantitative variables into  $k$  ( $\leq n$ ) sets, by minimising within-cluster sum of squares (i.e., variance). No data standardisation was required because of the homogeneity of data. The variables used to identify the clusters were scores measuring the intensity of basic emotions on a progressive scale of (7) values. Once the groups have been established it was decided to fix the total number of clusters at six after several attempts of classification procedure have occurred. A descriptive analysis of all the available variables was then performed, with the aim of characterising the profiles of the different clusters. In this way it was possible to describe the main characteristics of each group, whilst highlighting those variables that were different from the overall average of the statistical sample. The process took place without taking into consideration those variables fairly in line with the general averages. Finally, the Principal Components Analysis (PCA)<sup>19</sup> was applied to the same variables in order to obtain the partition into clusters, by operating a vectorisation of the quantitative variables relating to basic emotions. The results, obtained by using a Pearson's correlation matrix among data, helped to transfer the dataset into a Cartesian plane where the six clusters have been projected as centres of factorial points. The clusters result to be strongly correlated to the vectors (PCA factors) and by adopting a synoptic vision it is possible to better understand their structure.

## Results

The basic emotions were investigated by the question: "What are the emotions you feel most because of lockdown situation?". Respondents

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\*<https://wearesocial.com/it/digital-2020-italia>

were asked to indicate the intensity by expressing a rating from 1 (minimum) to 7 (maximum). During the period from March 22 to April 2 2020, the basic emotions felt with higher intensity by the interviewees were: sadness (4.65 out of 7), fear (4.22 out of 7), anxiety (3.9 out of 7), anger (3.16 of 7), while happiness was the emotion with the lowest score (2.22 out of 7). These emotions have emerged more intensely among women: anxiety +1.12, fear +1.05, sadness +0.81, +anger 0.21 were higher than among men. Emotions were perceived with lower intensity as age of respondents increases. In fact, those over 70 years old have shown a lower emotional intensity than youngsters (up to 29 years old) and adults (30-49 years old). Sadness was the prevailing emotion during this phase of social distancing, without any noticeable difference by age, excepts for those over 70 years old who have experienced it with a lower intensity (4.15). In general, the intensity of basic emotions does not seem to be affected by the level of education; respondents with medium-low educational level tend to show slightly higher values than the other groups, in particular in relation to disgust (+0.44) and anger (+0.39). The geographical distribution shows that the intensity of emotions reaches higher levels

in southern Italy, rather than in the North and the Centre of the country. These results deviate from what we expected, as COVID-19 spreading and its consequences (i.e., high mortality rate) have mainly affected Northern Italy. The main basic emotions emerging during this period seem to have a greater intensity as the number of cohabiting people increases. The trend seems confirmed both for negative emotions as sadness, fear, anxiety, but also for happiness. Furthermore, as the time spent on Internet increases, negative emotions arise: anger (+0.78), disgust (+0.68), fear (+0.88) anxiety (+0.91) and sadness (0.88). On the contrary, the positive emotions decrease: happiness (-0.12) and calm (-0.04).

The six clusters resulting from our analysis and classified using Maslow's hierarchy of needs are described below and synthetically represented in Figure 1.

**Group 1-The Quiet Ones**

**Description:** This group consists of 24,404 people. The cluster analysis shows a prevalence of relaxation and happiness. The group is mainly composed of men of all ages. The majority of them live in the North of Italy and have children over 12 years old. This group spends less

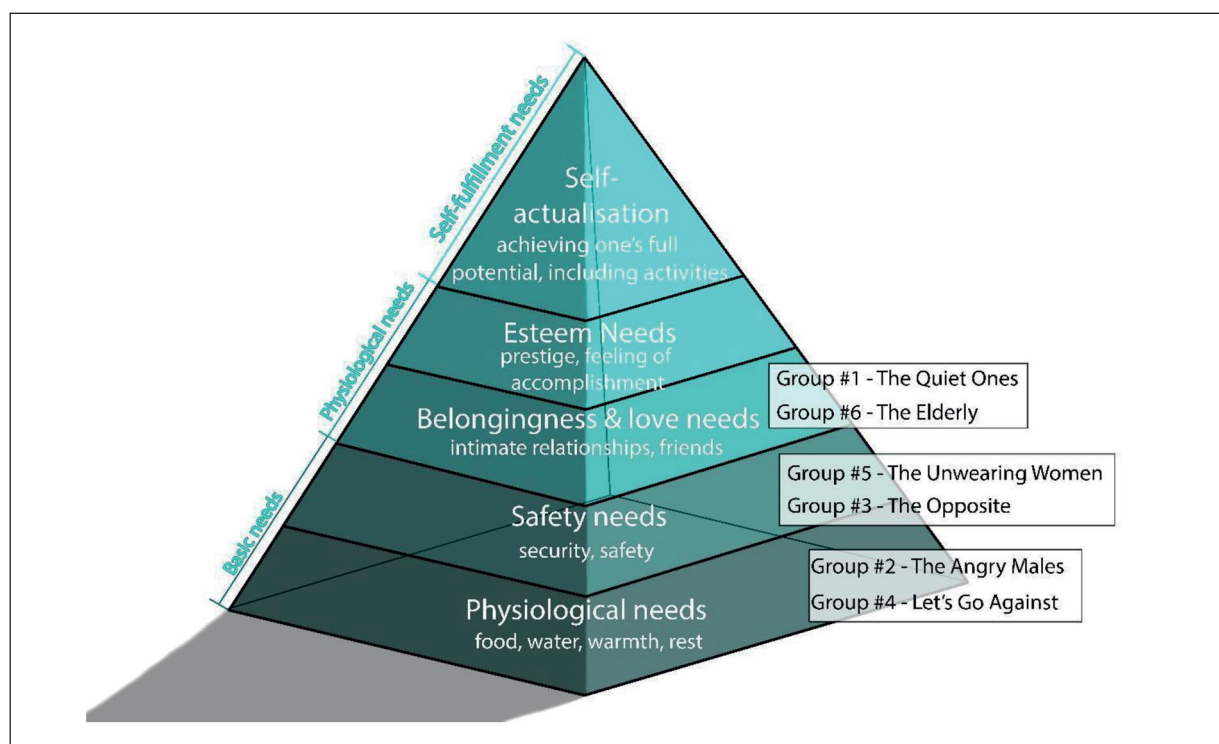


Figure 1. Hierarchy of groups based on Maslow's pyramid of needs.

time on social web in comparison to the sample average and shows a good propensity to follow the rules imposed by the authorities about the pandemic containment. They are mainly employed and do not expect to have work-related difficulties resulting from COVID-19 lockdown; on the contrary, they believe that the situation may represent an opportunity for the future. They are mainly leftist and have a high level of trust in the socio-political system. Finally, the majority of them do not suffer from loneliness.

**Data and discussion:** This group shows the highest levels of positive emotions. This positive emotional state, referring to Maslow's pyramid of needs, places the group over the layer #3 (Belongingness and love needs). Thus, Quiet Ones group is satisfied regarding physiological and safety needs (respectively layers 1 and 2) and in terms of belongingness and love needs. Furthermore, their positive emotional state has a relevant impact on resilience, where the group shows the highest scores in comparison with the whole sample.

### ***Group 2-The Angry Males***

**Description:** The cluster analysis shows that anger and disgust are the predominant emotions within Group 2, and at the same time sadness is highly represented too. The group consist of 13,960 people. It is mainly composed of males with a medium-low level of education. The majority of them live in Southern Italy. In these days of lockdown, they spend a lot of time on social web and are reluctant to follow the rules. Most of them are employed but face the risk of serious economic losses due to the suspension of their work activity. They have declared to be exposed also to the risk of insufficient availability of economic resources for food support. As a consequence, the members of this cluster often show a medium-high level of uncertainty for the future and are inclined to believe in conspiracy theories. They mainly have centre-right political orientation, showing a low level of trust in the socio-political system. The majority of them live in confined spaces. Finally, they suffer more from loneliness in comparison with the sample average.

**Data and discussion:** This group shows a high level of negative emotions. Such a negative emotional state, referring to Maslow's pyramid of needs, places the group over the layer #1 (physiological needs). This means that the

group of Angry Males is completely unsatisfied in terms of basic physiological needs, being highly exposed to the risk of poverty. Furthermore, their perception of anger and sadness may be related to the small dimensions of their houses. They also have a suspicious perception of the external world showing great distrust in scientists, politics, police, regional government, civil protection and health system. The domestic environment seems to be perceived as unpeaceful, endorsing their predominant emotions of anger and disgust.

### ***Group 3-The Opposites***

**Description:** This cluster consists of 18,307 people. The analysis shows that the levels of intensity of the emotions are very high in relation to fear, anxiety, sadness, happiness and calm at the same time. The group is composed mainly of females, and people less than 30 years old. In this case the educational level is irrelevant in determining the characteristics of the cluster. Most of them live in Central-Southern Italy, have no children and in some cases have children younger than 12 years old. In these days of social distancing the group shows the tendency to spend a lot of time on social media, declaring that virtual communication can consistently replace face to face communication; perceived loneliness is set at a medium-high level. In relation to the rules imposed by the Italian government in order to contain the spread of the disease, the members of the cluster seem to feel at ease with the directives. From the occupational point of view, the cluster is mainly composed of students, occasional workers or unemployed people and, for the employed ones, work activity was suspended. Their level of uncertainty about the future is medium-high. The political orientation varies within the group, but their majority declared to belong to the "centre", having a medium-high level of trust in the socio-economic system.

**Data and discussion:** Due to the high degree of variability within the cluster, we could not associate the resulting respondents' profile to a precise position in the Maslow's pyramid of needs. In order to gain a better understanding of the cluster composition, the analysis has been repeated within respondents belonging to cluster 3. We obtained three new sub-clusters where anger and sadness were decreasing on average, moving from a sub-cluster to another. While respondents in this cluster were located

on layer 2 in the Maslow's pyramid of needs, they are at risk to slip downwards to layer 1 in case the social distancing measures were prolonged. The precarious work conditions of respondents and the presence of a consistent number of youngsters seem to produce a certain degree of emotional instability.

#### ***Group 4-Let's go Against***

**Description:** This cluster consist of 22,730 people. The analysis shows that the levels of intensity of the emotions are very high in relation to anger, disgust, fear, anxiety and sadness. The group is mainly composed of female and young people with a medium-low level of education. Most of them live in Southern Italy and have children younger than 12 years old. In these days of social distancing the group shows the tendency to spend a lot of time on social media, declaring that virtual communication can efficiently replace face to face communication. The level of perceived loneliness is the highest within the sample. In relation to the rules imposed by the Italian Government in order to contain the spread of the disease, they seem to have extreme difficulties in following the directives. From an employment point of view, the cluster is mainly composed of occasional workers, who are often experiencing the interruption of their work activity. For this reason, most of them are afraid of losing the job and are at risk of serious economic losses and food insecurity. Their level of uncertainty about the future is very high. The group shows a political orientation tending to the "Centre-Right" and has the lowest level of trust in the socio-economic system compared to the whole sample.

**Data and discussion:** This group shows high levels of negative emotions and, referring to Maslow's pyramid of needs, the group is placed over layer #1 (physiological needs). This means that the cluster cannot satisfy the basic physiological needs and it is highly exposed to the risk of poverty. All factors described above have a direct impact on the level of resilience that, in the case of cluster 4, has the lowest scores of the whole sample. Also, domestic environment is not very peaceful and cooperative, reflecting the negative emotions perceived by the members of this group.

#### ***Group 5-The Unwavering Woman***

**Description:** the cluster analysis for this group shows that fear, anxiety and sadness are the

most relevant emotions. The group consist of 25,646 people. It is mainly composed of young and adult female, who often have children, with a medium-high level of education. The majority of them live in Central-Southern Italy. In these days of lockdown, they spend a lot of time on social media, showing reluctance in following the rules. This group mainly consists of occasional workers, who in many cases are working from home. Because of the COVID-19 pandemic, they risk losing their jobs. In relation to their political orientation, they are predominantly leftist. The majority of them declared that virtual communication may consistently substitute real communication. Despite the high level of uncertainty about the future and a sense of loneliness, the group shows a high level of trust in the institutions.

**Data and discussion:** This group shows the highest levels of fear, anxiety and sadness, but these emotions are not linked with anger, instead of what happens in cluster 4. From our perspective, this emotional condition may appear as a temporary depressive state, strongly linked to the lockdown situation. In this case, it is crucial to stress that the data analysed in this paper refer to a timespan of twelve days (starting from March 22 until April 2). An interesting point for future considerations would be about the evolution of this group's emotional state over time. As the linkage between fear and anxiety generally refers to the sense of security we perceive in our lives, we placed Group 5 in layer #2 (security needs) of the Maslow's pyramid of needs. Our consideration seems appropriate because this group is mainly composed of women, who also have to bear the task of reproduction, to a psychobiological extent.

#### ***Group 6-The Elderly***

**Description:** This cluster consist of 28,020 people. The analysis shows that the prevalent emotions within the group are fear, anxiety and sadness. This group is mainly composed of adult and elderly males with a medium-high level of education. Most of them live in Northern Italy and have children over 12 years old. Despite the fact that during social distancing the group shows the tendency to spend more time on social media than before, they have declared that virtual communication cannot replace face to face communication. The level of loneliness perceived by the majority of

them is medium-low. In relation to the rules imposed by the Italian government in order to contain the spread of the disease, they do not seem to have difficulties in following the directives. From the occupational point of view, the cluster is mainly composed of retired and employed people, who in many cases are working from home. The majority of them do not expect serious consequences related to the lockdown, stating they will not have economic difficulties in meeting food needs. Their level of uncertainty about the future is medium. The group shows a political orientation tending to the “Left” and has a high level of trust in the socio-economic system.

**Data and discussion:** This group has medium levels of sadness, anxiety and fear, showing low levels of the other emotions at the same time. In relation to the Maslow’s pyramid of needs, this cluster can be placed over layer #3 (Belongingness and love needs). This means that the group has fully met the physiological and safety needs (respectively layers 1 and 2), though it is still looking for the fulfilment of the belongingness and love needs. The resilience scores among the group are high, compared with the ones of other clusters.

The overall picture of the profiles obtained with the cluster analysis can also be proposed in a synoptic way through the projection of the groups on a factorial plan (Figure 2). The projection is the result of the optimal linear combination of the same variables used for the cluster analysis (PCA). The PCA provided only two factors (eigenvalue  $\geq 1$ ) which summarize the 63% of the initial overall information (variance explained). It is quite evident that the relative position of the clusters reflects the meaning assigned to the main factors: for example, Group 1 is located in the first quadrant, relatively close to the emotions of fulfilment of primary needs. In the same way, Group 4 is placed near the emotions that express negative reactions; the groups characterised by the high tendency to relaxation (Group 6) or also by anger and contrasting emotions (Group 2 and Group 3) are positioned on the vertical axis; Group 5 is located relatively close to the emotions of fear, anxiety and sadness.

Most people experiencing an emergency situation implying a collapse of social contacts – as COVID-19 sanitary emergency – do experience some kind of emotional reactions. Emotions, especially negative ones, may go along with primary needs or be a result of the lack of their satis-

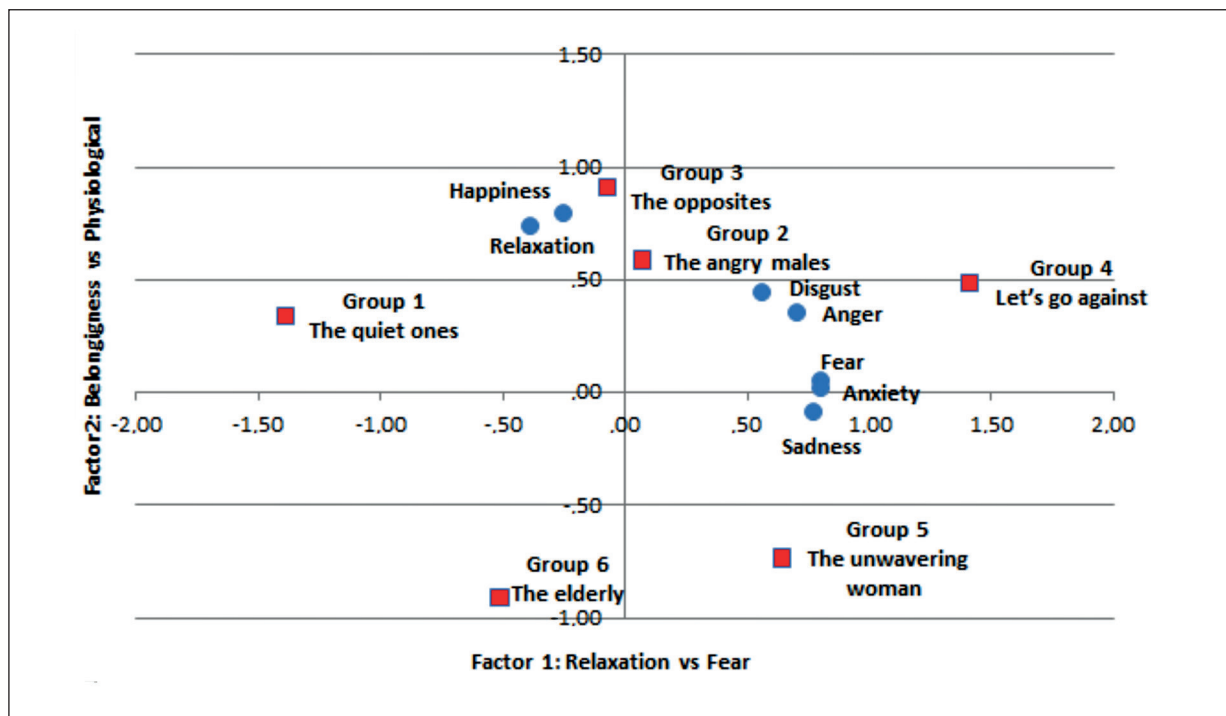


Figure 2. Factorial plan with projection of basic emotions and clusters.

faction. Although each person reacts differently, there are a number of common responses that are experienced by the majority of those involved.

In our study, we found a mix of emotions that can be perceived at the same time. The results of this pattern generate different attitudes and behaviours in order to cope with social, psychological and economic problems arising from social distancing. There is no doubt that the limitation of the access to normal daily activities, including common social interactions with other people, affects our emotional status as well as our economic situation.

COVID-19 has boosted unprecedented and unforeseeable financial insecurity. In our study, we found a correlation between basic emotions and Maslow's hierarchy of needs. In times of crisis, the most basic needs are physiological. Insecurity and uncertainty towards the near future produce effects at a level of individual's emotions. Fear, anger and sadness are predominantly present in all the population groups; anger and disgust mainly appear when people may be unable to meet subsistence needs or deeply perceive the lack of economic security. High level of education and more stable working/economic conditions produce a lower amount of negative effects, in emotional terms. When physiological and safety needs are met, the emotions perceived by the population can be positive and social distancing phenomenon seems to be considered as a transitory time or even an opportunity for the future.

## Conclusions

Social distancing is crucial to contain COVID-19 contagion, but it may create negative emotions in the majority of people or social groups. The well-known Maslow's theory of human needs seems to fit well with the outbreak of negative emotions in the context of COVID-19. In Maslow's theory human needs are hierarchically arranged; they emerge and progress once a particular need is satisfied. Our study demonstrates the existence of links between the perception of negative basic emotions and the fulfilment of primary needs mainly referring to the first three levels of the Maslow's pyramid: physiological, safety, love and (social) belongingness. As a result of COVID-19 worldwide pandemic, many people – regardless of their position on Maslow's pyramid prior to the pandemic have been sucked into the bottom layers of the pyramid. This unexpected change in the individual basic needs has triggered

a relevant transformation in the individual emotional status and a shift towards negative emotions. COVID-19 emergency has made Maslow's hierarchy of needs a slippery slope where people feel at risk of losing the level of basic needs they have achieved before the pandemic. As soon as possible, we will carry on an additional survey to furtherly investigate the issue.

At this stage of the COVID-19 pandemic, social distancing appears to be our reality now as it will also be in the near future. Thus, new studies and scientific research on people's emotions and reactions will be needed. There is huge space for in-depth research activities on our large dataset.

Gender differences and emotional reactions due to COVID-19 social distancing may be consistent aspects to be investigated. The need to stay at home may strengthen a woman-centred model in the care of family members and housework. Indicators of resilience show that women are more task-oriented, while men are more likely to experience positive emotions. As a result, women are at risk of increasing limitation of their spaces of autonomy, when losing their jobs and related social achievements.

Usage of Internet may also affect our emotional status. Internet users not only have access to and exchange information, but also find on the web a place where to express their social/emotional dimension. Internet usage is a complex and interdisciplinary area of study involving computer scientists, psychologists, sociologists and experts in communication. It will be very interesting to go in-depth in our dataset by analysing and exploring people's emotions when the web is the only alternative to face-to-face contacts. During COVID-19 sanitary emergency, social distancing has relentlessly reduced the amount of contacts we have with each other. The use of technology may help us feel less alone, but its side effects on our emotions and on our ability to re-establish direct interactions are still unknown to us.

The effects of short-term social distancing have not been sufficiently studied. Though people are basically resilient, the impact of isolation and limitation of social contacts should not be underestimated or fall to the bottom of the political agenda. What could now be underestimated, in the near future may result in high human and economic costs.

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## Conflict of Interest

The Authors declare that they have no conflict of interests.



### Ethics Approval and Consent to Participate

The study was approved by the National Ethics Committee of the National Institute for Infectious Diseases Lazzaro Spallanzani I.R.C.C.S. of Rome.

### Funding

This study was supported by the Institute for Research on Population and Social Policies of the National Research Council of Italy (CNR-IRPPS) in partnership with the Istituto Nazionale di Geofisica e Vulcanologia (INGV) and **Fonadazione** Movimento Bambino ONLUS.

### Authors' Contribution

CL, CG, CM, LLF, TA conceived and designed the study, consulted literature, collected data and wrote and edit the paper. CL did the statistical data analysis, CG and TA did the sociological interpretation, CM and LLF did the psychological contribution and PMR contribute to the conclusion paragraph and PR reviewed the manuscript. All authors read and approved the manuscript.

## References

- 1) SOLOMON RC (ED.). What is an emotion? Classic and contemporary readings. New York, NY: Oxford University Press, 2003.
- 2) EVANS D, CRUSE P (EDS.). Emotion, evolution and rationality. New York, NY: Oxford University Press, 2004.
- 3) BECK J. Hard feelings: science's struggle to define emotions. *The Atlantic*, March 13, 2015.
- 4) DARWIN C. The expression of the emotions in man and animals (3rd ed.). London, England: John Murray, 1998 (Original work published 1872).
- 5) EKMAN P, DAVIDSON RA (EDS.). The nature of emotion. New York, NY: Oxford University Press, 1994.
- 6) EKMAN P, FRIESEN WV. The repertoire of nonverbal behavior: categories, origins, usage and coding. *Semiotica* 1969; 1: 49-98.
- 7) PLUTCHIK R. The emotions: facts, theories, and a new model. New York, NY: Random House, 1962.
- 8) EKMAN P. What scientists who study emotion agree about. *Perspect Psychol Sci* 2016; 11: 31-34.
- 9) MASLOW AH. A theory of human motivation. *Psychol Rev* 1943; 50: 370-396.
- 10) DANESH HB. Human needs theory, conflict, and peace: in search of an integrated model. In DJ Christie (Ed.), *Encyclopedia of Peace Psychology*. Hoboken, New Jersey: Wiley-Blackwell, 2011.
- 11) ZHENG Z, GU S, LEI Y, LU S, WANG W, LI Y, WANG F. Safety needs mediate stressful events induced mental disorders. *Neural Plast* 2016; 2016: 8058093.
- 12) ANTOUN C, COUPER MP, CONRAD FG. Effects of mobile versus PC web on survey response quality: a crossover experiment in a probability web panel. *Public Opin Q* 2017; 81: 280-306.
- 13) TOURANGEAU R, SUN H, YAN T, MAITLAND A, RIVERO G, WILLIAMS D. Web surveys by smartphones and tablets: effects on data quality. *Soc Sci Comput Rev* 2018; 36: 542-556.
- 14) ZIJLSTRAAB T, WIJGERGANG K, HOOGENDOORN-LANSER S. Traditional and mobile devices in computer assisted web-interviews. *Transportation Research Procedia* 2018; 32: 184-194.
- 15) DI FRANCO G. *Tecniche e modelli di analisi multivariata*. Milano: FrancoAngeli, 2017.
- 16) TAN PN, STEINBACH M, KUMAR V. *Introduction to data mining*. Pearson New International Edition, 2006.
- 17) HARTIGAN JA, WONG MA. Algorithm as 136: a k-means clustering algorithm. *J R Stat Soc Ser C Appl Stat* 1979; 28: 100-108.
- 18) HÄRDLE WK, LU HH-S, SHEN X. Handbook of big data analytics. In: *Springer Handbooks of Computational Statistics*, 2018; 9, (no. 518): 978-983.
- 19) ABDI H, WILLIAMS LJ. Principal component analysis. *Wiley Interdiscip Rev: Comput Stat* 2010; 2: 433-459.