The more you know, the better you act? Institutional communication in Covid-19 crisis management

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ABSTRACT

The plurality of communication channels and the spread of fake news are widespread phenomena in today's society. Those constituted a serious risk during the Covid-19 pandemic crisis management, increasing the confusion among the population. This research aims at assessing the effectiveness of institutional communication amid the management of the Covid-19 pandemic crisis in Italy. We first assessed the phenomenon by building a structured theoretical background stressing the concepts of risk communication, community engagement, and health literacy, highlighting the dynamic and continuously changing scenario of communication strategies, also due to the spread of social media and the mutation of conventional media outlets. We sent a questionnaire to a sample of citizens to assess the impact of three predictors, i.e., the perceived communication, the perceived knowledge, and the perceived information. Based on answers, we built an ordered logit model assigning continuous intervals as values for the dependent variables. The observed results enhanced the crucial role of the phenomenon of health literacy and the impact of asymmetric information on the effectiveness of institutional communication. Education played a fundamental role in understanding communication pillars and building an individual consciousness about health risks prevention.

1. Introduction

The emergency caused by the spread of Covid-19 and the consequent measures adopted throughout the Italian national territory have been considered a flourishing and interesting story and found a lot of representation in the social media. Floating between the need for direct information from the official channels, avoiding fake news, and the creativity of a population of users "forced" into their homes (and therefore, even more strongly connected to their devices), social media users made new contingent habits. The world of social platforms has often become a crossroads of strategies for institutional communications and representations from the bottom, a place of discussion capable not only of interpretation of the daily debate but also of its anticipation, encouraging multiple points of view.

The Covid-19 pandemic has boosted this process because, since February 2020, the problem of the presence - within social media – of an overload of news from unreliable sources and fake news risked fostering behaviours that were seriously harmful to health. In this case, the social platforms have chosen to take actions to improve the quality of the content relating to Covid-19.

In the initial phase (February 2020), the platforms started to move independently. The most significant choice was made by Twitter which - in compliance with the Ministry of Health guidelines - immediately invited users, who were looking for information about Covid-19, to check the web channels of the Ministry as well as launched a process to guide the algorithms for displaying the results to display first reliable sources in the research queries.

The communication strategies implemented by local institutions need further inquiries, given that, since the beginning of the emergency, they have represented a key player both in the crisis management at a local level and in the implementation of health and social policies to tackle and prevent the spread of the virus. Specifically, since, according to the Italian Constitution, health issues are of exclusive jurisdiction of the regional units, the local authorities must face the emergency by acting either in line with or in contrast to the national government. Social and institutional communication, the use of social media, and the launch of specific campaigns represent a curious and privileged ground to observe reactions and priorities of the single local authorities, as well

as the style, language and registers used.

The aim of the present study is then to find a relationship between such predictors as the perceived knowledge, the quantity of information, and the quality of communication, on the effectiveness of the messages issued, also measuring the impact of education on the creation of the so-called health literacy (Nutbeam, 2000). We first built a questionnaire that has been sent to a sample of citizens, obtaining a dataset made by direct observations. We then built an econometric model to assess the impact of such predictors on the dependent variable. The results observed supports the integration of a framework pointing at the the effectiveness of institutional communication in the emergency scenario of the Covid-19 pandemic crisis management in Italy. At a glance, the importance of building a set of indicators to assess the effectiveness of institutional communication in crisis management is urgent and necessary to face an emergency scenario. The present study considers the relationship between education and health literacy, suggesting managerial, political and practical implications, which aim at covering new behavioural paths regarding the effectiveness of communication strategies in crisis management as well as new organisational models centred on the institutional communication strategies. In this way, the paper contributes to the extant literature. The most important outcome of this research is highlighting the relationship between education and health literacy, as a form of prevention and resilience to public health issues.

The next section of the paper contains a theoretical framework in which we studied the extant literature in the field and the hypotheses formulation. Section 3 describes the methodology and the empirical analysis building, while Section 4 comments on the obtained results. The paper ends with a discussion section and the conclusion paragraph, including implications and paths for future research.

2. Theoretical background

Information systems have been radically changing in recent years and are still mutating day by day. Nowadays, we are assisting in the rise of two phenomena relevant to the evolution of information: the dramatic increase in the rapidity of spreading and the incredible overload of information. Social media have changed communication practices by creating an acute need for continuous interaction. The use of social chatbots as an effective way to communicate with the public is growing (Suarez-Gonzalo, 2019). The second issue, in particular, also generated the plague of the present times: the rise of the phenomenon of fake news. It raised serious concerns related to the concept of quality in information and communication, which rose further in importance during the Covid-19 pandemic emergency. If defining quality for material outputs could result in simple and intuitive design in case of immaterial outputs for non-market situations, such as public service and administration, then unclear role relations between customers, citizens, civil servants, and legislators complicate the situation (Lillrank, 2003).

The quality of information can be approached using the distinction of information-as-artifacts and information-as-deliverables (Lillrank, 2003), which establish the nature of the unit of analysis. According to some scholars, information quality is a mediating factor of the relationship between system quality and organisational impact (Gorla et al., 2010), attributing a crucial role to responsive organisations. On the other hand, others argue that information alone is insufficient, stating that it is essential for citizens to have the power and incentives to act on information (Kosec and Wantchekon, 2020). This could be a relevant issue, but in times of global emergency, where governmental responsiveness is fundamental, how to reconcile the necessity to call on public needs and the necessity to self-organise when decision-making processes need to be undertaken in real time?

This scenario shows the need for institutional communication to be clear and immediate in terms of velocity and quality.

Public health is one of the most critical fields to intervene with massive communication campaigns in order to inform citizens about risk and prevention strategies. Indeed, one of the most alarming concerns argued by scholars, amid the framework of the Covid-19 emergency, has been, since the very beginning, the risk of misinformation and the ability to engage by the communities involved (WHO, 2020). Relevant experts believe that the cognition of emerging infectious diseases often follows the principle of "if in doubt yes", and prevention and control also follow the principle "prevention is better than failure". Reviewing and sorting out expert opinions during a pandemic can accumulate useful experience for dealing with similar challenges in the future (Sina News Chinese State Agency, 2020).

Italy has been, during the first month of the pandemic crisis, one of the most exposed countries to health risks, and thus it needed to prepare a highly responsive and effective strategy in terms of patient treatment and prevention. While home and hospital treatment depended on the structural capacity of the health care system to react to the stress caused by the massive number of cases occurring, prevention strategy focused on the need to get citizens acquainted with the risks of contracting the virus (Rosa et al., 2020).

The exceptional events put all the institutions involved in crisis management in serious difficulties, from the local healthcare units to the intergovernmental bodies. The World Health Organization dictated the line of intervention in light of the urgent situation. Risk communication has been a crucial part of the strategy, aimed at generating consensus and public acknowledgement about the situation as a whole. This required experts to be cautious when publishing research opinions that may affect decision-making. Risk communication, operated through the months by governmental bodies, acquired more and more room in the media outlets. Prime Minister Giuseppe Conte used to appear on the screens several times per week, symbolising an attempt from politics to re-establish a point of contact with the population.

Political communication in many democracies reflects the disconnection between the public and institutions of press and politics due to the hollowing of centre parties and growing social divides (Bennet & Pfetsch, 2017). Negative examples arose from politics about information quality issues in recent years. Political campaigns, e.g. in the United States in 2016, showed the ability of chatbots to spread low-quality information, as they managed to influence public opinion and call people to action by canalising the voting intentions of the electorate (Howard et al., 2018).

Starting from the view of an inclusive public sphere (Habermas, 1996), Bennet & Pfetsch (2017) identified two relevant dimensions of radical change: the proliferation of social and digital media, which has increased the dispersion and cacophony of public voices (Dahlgren, 2005), and the fragmentation of the public that has led to an "inability to communicate across differences" (Waisbord, 2016).

In communication studies, the theme of trust represents a central field of reflection, if not one of the most relevant questions about the dynamics of influence between communication actors and the mechanisms that regulate the attribution of trust to a source and therefore its credibility). From interpersonal relationships to journalistic news, from commercials to politicians' communication, trust is the indispensable ingredient that defines how we will modify the "truth" of the issuer from a communicative experience and how it will become part of our vision. Within a few days, a similar management model was thus established in the various countries gradually reached by the virus, with the progressive discovery of outbreaks at the international level: a two-faced body, based on knowledge, science, politics, called to convey information and operational indications to citizens in concert. That is what requires a health emergency: virological and epidemiological analysis of the territory and subsequent activation of security protocols by the policy.

But what happens when there are many subjects representing the institutional sources? And how to recover from the credibility crisis that leaderships are going through during the emergency?

Amidst the blow-up of such critical events, the opportunity to resume relations with people is fundamental to contain the negative effects of the pandemic. On the other hand, failure to properly communicate leads

to a loss of trust and reputation, economic impacts, and – in the worst case – loss of lives. One of the most important and effective interventions in public health response to any event is to proactively communicate what is known, what is unknown, and what is being done to get more information, with the objectives of saving lives and minimising adverse consequences (WHO, 2020). Smith (2006), amid the SARS crisis of the beginning of the 21st century, stated that there is a lack of evidence concerning the relative role of the media, government or other agencies in heightening public concern and instilling alarm compared with providing reassurance. It is relevant, in this sense, to better understand the role of communication in a health crisis. Handling the Covid-19 epidemic required a balanced approach that promptly tells people what they and the health system can do without causing panic (Cowper, 2020). China, where the SARS-CoV-2 virus originally infected humans, tried to use an authoritarian approach to underplay the seriousness of the outbreak in its early stages. This actually proved the existence of different approaches to crisis management, which may not be effective in each country. The WHO provided a strategy based on Risk Communication and Communication Engagement (RCCE), which helps in contrasting the effects of "infodemics" (an excessive amount of information about a problem that makes it difficult to identify a solution), building trust in the response, and increasing the probability that health advice will be followed (WHO, 2020).

Countries worldwide and international organisations have taken various actions towards fighting the COVID-19 outbreak, including promoting the transparency of and public access to disease data (Gao et al., 2020).

Other scholars argued that collective cognition, amplified by timely, valid communication and supported by sound planning, trained personnel, appropriate technology, and bold leadership, enables coordinated action needed to bring a large-scale global crisis under control (Comfort et al., 2020).

Recent studies have proved the difficulty of finding WHO-promoted measures to prevent Covid-19 or other infectious diseases on the Internet (Covolo et al., 2013; Hernández-García and Giménez-Júlvez, 2020). Supporting this need for good quality information, Chundakkadan and Ravindran (2020) conducted research in India, stating that the information flow about Covid-19 is inversely related to positive cases reported. This result suggests that internet inclusion is a relevant factor in the fight against the pandemic.

One of the vital clues claimed by the present study is to show the evidence of the gap between the people's perception of risk and that of experts and authorities (Smith, 2006; WHO, 2020). Risk perception may be affected by the media via availability (more information gives a stronger effect) but the effects are lessened by impersonal impact: general risk perception is more easily changed than personal risk perception (Wahlberg and Sjoberg, 2000). In this frame, public health agencies should consider adapting risk communication strategies to account for a dynamic news environment and the media's agenda (Kott and Limaye, 2016).

Moreover, there may be differences in risk preference associated primarily with cultural differences in the perception of the risk of the financial options rather than with cultural differences in attitude towards perceived risk (Weber and Hsee, 1998). A relevant role is played by perceived knowledge in the risk perception. Zhu et al. (2016) discussed that people with more perceived knowledge tend to judge high levels of risk. Similarly, focusing on the social media framework, Schafer (2020) argued that many news posts increased perceived knowledge that is not paralleled by the gain in factual knowledge.

Another crucial aspect in understanding communication in order to pursue health literacy, i.e. a range of outcomes to health education and communication activities (Nutbeam, 2000), is the role played by education. Education has a crucial role in many life aspects, including the determination of a direct relationship between health and life expectancy, so it has also been largely proven the opposite (Ross and Wu, 1995). The present study aims at making a step forward, understanding

how each of the mentioned predictors impacts the quality of institutional communication in presence of multiple sources of information, that is, in the framework of an emergency scenario, like the Covid-19 pandemic crisis. The core of this contribution is conveyed by the need to understand how the dynamics of a changing society, in a new crisis scenario, with new information sources have changed the approach to crisis management.

According to the extant literature and the variables detected, we formulated the following set of hypotheses, which have been tested through an econometric model:

H1a: Perceived knowledge positively impacts the effectiveness of the message, i.e., it increases the score.

H1b: Perceived information positively impacts the effectiveness of the message, i.e., it increases the score.

H1c: Perceived communication positively impacts the effectiveness of the message, i.e., it increases the score.

H2: Education positively impacts the effectiveness of the message, i.e., it increases the score.

These hypotheses have been tested through the methodology structured as follows.

3. Empirical application

3.1. Methodology

In order to verify the premises of our study, we needed to explain the theoretical foundation of the model we have foreseen to employ.

Ordered logistic regression is used to predict categorical placement in or the probability of category membership on a dependent variable based on multiple independent variables. The independent variables can be either dichotomous (i.e., binary) or continuous (i.e., interval or ratio in scale). Ordered logistic regression is an extension of binary logistic regression that allows for more than two categories of the dependent variable. The categories for the dependent variables are rankings. Like binary logistic regression, multinomial logistic regression uses maximum likelihood estimation to evaluate the probability of categorical membership.

The ordinal regression model (ORM), commonly known as the cumulative odds model (Walker and Duncan, 1967) or proportional odds model (Mccullagh, 1980), was the first model developed exclusively for ordinal outcomes. The ORM can be defined as a probability model:

$$ln\left(\frac{Pr(y \le j|\boldsymbol{x})}{Pr(y > j|\boldsymbol{x})}\right) = \tau_j - \boldsymbol{x}\beta, \quad j = 1, ..., J - 1,$$

where **x** is the vector of independent variables, βs are the slope coefficients, τ_j are the thresholds, and J is the number of categories of the ordinal dependent variable. The predicted probabilities of belonging to a certain category are defined as:

$$\Pr(y = 1|\boldsymbol{x}) = \frac{exp(\tau_1 - \boldsymbol{x}\beta)}{1 + exp(\tau_1 - \boldsymbol{x}\beta)}$$

$$\Pr(y = j|\boldsymbol{x}) = \frac{exp(\tau_j - \boldsymbol{x}\beta)}{1 + exp(\tau_j - \boldsymbol{x}\beta)} - \frac{exp(\tau_{j-1} - \boldsymbol{x}\beta)}{1 + exp(\tau_{j-1} - \boldsymbol{x}\beta)}, \quad j = 2, ..., J - 1.$$

$$\Pr(y = J|\boldsymbol{x}) = 1 - \frac{exp(\tau_{J-1} - \boldsymbol{x}\beta)}{1 + exp(\tau_{J-1} - \boldsymbol{x}\beta)}$$

Furthermore, the ORM is often formulated as a latent variable model, defined as:

$$y_i' = \boldsymbol{x}\beta + \in_i$$

$$y_i = j \quad if \quad \tau_{j-1} \le y_i' < \tau_j, \quad j = 1, ..., J$$

Table 1

– Frequency by age group (own elaboration)

Class Age	Frequency	Percent	Valid Percent	Cumulative Percent
1 - I-Generation	37	3.903	3.903	3.903
2 - Millennial	220	23.207	23.207	27.110
3- X-Generation	397	41.878	41.878	68.987
4 - Baby Boom 2	224	23.629	23.629	92.616
5 - Baby Boom 1	59	6.224	6.224	98.840
6 - Generation of the Reconstruction	11	1.160	1.160	100.000
Missing	0	0.000		
Total	948	100.000		

Table 2

– Frequency by Education level (own elaboration)

EDU	Frequency	Percent	Valid Percent	Cumulative Percent
1- Primary School	10	1.055	1.055	1.055
2 - 1st grade sec. school	40	4.219	4.219	5.274
3 - 2nd grade sec. school	300	31.646	31.646	36.920
4 - Degree	548	57.806	57.806	94.726
5 - Ph.D.	50	5.274	5.274	100.000
Missing	0	0.000		
Total	948	100.000		

Table 3

– Frequency by working position (own elaboration)

Work_P	Frequency	Percent	Valid Percent	Cumulative Percent
Employee	538	56.751	56.751	56.751
Freelance	212	22.363	22.363	79.114
Unemployed	69	7.278	7.278	86.392
First job seeker	65	6.857	6.857	93.249
Retired	64	6.751	6.751	100.000
Missing	0	0.000		
Total	948	100.000		

Table 4

- Frequency for answers to the question (own elaboration)

Diff_ITA	Frequency	Percent	Valid Percent	Cumulative Percent
dec-19	71	7.489	7.489	7.489
jan -20	329	34.705	34.705	42.194
feb-20	516	54.430	54.430	96.624
mar-20	32	3.376	3.376	100.000
Missing	0	0.000		
Total	948	100.000		

where $y_i^{'}$ is the latent variable ranging from ∞ to $-\infty$, and $\in_i$ is the random error. The thresholds τ_1 through τ_{J-1} are parameters to be estimated, assuming that $\tau_0 = -\infty$ and $\tau_J = \infty$. In our context, the continuous latent variable $y_i^{'}$ can be thought of as the propensity of a person to reply correctly to coronavirus indication, belonging to a certain p. For example, the quartile category now relies on the latent variable:

$$y_i = first \ if \ \tau_0 \leq y_i^{'} < \tau_1.$$

$$y_i = second \ if \ \tau_1 \leq y_i^{'} < \tau_2.$$

$$y_i = third \ if \ \tau_2 \leq y_i^{'} < \tau_3.$$

$$y_i = fourth \ if \ \tau_3 \leq y_i^{'} < \tau_4$$

Thus, when the latent variable crosses a threshold τ_j, and this threshold is equal or similar to the quartile (in our case) in the dependent variables, this means that the empirical distribution (quartile) of the dependent variable is correct.

3.2. Data description

Before starting the empirical analysis, we illustrated some descriptive statistics that offer an overview of the personal characteristics of our sample.

The questionnaire submitted to the Italian population was structured in four sections, divided as follows:

1) Personal information of the interviewees:
2) Institutional communication on Coronavirus:
3) Mass Media and Social Networks:
4) Contents of the Decree of the President of the Council of Ministers of 9th March 2020 (#iorestoacasa).

The first section contains questions addressed to the interviewee aimed at understanding the characteristics of the sample (age, sex, marital status, educational qualification, job position, region and province of residence).

The section dedicated to Institutional Communication on Coronavirus was structured in order to know the degree of awareness gained by the interviewee regarding the risks associated with Coronavirus, as well as the timing with which he became aware of its spread in Italy.

The third section contains questions useful to understand the interviewee's perception of the reliability of the information reported by traditional sources and social media outlets.

The last section was structured to understand the degree of knowledge of the measures adopted by the Government in terms of containing COVID-19. These questions have been constructed starting from the Frequently Asked Questions (FAQ) published on the Italian government website. Each question had only one correct answer.

We collected 948 responses in the period between 22 and 30 March 2020. The interviewed sample was divided by age group, using the classification provided by the Italian National Statistical Institute (ISTAT) according to the following categories: I-Generation (age less than or equal at 23 years old); Millennials (aged 24 to 38); X-Generation (aged between 39 and 53); Baby Boom 2 (aged between 54 and 63); Baby Boom 1 (age between 64 and 73) and Generation of the reconstruction (age greater than or equal to 74 years). The sample interviewed (Table 1) is structured as follows: 3.9% I-Generation; 23.2% Millennials; 41.88% X-Generation; 23.3% Baby Boom 2; 6.2% Baby Boom 1 and 1.7% Generation of reconstruction.

57.8% of respondents have an education level equal to a degree (Table 2). And about 80% declare that they are self-employed or employed (Table 3)

As regards the section dedicated to Institutional Communication on Coronavirus, 34.7% declared that they became aware of the spread of COVID-19 in Italy in January 2020, while 54.43% in February 2020 Table 4

Further information about sample stratification is reported in the annex.

Regarding our analysis, we have three mediation variables that we can describe in this way:

1) PERCEIVED KNOWLEDGE: measures the knowledge perceived about the coronavirus by the people who answered the survey. It is determined by the answer to the question: "How informed do you think you are about the risks associated with Coronavirus?". It is measured from 1 (not at all, a little) to 5 (a lot).
2) PERCEIVED COMMUNICATION: measures the quality of institutional communication perceived by the people who answered the survey about coronavirus. It is the answer to the question: "Do you

What kind of information about Coronavirus are you looking for most on the internet?
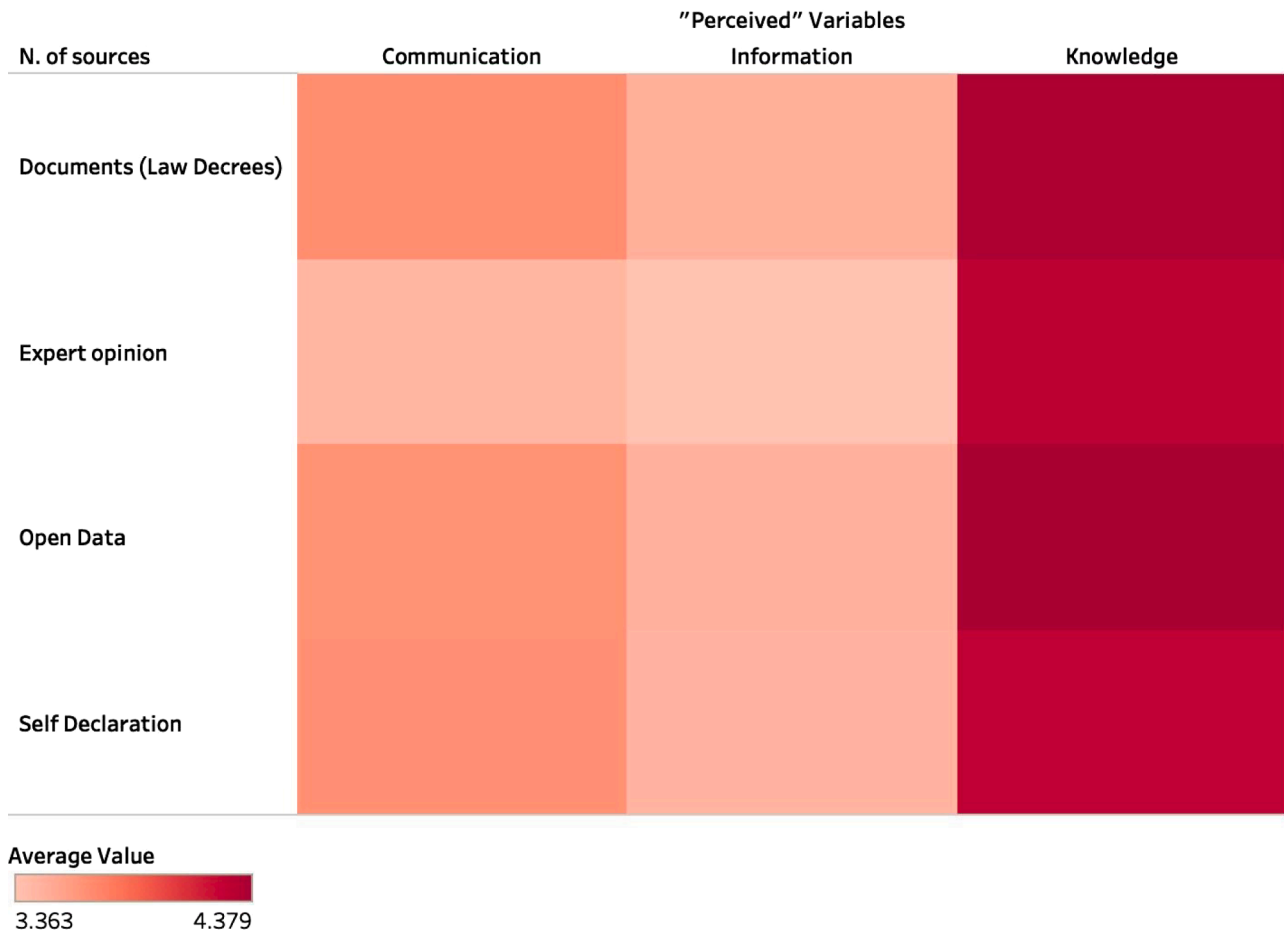

Fig. 1. Type of information sought (own elaboration).

consider the institutional communication on Coronavirus adequate?". It is measured from 1 (not adequate at all, barely adequate) to 5 (totally adequate).

3) PERCEIVED INFORMATION: measures the exposure to the quantity of information perceived about the coronavirus by the people who answered the survey. It is the answer to the question: "How much information on Coronavirus is available compared to the quantity of information?". It is measured from 1 (not at all, a little) to 5 (a lot).

We then observed, through some heatmaps, what depends on the perceived knowledge, information, and communication. Subsequently, through an orderly logit model, we assessed how these mediation variables influenced effective knowledge and, therefore, the final aim of effective institutional communication.

Fig. 1, a red heatmap, indicates the relationship between the type of information sought on the Internet and the perceived quality of knowledge, communication and information. This preliminary analysis told us that those, who believe they are more informed, have sought data and decrees. Those who have a not very positive opinion of institutional communication have sought more expert advice. Similarly, those who accuse of information deficiency in institutional communication have mainly sought expert advice.

Subsequently, we studied the average perception of knowledge, information, and communication in relation to the sources used to collect information on coronavirus, as shown in Fig. 2. Well, the perceived

knowledge grows as the number of sources used grows. At the same time, the quality of information remains poor (it can be seen that, in general, all the scores related to perceived information are light blue).

Among the multitude of sources used, participants were asked which was the most reliable institutional source (Fig. 3): 47% replied WHO, 19% replied Presidency of the Council of Ministers and Ministry of Health, Italian National Institute of Health and Civil Protection have around 10% for each.

Those, who ranked the preferred knowledge highly, mainly used the Ministry of the Interior and, lastly, the municipality (a sign that those, who were not satisfied, sought a closer channel for information). Regarding satisfaction with the amount of information, the Prime Minister's Office, the World Health Organization, and the Ministry of the Interior are the sources of those who consider themselves more informed. The same conclusions can also be drawn for those who feel more satisfied with institutional communication in general.

Finally, another aspect to be taken into consideration was the compulsiveness with which people searched for information on the Internet.

According to the answers reported in Fig. 4, 66% did not check for updates more than three times a day, while about 23% checked for updates more than five times a day, presenting a compulsive and apprehensive attitude.

Those who have checked it several times (with values greater than ten times) seemed to be more aware of the risks related to coronavirus.

How many websites or social channels of the institutions do you check daily?
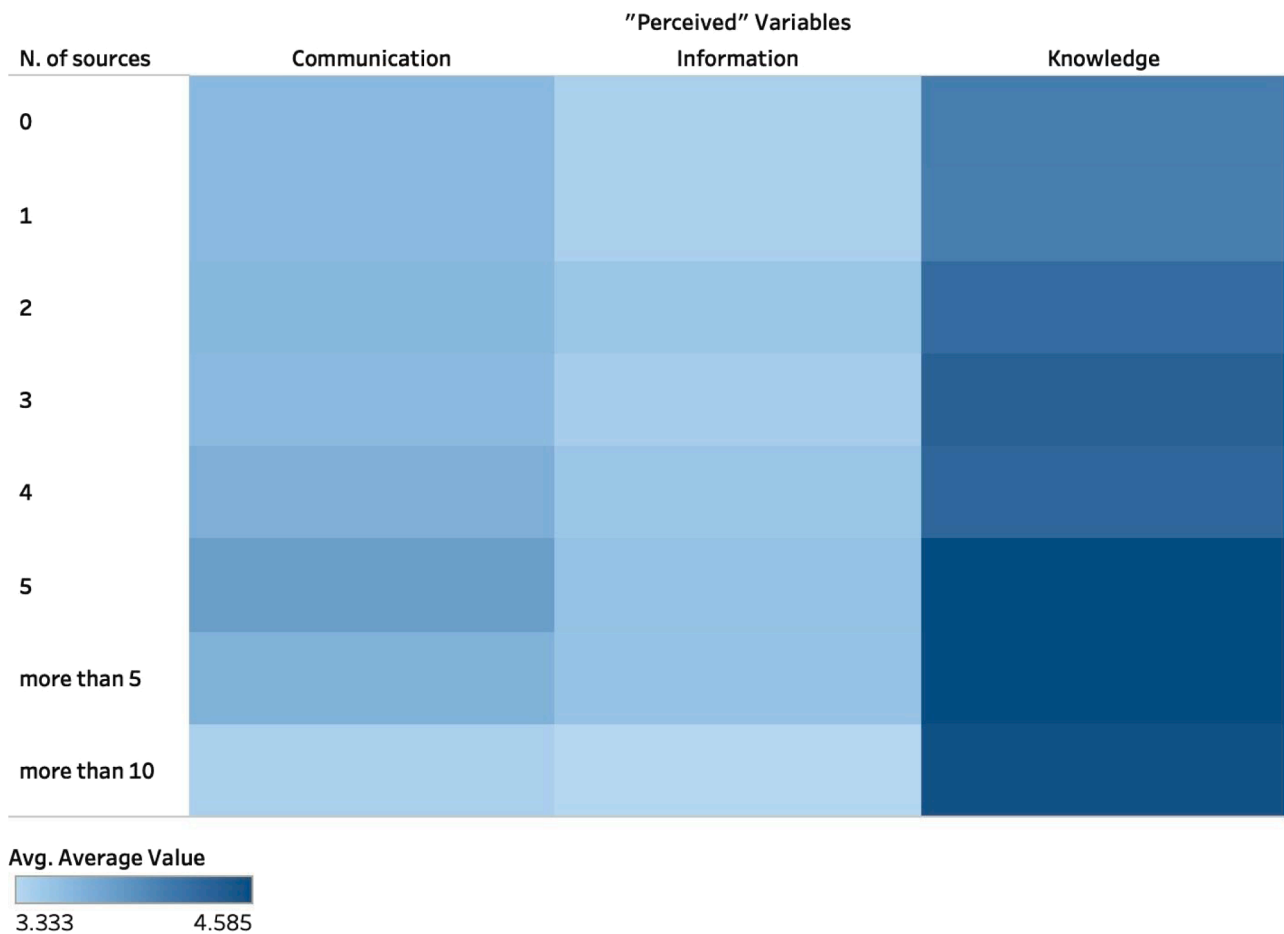

Fig. 2. - Information sought based on the number of sources used (own elaboration).

Similarly, those who felt satisfied with the information had to check social networks and websites, on average, at least five times a day. In general, the amount of information continues to have low average satisfaction levels. Those who felt more satisfied with institutional communication, on the other hand, checked the daily updates on average five times a day.

4. Results

Therefore, we composed a dataset based on the answers to the questionnaire and proceeded with the analysis of an orderly logit model, allowing us to understand which variables influence the effectiveness of institutional communication. In this regard, we introduce our main dependent variable: score.

The score variable was obtained by assigning a score of 1 to each correct answer, corresponding to the questions related to the measures implemented by the Italian Prime Minister's decree of the 8th March 2020, and a score of 0 for each wrong answer.

Subsequently, the correct answers were added for each questionnaire. The score obtained, compared to the maximum obtainable, generated the percentage of correct answers for each questionnaire. The score variable was constructed by dividing the percentage of correct answers into quartiles: for a percentage >75%, the score of 4 was assigned; for a percentage >50% and <75%, the value of 3 was assigned; for a percentage >25% and <50%, the score of 2 was assigned; while for

a percentage lower than 25%, the score of 1 was assigned.

At this point, we implemented an orderly logit model to measure what is the impact of the variables on the probability of correctly answering the questionnaire and then to measure what are the variables that allow a correct understanding of institutional communication.

To the mediation variables that we have previously described, we further added two more variables: age, measured in years of age, and education, that is the level of education.

The results shown in Table 5, in our complete model (model III), are very clear: education is the most important variable in ensuring the correct understanding of institutional communication: in fact, it turned out to have a positive impact, i.e., as the level of education increases, the effectiveness of institutional communication (the ability to understand it) increases. The level of significance is maximum in this variable. As for the age variable, there seem to be no effects because there is no significance, and the coefficient is nearly equal to zero.

Regarding our mediation variables (perceived knowledge, perceived information, and perceived institutional communication quality), we obtained the following results.

As regards perceived knowledge, we observed a positive effect on the probability of answering correctly. It means that there is a positive correlation between how one believes to be aware of the risks related to coronavirus and the effectiveness of institutional communication.

Perceived information, that is how institutional communication on Coronavirus is considered with respect to the quantity of information,

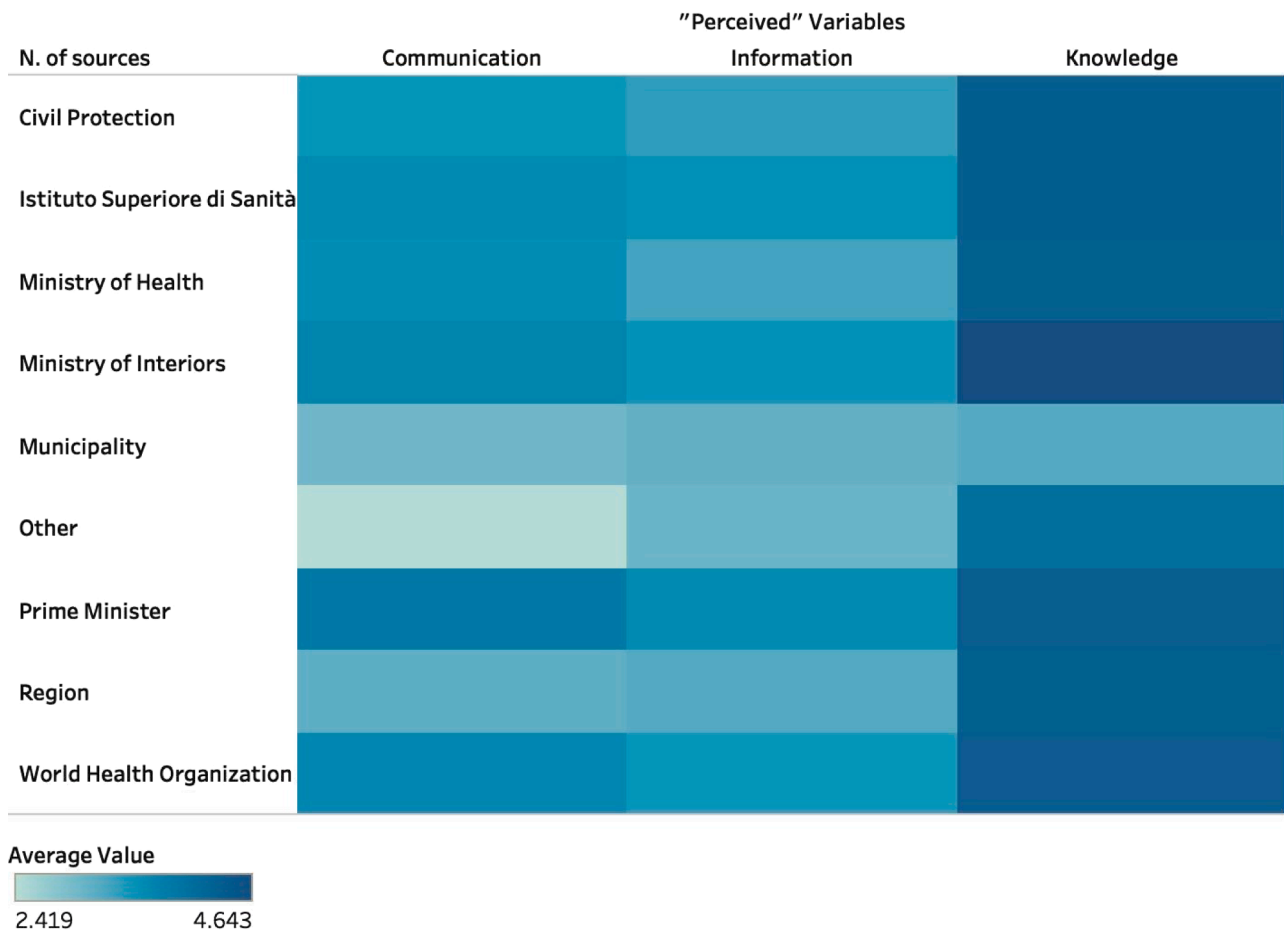# Which public institution is the best source of information for you compared to finding news about the Coronavirus?

Fig. 3. - Information sought based on the type of sources (own elaboration).

has a positive impact. It means that those, who have obtained a greater quantity of information, have managed to answer better.

On the other hand, we focused our attention on the overall opinion with respect to institutional communication quality, noting that the perceived communication variable is not significant (and it has, anyway, a negative coefficient).

This aspect demonstrates the information asymmetry existing between the perception of good institutional communication and the effectiveness of institutional communication itself.

Same conclusions can be drawn regarding the variables detecting how many times social media have been accessed, as well as the number of different social media attended on a daily base.

5. Discussion

The study aimed at detecting the existence and, consequently, assessing the measure of the relationship between the factors characterising institutional communication and the effectiveness of the messages conveyed. According to the observed results, some interesting considerations arose.

First, education has a central role in developing the ability to understand the content of the communication. The most educated people obtained the highest scores, determining a better result in terms of message effectiveness, translating it into best practices applied to crisis management at an individual level. According to what previously

discussed, health literacy plays a relevant role in the field (Nutbeam, 2000; Nutbeam and Kickbusch, 2000; Kickbusch, 2001; Kim et al., 2005; Van der Heide et al., 2013), applying the necessity of informing and educating people, particularly on public health issues. Scholars, indeed, underline the importance of such best practices, so it is suggested to introduce proper indicators to assess health literacy among citizens (Nutbeam and Kickbusch, 2000; Kickbusch, 2001; Kim et al., 2005). It happens, for example, by disseminating the results of academic studies, both on scientific and divulgation levels, increasing the public awareness and the spread of prevention medicine among the citizens (Feldmann, 1966; Andréasson et al., 2000; Kazis et al., 2006; Dyson et al., 2017; Gravili et al., 2020). In this outlook, health workers play a crucial role in intermediation between institutions and citizens.

Second, the quantity of information acquired from accredited sources positively influenced the effectiveness of communication. This is a specific case proving that good quality information (i.e., the perceived knowledge) could embrace a great quantity of news, implying that the better you know, the more you know, the better you behave. Here we seize the essence of perceived information quality (PIQ), attributing high value to the role of information channels and outlets (Shepperd et al., 1999; Yang et al., 2005; Gabarron et al., 2013; Fahy et al., 2014; Dziak et al., 2020), useful in the process of trust-building (Nicolaou and McKnight, 2006) and helping in decreasing the burden of bad health awareness on healthcare consumers (Armstrong-Heimsoth et al., 2017). Moreover, this issue could be also addressed by building a new

How many times a day do you check the institutions' websites or social channels?
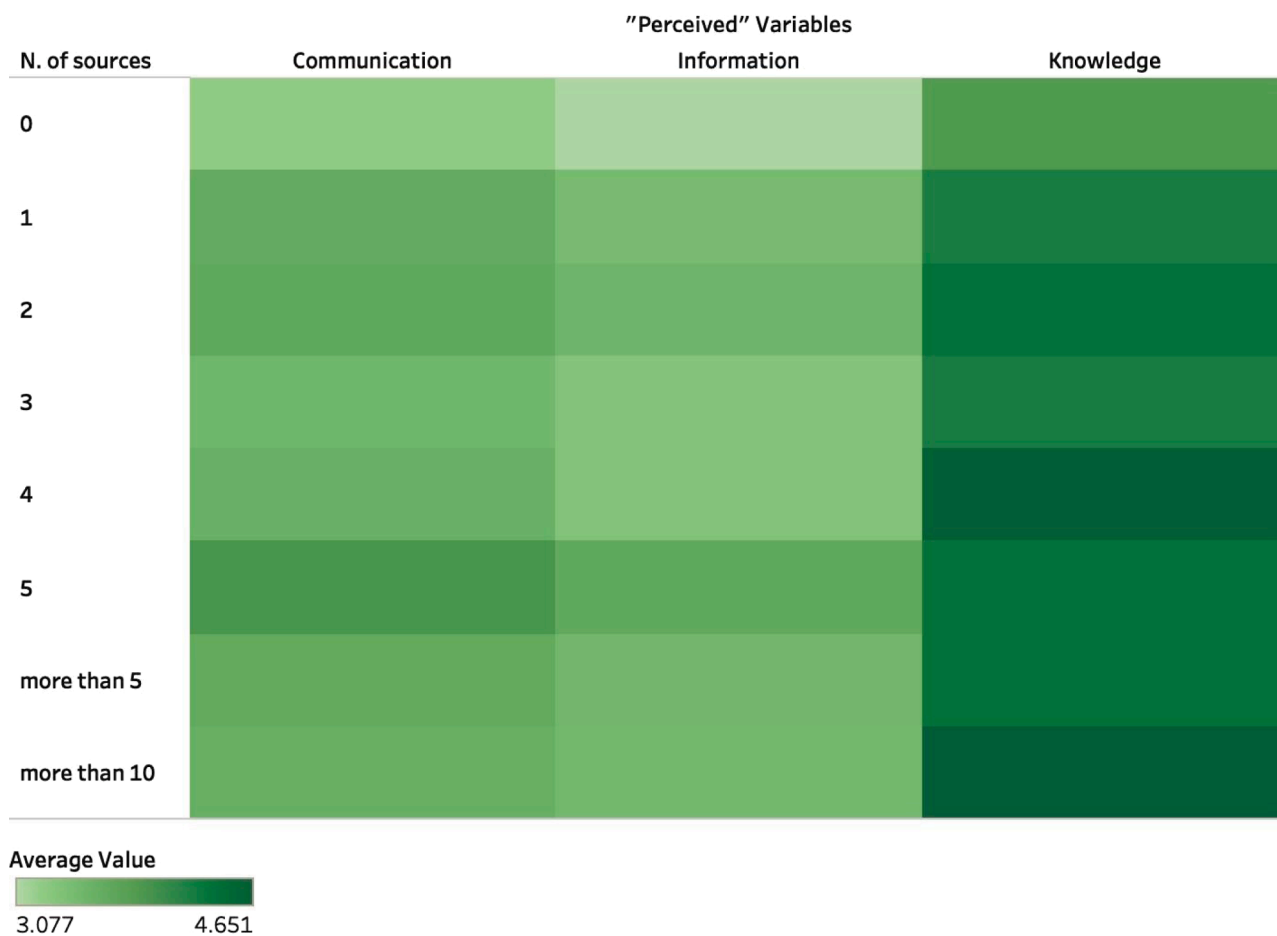

Fig. 4. - Information sought based on the compulsiveness (own elaboration).

Table 5
– regression outputs (own elaboration)

dependent variable: Score				
	model I	**model II**	**model III**	**model IV**
	coeff	*coeff*	*coeff*	*coeff*
PerceivedInformation	0.14*	0.14*	0.17*	0.14*
	(0.07)	(0.07)	(0.09)	(0.07)
Perceived Knowledge	0.19**	0.19**	0.20**	0.19**
	(0.09)	(0.08)	(0.09)	(0.09)
Education	0.26***	0.26***	0.26***	0.26***
	(0.09)	(0.09)	(0.09)	(0.09)
Age		0.00(0.00)	0.00(0.00)	
Perceived			-0.04	
Communication			(0.08)	
Source_Social				-0.01
				(0.03)
Times_social				0.00(0.02)

n. of observation: n.948
Robust Standard Error: QML
Level of significance: *(90%), **(95%), ***(99%)

Table 6
– Frequencies by answers to the questions

Binomial Test Variable	Level	Counts	Total	Proportion	p
DIFF_Fake News	0	317	948	0.334	< .001
	1	631	948	0.666	< .001
DIFF_Outbound Links	0	727	948	0.767	< .001
	1	221	948	0.233	< .001
DIFF_Too much_Info	0	678	948	0.715	< .001
	1	270	948	0.285	< .001
DIFF_NO_Info	0	861	948	0.908	< .001
	1	87	948	0.092	< .001
DIFF_Clickbait	0	823	948	0.868	< .001
	1	125	948	0.132	< .001

Note. Proportions tested against value: 0.5.

Eysenbach et al. (1998) and Maltz (2000) stated that the presence of multiple wrong types of communication damages the perceived information quality.

Third, the age variable has not influenced the model at all. If it is a non-significant predictor or not, it had a coefficient close to zero. This is an interesting result in itself, which, as previously discussed, attributes greater importance to education. Youngsters are nowadays more aware and concerned about public issues, including health. This is mainly due to the ability to absorb good information and knowledge, which depends

regulatory or a guiding framework including selection criteria for the provision and dissemination of quality information (Naumann and Rolker, 2005; Eppler, 2006; Dziak et al., 2020) discussing health issues on the new media outlets, which provide great quantity without quality, in most of the cases (Ľ Černá, 2012; Pauer et al., 2016). Indeed,

Table 7

- Frequencies by answers to question

Binomial Test Variable	Level	Counts	Total	Proportion	p
Best_Institution_WHO	0	506	948	0.534	0.041
	1	442	948	0.466	0.041
Best_Institution_EU	0	938	948	0.989	< .001
	1	10	948	0.011	< .001
Best_Institution_Pres_Min_Counc	0	607	948	0.640	< .001
	1	341	948	0.360	< .001
Best_Institution_Min_Interior	0	899	948	0.948	< .001
	1	49	948	0.052	< .001
Best_Institution_Min_Health	0	629	948	0.664	< .001
	1	319	948	0.336	< .001
Best_PIC_Nat_Health_Inst	0	651	948	0.687	< .001
	1	297	948	0.313	< .001

Note. Proportions tested against value: 0.5.

Table 8

- Frequencies by answers to the question

Binomial Test Variable	Level	Counts	Total	Proportion	p
WEB_SOC_WHEN_Access	Costantemente (Constantly)	333	948	0.351	< .001
	Mai (Never)	32	948	0.034	< .001
	Mattina (In the morning)	187	948	0.197	< .001
	Notte (In the night)	117	948	0.123	< .001
	Pomeriggio (In the Afternoon)	279	948	0.294	< .001

Note. Proportions tested against value: 0.5.

Table 9

- Frequencies by answers to question (National newspapers, NNP)

TRUST_NNP	Frequency	Percent	Valid Percent	Cumulative Percent
1	86	9.072	9.072	9.072
2	200	21.097	21.097	30.169
3	343	36.181	36.181	66.350
4	236	24.895	24.895	91.245
5	83	8.755	8.755	100.000
Missing	0	0.000		
Total	948	100.000		

Table 10

- Frequencies by answers to question (Local newspapers, LNP)

Frequencies for TRUST_LNP

TRUST_LNP	Frequency	Percent	Valid Percent	Cumulative Percent
1	138	14.557	14.557	14.557
2	243	25.633	25.633	40.190
3	350	36.920	36.920	77.110
4	173	18.249	18.249	95.359
5	44	4.641	4.641	100.000
Missing	0	0.000		
Total	948	100.000		

Table 11

- Frequencies by answers to question (National newsletters)

Frequencies for TRUST_NNEWS

TRUST_NNEWS	Frequency	Percent	Valid Percent	Cumulative Percent
1	50	5.274	5.274	5.274
2	159	16.772	16.772	22.046
3	323	34.072	34.072	56.118
4	284	29.958	29.958	86.076
5	132	13.924	13.924	100.000
Missing	0	0.000		
Total	948	100.000		

Table 12

- Frequencies by answers to question (Local news)

TRUST_LNEWS	Frequency	Percent	Valid Percent	Cumulative Percent
1	89	9.388	9.388	9.388
2	214	22.574	22.574	31.962
3	349	36.814	36.814	68.776
4	215	22.679	22.679	91.456
5	81	8.544	8.544	100.000
Missing	0	0.000		
Total	948	100.000		

Table 13

- Frequencies by answers to question (Radio)

TRUST_RADIO	Frequency	Percent	Valid Percent	Cumulative Percent
1	99	10.443	10.443	10.443
2	204	21.519	21.519	31.962
3	350	36.920	36.920	68.882
4	224	23.629	23.629	92.511
5	71	7.489	7.489	100.000
Missing	0	0.000		
Total	948	100.000		

Table 14

- Frequencies by answers to question 1 (Online newspapers)

TRUST_ONP	Frequency	Percent	Valid Percent	Cumulative Percent
1	109	11.498	11.498	11.498
2	210	22.152	22.152	33.650
3	343	36.181	36.181	69.831
4	212	22.363	22.363	92.194
5	74	7.806	7.806	100.000
Missing	0	0.000		
Total	948	100.000		

Table 15

- Frequencies by answers to question

Binomial Test Variable	Level	Counts	Total	Proportion	p
INFO_SHARE_SN_FB	0	232	948	0.245	< .001
	1	716	948	0.755	< .001
INFO_SHARE_SN_WA	0	183	948	0.193	< .001
	1	765	948	0.807	< .001
INFO_SHARE_SN_LinkedIn	0	948	948	1.000	< .001
INFO_SHARE_SN_INST	0	733	948	0.773	< .001
	1	215	948	0.227	< .001
INFO_SHARE_SN_Tw	0	866	948	0.914	< .001
	1	82	948	0.086	< .001
INFO_SHARE_SN_TEL	0	879	948	0.927	< .001
	1	69	948	0.073	< .001
INFO_SHARE_SN_YT	0	721	948	0.761	< .001
	1	227	948	0.239	< .001

Note. Proportions tested against value: 0.5.

Table 16

- Frequencies by answers to question

ADAPT_PIC	Frequency	Percent	Valid Percent	Cumulative Percent
1	39	4.114	4.114	4.114
2	60	6.329	6.329	10.443
3	283	29.852	29.852	40.295
4	366	38.608	38.608	78.903
5	200	21.097	21.097	100.000
Missing	0	0.000		
Total	948	100.000		

Table 17

- Frequencies for answers to question

H_MUCH_PIC	Frequency	Percent	Valid Percent	Cumulative Percent
1	31	3.270	3.270	3.270
2	65	6.857	6.857	10.127
3	377	39.768	39.768	49.895
4	377	39.768	39.768	89.662
5	98	10.338	10.338	100.000
Missing	0	0.000		
Total	948	100.000		

Table 18

- Frequencies by answers to question

WEB_SOC_NR_DAY	Frequency	Percent	Valid Percent	Cumulative Percent
1	127	13.397	13.397	13.397
2	303	31.962	31.962	45.359
3	239	25.211	25.211	70.570
4	80	8.439	8.439	79.008
5	199	20.992	20.992	100.000
Missing	0	0.000		
Total	948	100.000		

Table 19

- Frequencies for answers to question

WEB_SOC_FREQ_DAY	Frequency	Percent	Valid Percent	Cumulative Percent
1	231	24.367	24.367	24.367
2	219	23.101	23.101	47.468
3	164	17.300	17.300	64.768
4	50	5.274	5.274	70.042
5	284	29.958	29.958	100.000
Missing	0	0.000		
Total	948	100.000		

more on education than age (Stanovich and Cunningham, 1993; Edwards and Browne, 1995; Benvenuto et al., 2020).

A final consideration ought to be made about the perceived communication variable. Although its results were non-significant in the study itself, its features need to be followed up in order to better understand what is wrongly perceived by the public, notwithstanding the content of the message itself and no matter what the political address is.

6. Conclusions

The present research proved to the scientific community that education is strongly related to the behaviour of the individual in a community, and the case study confirms the hypothesised interrelationship. The institutional communication strategies implemented by the local institutions deserve further study because, since the beginning of the emergency, local institutions were a key player in crisis management at the local level, especially in the implementation of health and social policies to prevent the spread of the virus. For the specific skills in health matters and the ability to issue specific regulations regarding limitations of certain production and professional activities, regional authorities are the local authorities that are found to face the emergency by acting either in line with or in contrast to the national government, in a frame of a more direct relationship of authorities and citizens. Social and institutional communication, the use of social media, and the activation of targeted campaigns represent an interesting and privileged ground of observation of the reactions and priorities of the single local authorities, as well as the style and the registers of the language used as a lever for service management in public administration. This study can be useful for public corporate governance management strategies since social media have changed institutional communication strategies. The use of social media is growing as an effective way to communicate with the public during an emergency. However, great attention ought to be paid to avoid information overload and the spread of fake news. Moreover, since health responsibility is limited to action and rationality, it cannot be attributed directly to digital language. Who should be held accountable for the actions of humans and their well-being, particularly when the consequences of these actions are negative? We have approached this controversy from both theoretical and empirical perspectives. We discussed the adequacy of the notions of moral responsibility and accountability with respect to institutional communication, as they are governed by complex, deliberately opaque and unpredictable interactions, and processes. The research underlines the need to reform and reshape institutional communication strategies, as a process of coordination among all the public administration layers, in the healthcare sector (but not only) with enhanced decision-making processes, strategically and resolutely to transform weaknesses into opportunities in the Covid-19 trend evolution. The effects of the Covid-19 pandemic, in fact, have highlighted the need to implement short, medium, and long-term intervention strategies that must adapt to the primary needs of citizens and to all those who operate in the health production system. Therefore, citizens are the beneficiaries of the institutional intervention, the health workers have the difficult role of connecting the public institutions and the citizens themselves, and the representatives of the institutions have the fundamental role of promoting the protection policies of the national interest. There is a need in this broad and complex debate to include a new national socio-technical domain, in consideration of the intellectual capital involved in the issue of emergencies/pandemics and, at the same time, to understand how the definition of this domain can make healthcare management more flexible according to a multi-level participatory approach of the joint optimization type. Finally, education is a key factor in all public and private activities, fostering best practices of responsible behaviour at individual and organisational levels.

Some limitations of the studies occur as the data collection activity could have suffered from emotional components related to the disruptive and sudden blast of the emergency, which created much confusion

at all levels. This can also be a point of strength by testing the responsiveness and the effectiveness of emergency protocols. Similar studies may be carried out in the future to understand whether, in the long run, perception variables confirm their impact.

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All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. Furthermore, each author certifies that this material or similar material has not been and will not be submitted to or published in any other publication before its appearance in the *Hong Kong Journal of Occupational Therapy*.

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Annex I

Here are the results of statistical tests on the distribution of answers to some selected questions. Anyone who needs the text of the questionnaire and / or data, even in Italian (original language of the questionnaire) can contact the corresponding author.

To the question "What difficulties do you encounter in finding information / institutional sources through search engines?" respondents identify the one relating to fake news at 66%, while they do not highlight any difficulties in other situations, such as, for example, identifying click-baits (Table 6)

The sample interviewed, when asked about the main institutional sources of information on COVID-19 (Table 6), identifies WHO as the most important (46.6%), followed by the Civil Protection (37.7%), by the Prime Minister of Ministers (36%) by the Ministry of Health (33.6%) and by the Higher Institute of Health (31.3%).

Table 7

Regarding the habits on the use of information tools, the interviewees reveal a particular aspect, which we also found in literature: the constant search for information. 35% of the interviewees, in fact, state that they are constantly looking for information on institutional sites (Table 8).

As regards the mass media and the trust put on the information reported on national and local newspapers, there is a medium-low level of trust (66% in the first case, 77% in the second), while national and local

news, radio and online newspapers have a medium-high level of confidence, with a peak of approximately 78% in the case of national news (Table 9, Table 10, Table 11, Table 12, Table 13, Table 14).

Even more interesting is the data detected on the use of the social networks WhatsApp (80.7%) and Facebook (75.5%). These social networks seem to be the most used tools to disseminate news considered interesting on COVID-19 (Table 15).

Institutional communication is considered adequate (Table 16) and almost excessive (Table 17), respectively by about 60% and 50% of the interviewees.

Table 18, Table 19

As regards the habits of the interviewees regarding the access on the websites and social channels of the institutions, 70.57% answered that they visit a few and 64.77% several times a day.

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