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The effect of differently modulated communications on the covid-19 pandemic in the young population

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Summary. Background. Media communication during the covid-19 pandemic has been relevant for the population to receive information about the ongoing number of cases, deaths, and social restriction measures. Notably, the effects of the communication methods on young adults during the covid-19 pandemic have not been studied. Therefore the present study aimed to investigate the influence of communication modality about covid-19 on the perception of risk and judgment among young adults. **Methods.** A double-blind cross-sectional study was designed. Three hundred four subjects (age range19-25 years old) saw a 4-minute video concerning data communication on the covid-19 pandemic and compiled an online questionnaire about their perceptions. Two videos were randomized, one presenting the covid-19 data negatively (HARD video) while the other showed a positive ongoing resolution of the pandemic (SOFT video). Association tests and nominal logistic regression were used to evaluate differences in responses among the two groups. **Results.** The two videos lead to different reactions. Participants showed higher disagreement concerning the video content in the "SOFT" group compared to the "HARD" group. The responses of the "SOFT" group were more to be optimistic (OR=2.87, 95% CI 1.311-6.27) than those who had seen the "HARD" video. The sense of helplessness was lower in the "SOFT" compared "HARD" group (OR=3.02, 95% CI 1.311-6.96). The perception of fear was higher for the "HARD" group (OR=2.91, 95% CI 1.21-7-02). **Discussion.** The modality of data presentation influenced the perception and feelings about the covid-19 pandemic. Likely, pre-existing perception of a pessimistic perspective was present in both groups; thus, the video did not lead to any change in the behavior. **Conclusions.** The phobic or counter-phobic reactions shown in the study participants highlighted the importance of the reliability of the information received and how previous feelings may influence the perception of the information.

Key words. Communication, covid-19, youth.

L'effetto di comunicazioni diversamente modulate sulla pandemia di covid-19 nella popolazione giovane.

Riassunto. Introduzione. La comunicazione dei media durante la pandemia di covid-19 è stata importante per consentire alla popolazione di ricevere informazioni sul numero di casi in corso, sui decessi e sulle misure di restrizione sociale. In particolare, non sono stati studiati gli effetti dei metodi di comunicazione sui giovani adulti durante la pandemia. Pertanto l'obiettivo del presente studio è stato quello di indagare l'influenza della modalità di comunicazione su covid-19 sulla percezione del rischio e del giudizio tra i giovani adulti. **Metodi.** È stato progettato uno studio trasversale in doppio cieco. Trecentoquattro soggetti (fascia di età 19-25 anni) hanno visionato un video di 4 minuti relativo alla comunicazione dei dati sulla pandemia di covid-19 e hanno compilato un questionario online sulle loro percezioni. Sono stati randomizzati due video, uno che presentava i dati covid-19 in modo negativo (HARD video) mentre l'altro mostrava una risoluzione positiva in corso della pandemia (SOFT video). Per valutare le differenze nelle risposte dei due gruppi si sono vautati test di associazione e modelli di regressione logistica nominale. **Risultati.** I due video hanno portato a reazioni diverse. I partecipanti hanno mostrato un maggiore disaccordo riguardo al contenuto video nel gruppo "SOFT" rispetto al gruppo "HARD". Le risposte del gruppo "SOFT" sono state più ottimistiche (OR=2,87, IC 95% 1,311-6,27) rispetto a quelli che avevano visto il video "HARD". Il senso di impotenza era più basso nel gruppo "SOFT" rispetto a "HARD" (OR=3,02, IC 95% 1,311-6,96). La percezione della paura era più alta per il gruppo "HARD" (OR=2,91, IC 95% 1,21-7-02). **Discussione.** La modalità di presentazione dei dati ha influenzato la percezione e le opinioni sulla pandemia di covid-19. Probabilmente, in entrambi i gruppi era presente una percezione preesistente di una prospettiva pessimistica, quindi il video non ha portato ad alcun cambiamento nel comportamento. **Conclusioni.** Le reazioni fobiche o controfobiche mostrate nei partecipanti allo studio hanno evidenziato l'importanza dell'affidabilità delle informazioni ricevute e come i sentimenti precedenti possano influenzare la percezione delle informazioni.

Parole chiave. Comunicazione, covid-19, giovani adulti.

Introduction

The spread of the new coronavirus disease (covid-19), and the isolation measures adopted to deal with it, highlighted health and socio-economic difficulties and problems of a communicative nature[1]. Notably, it was necessary to develop strategies to provide access to timely and appropriate evidence-

based information on covid-19, leading to increased use of new technologies and social media[2-4].

Communication strategies may impact the rational and emotional levels influencing health risk perception[5-7].

Adolescents and young adults were the most affected by the effects of health restrictions and isolation[8-13]. Young Italians and Europeans had never before directly experienced worldwide health issues, wars, or lockdown state laws with a considerable impact on their freedom of moving and social interactions. Interestingly, during lockdown, there was an increased trend in psychiatric impairments and consultation related to substance abuse by young adults[14-16].

The subjects of this age range are also those most familiar with the use of new technologies and social media, being exposed daily to various digital and television information through sources that are not always reliable[17-19].

Therefore, the study of the effects of the communication methods adopted during the covid-19 pandemic on young adults is a topic that needs further study.

It is fascinating to investigate how and if different communication methods regarding the pandemic can determine reactions and attitudes. Such phenomena have been analyzed in the health sector for fostering prevention campaigns that used communication based on fear arousal[20,21] as a tool to induce behavior change. Indeed, it is known how the persuasive capacity of a communicative intervention to induce a behavioral change can be enhanced or hindered by several personal and social factors.

This study is aimed to investigate the relationship between the communication modality of data relating to covid-19, risk perception and judgment, and the influence on behavior in young adults. Specifically, by using two presentation modalities of a narrative video, the study aims to verify whether the communication method leads to a different reaction and perception of the covid-19 pandemic and if narrative video can influence the subjects' behavior. Subjects' behavior was investigated with respect of preventive attitudes towards the pandemic, transmission of the received information, and the modification of future projects/activities in the workplace or field of study.

Material and methods

Between March and April 2021, a double-blind cross-sectional study was conducted. Three hundred four subjects, aged between 19 and 25 years old, were enrolled through a consecutive convenience sampling among students at the University of Milan-Bicocca in health, biological and economic study fields and students attending the last year of high school in downtown Milan. All subjects were invited to view a short 4-minute video concerning data communication on the covid-19 pandemic and fill out an online questionnaire (table 1).

The questionnaire consisted of two parts: the first one was administered before viewing the video to collect socio-demographic variables and to detect the subjects' attitudes toward the pandemic (questions A). The second part of the questionnaire was administered after viewing the video to detect their reactions (questions B, C, D).

The 4-minute video consisted of 14 slides presenting data and statements about the ongoing pandemic. Two video presentation modalities were developed. The same data were proposed according to the following modality: I) a negative (HARD) and II) a positive view (SOFT) of the pandemic. The SOFT video proposed a quick and effortless resolution of the pandemic (acknowledging the resources of the Italian health system), showing higher mortality among the elderly and in low-income countries. The HARD video described a catastrophic scenario in which the mortality from covid-19 and the sequelae of the infection were assimilated to the ones caused by war. Doctors were fighters against the virus and judges and executioners in deciding whom to treat due to scarcity of resources. The SOFT video described the high vaccination rate as protective and decisive, thanks to the production and marketing of two safe vaccines. Conversely, in the HARD video, low confidence in vaccinations was presented due to the high risk of mutation of the viral genome and the absence of long-term testing on people prior to their commercialization.

The subjects were randomized into two groups (group H and group S) and subjected to the vision of one of the two versions of the video HARD or SOFT, respectively. All questionnaire items had a fixed set of possible answers, where applicable. A 5-point Likert scale was used to assess the statements.

Data analysis

Questionnaire items were analyzed based on the frequency and descriptive statistics. Chi-square and Fisher Exact tests were used to evaluate the homogeneity of the response distribution between the two groups. To quantify differences in response agreement among the Hard and Soft group, several bivariate nominal logistic regressions were used to evaluate, for each item, differences in response agreement (i.e., dependent variable) among the Hard and Soft groups (i.e., predictor variable).

Multinomial logistic regression was used to predict a nominal dependent variable given one or more independent variables. Maximum likelihood was

Table 1. Questionnaire.

Part I. Baseline questions	
Code	Questions
A1	Age
A2	Gender
A3	Year attended
A4	Have there been any cases of covid-19 among your family members or closest friends?
A5	Do your parents work in the health sector (e.g. doctors, nurses, pharmacists, etc.)?
A6	Do you suffer from a disease that could increase your risk of contracting covid-19 or of having a severe form (e.g., diabetes, asthma, blood diseases, low immune defenses, etc.)?
A7	In which geographic area do you live in?
A8	Do you believe that the communication about the pandemic received through the media was
A9	How much do you agree with the following statements regarding the pandemic?
	The risk of serious disease is low
	Everyone underestimates the risk for health
Part II. Video reaction (agreement)	
Code	Questions
B1	What reactions does the text you have seen / read arouse in you?
C1	After watching the video, what is your attitude towards the covid-19 pandemic?
C2	After watching the video, do you believe that the communication about the pandemic received through the media was
C3	After watching the video, what is your opinion of what's going on?
C4	After watching the video, what is your opinion of the "experts" who have talked about the covid-19 epidemic in recent months?
D1	Do you think that the communication you see will change your daily behaviors with a view to preventing covid-19?
D2	In what direction will your preventive behaviors change and how
D3	Will you transmit the contents of the communication read / seen to your friends / family talking about covid-19?
D4	Why
D5	From 1 to 5, to what extent do you agree with the following statement: "In light of what you have seen, I will change something of my work projects".
D6	From 1 to 5, to what extent do you agree with the following statement: "What you saw changes your opinion of the frequency of study and workplaces?"

Notes: "A" variables refer to personal information, while "B", "C" and "D" variables refer to the perception of Covid-19 after video communication.

used for estimation of parameters and odds ratios (OR), showing how the odds of the dependent variable varied with respect to predictor variables. To this end, to limit the number of estimated parameters, responses on a 5-point Likert scale were rearranged into a 3-point scale aggregating similar answers (i.e., strongly agree and agree, strongly disagree and disagree).

Results

Three hundred four subjects were recruited (mean age 21.46 (4.66) years, M/F= 141/163). 49% of the participants (147 subjects) were subjected to the "HARD" video (group H), while 51% of them (157 subjects) were assigned the "SOFT" video (group S). The total time required to view the presentation and complete the questionnaire was approximately ten minutes. The distributions of socio-demographic variables (part A of the questionnaire) and p-values of chi-square and Fisher's tests are reported in table 2. Table 3 illustrates results regarding the comparison of perceptions and attitudes among two groups (Sections B, C and D).

Table 2 shows that both groups (S and H) did not differ in baseline characteristics. The gender variable does not seem to influence the attitude or categories to which the subjects belong.

Table 2. Characteristics of the sample and p-values of Chi-square (χ^2) and Fisher's test on homogeneity of response distribution among two groups (Section A).

		Total (n= 304)	Group S (n= 157)	Group H (n= 147)	Chi-square	Fisher's test
Code	**Characteristics**	n (%)	n (%)	n (%)		
A1	**Age** (years) Mean (SD)	21.46 (4.66)	21.53 (4.34)	21.53 (4.99)	0.804	0.739
A2	**Gender**				0.249	0.276
	Male	141 (46.38)	44 (28.03)	97 (65.99)		
	Female	163 (53.62)	113 (71.97)	50 (34.01)		
A3	**School**				0.904	0.655
	High school	20 (6.58)	11 (7.01)	9 (6.12)		
	Ist year, Bach. Sci. (Health)	146 (48.03)	77 (49.04)	69 (46.94)		
	Ist year, Bach. Sci. (Economics/Statistics)	26 (8.55)	12 (7.64)	14 (9.52)		
	Ist year, Bach. Sci (Sciences)	60 (19.74)	32 (20.38)	28 (19.05)		
	IInd year Master of Science	44 (14.47)	22 (14.01)	22 (14.97)		
	Post Graduate Course	8 (2.63)	3 (1.91)	5 (3.40)		
A4	**Relatives/friends with covid-19**				0.611	0.731
	Yes	157 (51.64)	104 (66.24)	53 (36.05)		
	No	147 (48.36)	53 (33.76)	94 (63.95)		
A5	**Parents work in Health sector**				0.604	0.749
	Yes	55 (18.09)	33 (21.02)	22 (14.97)		
	No	249 (81.91)	124 (78.98)	125 (85.03)		
A6	**Health status at covid-19 risk**				0.634	0.749
	Yes	24 (7.89)	16 (10.19)	8 (5.44)		
	No	280 (92.11)	141 (89.81)	139 (94.56)		
A7	**Geographic area B**				0.081	0.082
	Suburban	74 (24.34)	45 (28.66)	29 (19.73)		
	Downtown	68 (22.37)	33 (21.02)	35 (23.81)		
	Hinterland or Town	130 (42.76)	65 (41.40)	65 (44.22)		
	Codogno or Bergamo	32 (10.53)	14 (8.92)	18 (12.24)		
A8	**Perception about covid-19 media communication**				0.860	0.915
	Bad: too much confusion and conflicting indications	62 (20.39)	31 (19.75)	31 (21.09)		
	Not clear: there is a lot of talk about covid-19, but not always in a clear and understandable way	227 (74.67)	118 (75.16)	109 (74.15)		
	Effective and useful: the most important aspects are widely discussed every day	15 (4.93)	8 (5.10)	7 (4.76)		
A9	**The risk of serious disease is low**				0.118	0.119
	Disagree	258 (84.87)	132 (84.08)	126 (85.71)		
	Don't know	13 (4.28)	6 (3.82)	7 (4.76)		
	Agree	32 (10.53)	19 (12.10)	13 (8.84)		
	Everyone underestimates the risk for health				0.359	0.356
	Disagree	122 (40.13)	54 (34.39)	68 (46.26)		
	Don't know	34 (11.18)	21 (13.38)	13 (8.84)		
	Agree	147 (48.36)	82 (52.23)	65 (44.22)		

Analyzing the homogeneity of the answers between the Hard and Soft groups, "Video reaction (agreement)", "Perception of fear", "Sense of helplessness", and "Perception of optimism" were the only items in which the responses of the two groups differed statistically significantly (table 3).

Table 3. Distribution of responses and p-values of Chi-square (χ^2) and Fisher's test on homogeneity of response distribution among two groups (Sections B,C,D).

		Total (n= 304)	Group S (n= 157)	Group H (n= 147)	Chi-square	Fisher's test
Code	**Characteristics**	n (%)	n (%)	n (%)		
B1	**Video reaction**				**<.0001**	**<.0001**
	Fear perception				**0.068**	**0.070**
	Disagree	167 (54.93)	108 (68.79)	59 (40.14)		
	Don't know	37 (12.17)	21 (13.38)	16 (10.88)		
	Agree	95 (31.25)	26 (16.56)	69 (46.94)		
	Feeling of impotence				**0.048**	**0.047**
	Disagree	90 (29.61)	62 (39.49)	28 (19.05)		
	Don't know	42 (13.82)	25 (15.92)	17 (11.56)		
	Agree	167 (54.93)	68 (43.31)	99 (67.35)		
	Desire to be alone				0.621	0.626
	Disagree	181 (59.54)	108 (68.79)	73 (49.66)		
	Don't know	50 (16.45)	23 (14.65)	27 (18.37)		
	Agree	68 (22.37)	25 (15.92)	43 (29.25)		
	Agitation perception				0.944	0.948
	Disagree	161 (52.96)	89 (56.69)	72 (48.98)		
	Don't know	47 (15.46)	22 (14.01)	25 (17.01)		
	Agree	87 (28.62)	44 (28.03)	43 (29.25)		
	Optimism perception				**0.080**	**0.080**
	Disagree	67 (22.04)	33 (21.02)	34 (23.13)		
	Don't know	44 (14.47)	24 (15.29)	20 (13.61)		
	Agree	188 (61.84)	98 (62.42)	90 (61.22)		
	Hope					
	Disagree	118 (38.82)	52 (33.12)	66 (44.9)		
	Don't know	57 (18.75)	29 (18.47)	28 (19.05)		
	Agree	124 (40.79)	75 (47.77)	49 (33.33)		
C1	**Concern about the pandemic**				0.104	0.106
	I'm not worried	29 (9.54)	20 (12.74)	9 (6.12)		
	I am moderately worried	201 (66.12)	106 (67.52)	95 (64.63)		
	I am very worried	74 (24.34)	31 (19.75)	43 (29.25)		
C2	**Perception about covid-19 media communication**				0.617	0.633
	Bad: too much confusion and conflicting indications	73 (24.01)	42 (26.75)	31 (21.09)		
	Not clear: there is a lot of talk about covid-19, but not always in a clear and understandable way	209 (68.75)	104 (66.24)	105 (71.43)		
	Effective and useful: the most important aspects are widely discussed every day	22 (7.24)	11 (7.01)	11 (7.48)		

(Continued) **Table 3**

(Continued) **Table 3**

		Total (n= 304)	Group S (n= 157)	Group H (n= 147)	Chi-square	Fisher's test
Code	**Characteristics**	n (%)	n (%)	n (%)		
C3	**Everyone's doing their best during the covid-19**				**0.013**	**0.012**
	Bad: They are all making a terrible impression	49 (16.12)	20 (12.74)	29 (19.73)		
	Neither good nor bad: in an exceptional situation you do your best, sometimes making mistakes, but it's inevitable	222 (73.03)	114 (72.61)	108 (73.47)		
	Good: it is being done everything possible in a situation where nobody knows anything and everywhere they make mistakes like us	33 (10.86)	23 (14.65)	10 (6.8)		
C4	**Perception about covid-19 experts**				0.794	0.824
	Good: every day they give us useful information that helps to better understand the problem	34 (11.18)	15 (9.55)	19 (12.93)		
	Neither good nor bad, they have different ideas as it happens, certainly it does not help, but it is inevitable	179 (58.88)	95 (60.51)	84 (57.14)		
	Bad: they argue every day, often with diametrically opposed opinions, which increase the confusion	91 (29.93)	47 (29.94)	44 (29.93)		
D1	**Communication received is behavioral changing**				0.868	1.000
	Yes	113 (37.17)	57 (36.31)	56 (38.09)		
	No	191 (62.83)	100 (63.69)	91 (61.9)		
D2	**Characteristics of the preventive behaviors changing**				0.169	0.115
	I will be more careful	130 (42.76)	60 (38.22)	70 (47.62)		
	I will not change my behavior	173 (56.91)	96 (61.15)	77 (52.38)		
	I will be less careful	0 (0)	0 (0)	0 (0)		
D3	**Transmissibility of the communication received**				0.590	0.615
	Yes	147 (48.35)	76 (48.41)	71 (4830)		
	No	157 (51.64)	81 (51.59)	76 (51.7)		
D4	**Why you will/won't transmit the contents received**				0.368	0.362
	I am convinced that it is the correct one	109 (35.85)	56 (35.67)	53 (36.05)		
	It's time to stop with too many unnecessary precautions	11 (3.61)	6 (3.82)	5 (3.4)		
	All my friends/family already feel this way	152 (50)	70 (44.58)	82 (55.78)		
	I don't feel like pushing it	32 (10.52)	25 (15.92)	7 (4.76)		
D5	**Agreement with the statement: "In light of what you have seen, I will change something of my work projects"**				0.434	0.432
	Disagree	128 (42.1)	65 (41.4)	63 (42.85)		
	Don't know	114 (37.5)	62 (39.49)	52 (35.37)		
	Agree	62 (20.39)	30 (19.1)	32 (21.77)		
D6	**Agreement with the statement: "What you saw changes your opinion of the frequency of study and work places?**				0.653	0.670
	Disagree	131 (43.09)	72 (45.86)	59 (40.12)		
	Don't know	88 (28.95)	48 (30.57)	40 (27.21)		
	Agree	85 (27.96)	37 (23.57)	48 (32.65)		

Following the video presentations, the two groups react differently: as shown graphically in figure 1, i.e., the perimeter of the "Hard" responses differs from that of "Soft", especially regarding the reactions of perception of fear and optimism.

Regarding differences in response agreement among the Hard and Soft groups, results of nominal logistic regressions showed that, as expected, significant differences were found only for statistically significant items using the chi-square or Fisher exact test.

In particular, the two videos led to different reactions: participants showed higher disagreement concerning the video content in the "SOFT" group compared to the "HARD" group. The responses of the "SOFT" group were more to be optimistic (OR=2.87, 95% CI 1.311-6.27) than those who had seen the "HARD" video. The sense of helplessness was lower in the "SOFT" compared "HARD" group (OR=3.02, 95% CI 1.311-6.96). The perception of fear was higher for the "HARD" group (OR=2.91, 95% CI 1.21-7-02).

The statistical analysis shows with strong statistical significance that the "Soft" group does not agree with what was seen, in a proportion five times higher than those who saw the "Hard" video (OR=5.00, 95% CI 2.24-11.68).

The responses of the "Soft" group were three times more likely to be optimistic (OR=2.87, 95% CI 1.311-6.27) than those who had seen the "Hard" video. Similarly, the sense of helplessness was expressed three times less by the "Soft" group compared to those who had seen the "Hard" video (OR=3.02, 95% CI 1.311-6.96). The same pattern applies to the perception of fear, which is more pronounced for the "Hard" group (OR=2.91, 95% CI 1.21-7-02).

In questions C concerning the perception and judgment of the pandemic after watching the video, the answers appeared homogeneous for Concern about the pandemic (C1, I am moderately worried: 66%, mean of two groups), perception of media communication (C2, With lights and shadows: there is much talk about covid-19, but not always clearly and understandably, 67%; mean of two groups), perception of communication by experts (C4, Neither good nor bad, they have different ideas such as it happens, it sure does not help, but it's inevitable; tot: 59%; mean of two groups). The only difference concerned the item "Everyone is doing their best during covid-19". There was a statistically significant difference between the two groups, where Group H strongly disagrees that everyone is doing their best during the covid-19 pandemic (OR=8.06, 95% CI 1.85-12.11).

In questions D, concerning the behaviors that we propose to adopt, the answers appear homogeneous concerning the two groups who declare that they do not want to change their behavior (D2, tot: 58% mean of two groups), highlighting in particular that the communication received did not influence the behavior (D1, 63%) and was in disagreement with the statement "In light of what you have seen, I will change something of my work projects" (D5, 42%, mean of two groups) and with the statement: "What you saw changes your opinion of the frequency of study and workplaces (D6, 44%). Half of the subjects also declared they did not want to share the information received as they were convinced that family and friends were already thinking in the same way (D4, 50% mean of two groups).

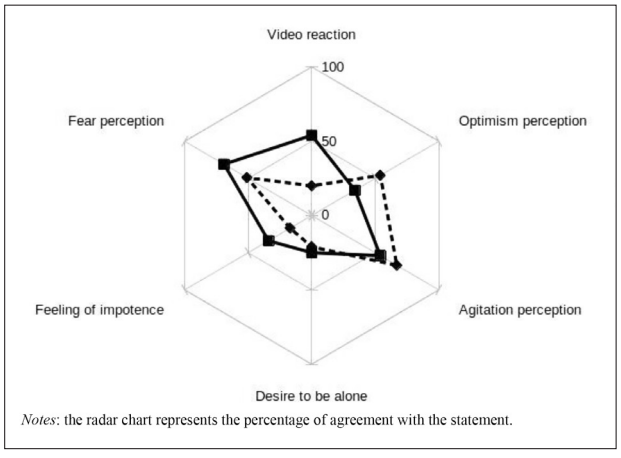

Figure 1. Graphic representation of question B1.*Notes*: the radar chart represents the percentage of agreement with the statement.

Discussion

The present work aimed to investigate the effects of the communication modality of information regarding covid-19 and the following reactions and behaviors in a group of young adults. Investigating, in particular, the impact of communication on preventive attitudes towards the pandemic, the transmission of the information received, and the modification of future projects related to the workplace or field of study.

The study findings revealed an initial emotional reaction to watching the video, which was a source of less optimism in group H than in group S. Similarly, the feeling of helplessness was higher in group H. These data were expected, given the different communication methods experienced.

However, the present data were accompanied by the detection of a degree of disagreement concerning the video content five times higher in group S than in group H. Such a result would suggest the presence of a pre-existing perception of a pessimistic perspective that characterized both groups before viewing the video, given the perception of a high and underestimated health risk (see responses to question A8).

The only significant difference found in the second part of the questionnaire concerned the per-

ception of the pandemic situation in item C3 (Everyone's doing their best during the covid-19) in favor of a higher significant percentage of subjects in group H that reported worse management of the pandemic compared to group S.

Regarding the behavior that we proposed to adopt after viewing the video, there were no significant differences between the two groups. All partecipiants reported that they did not want to change their behavior, nor did they want to change how they transmitted their knowledge and expressed their opinion on covid-19 to relatives and friends.

This belief seems to arise because individuals thought their opinion was more correct than what the video reported and reported that relatives/friends already agreed with what they heard in the video (see responses to question D4). Such behavior can be interpreted by assuming that the SOFT video generated an initial emotional effect but that this effect was counteracted by previous factors, e.g., the information provided by the media and various social networks, which may have reported the news in a high pessimist way.

Therefore, it would seem that the communicative effect of the video viewed was completely indifferent, regardless of the initial emotional reaction. It is interesting to note the hiatus between the initial emotional response, which is in tune with the content of the video, and the programming of the behavior, which, on the contrary, is out of tune with the content of the video. This fracture is connected to what other authors have reported when studying the Theory of Motivation to Protect (PMT)[22], which takes its cue in health care from a series of training/information interventions that have used fear as a tool for inducing prevention behaviors (as in the case of cigarette smoking[20] or HIV infection[21]. The PMT has highlighted an absence of a direct relationship between threat perception and behavior induction, indicating how fear produces persuasive effects only when the recommended action is considered adequate and specific.

Note that the survey was carried out during the third pandemic wave, where communication through the media had hitherto been confounded and confusing[6,17]. Therefore, the participants could not attribute credibility to the means of communication. Furthermore, in the same period (March-April 2021), the first phases of the vaccination campaign against covid-19 were accompanied by equally confused communication. In particular, in March 2021, the possible link between the AstraZeneca vaccine and some cases of thrombosis led some governments to suspend the vaccine administration or change their administration strategy. The lack of agreement between the various health authorities has reduced trust in scientific communication in the general population[23]. The unreliability of the communications in the previously acquired attitude prevailing beyond the contents of the communication itself. This is in line with the findings of the first two waves of the pandemic. At first, the measures taken were followed with discipline, but such behavior changed afterwards[24,25], probably because the same measures were no longer considered reliable or entirely suitable.

Finally, it should be considered how the pandemic and lockdown were accompanied by the onset of a significant psychiatric pathology[14,25,26] and changes of care models[27,28]. This was mainly related to the anxious reaction, reactive to the loss of certainty, represented explicitly by Post-Traumatic Stress Disorder and Phobia. Stabilization of the emotional reaction involves phobic and counter-phobic modalities that block the correct assumption of information, guaranteeing one's certainty through the maintenance of previously acquired knowledge and considered immutable certainties[29,30]. In March 2021, when the questionnaire was administered, our study population was experiencing a third lockdown where the restrictions experienced at that time may have influenced the response to the questionnaire.

It should also be emphasized that the age (and consequently the scholastic level: high school or university) and the type, of course, carried out by the student does not seem to have influenced the attitude, as well as having lived cases of covid-19 infection among their own family/friends closely or being in a particularly fragile condition from a health point of view.

Some limitations should be acknowledged. The study was performed in northern Italy, specifically in Lombardia, which was the most hit region in Italy by covid-19. Thus the generalizability to other young adult populations could be carefully evaluated. Additionally, convenience sampling could have collected data from particular groups (e.g., similar income).

Conclusions

In light of these data, regardless of the content of the information, it seems essential to take into account, on the one hand, the reliability of information used and, on the other hand, the phobic or counter-phobic reactions shown in the population under investigation, which can block the access to the acquisition of data different from one's original belief. In particular, our study studied the youth population, which, in terms of cognitive processing, was more likely to remain anchored to their original conviction or group membership[31].

Conflict of interests: the authors have no conflict of interests to declare.

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