ORIGINAL ARTICLE

Favorite YouTubers as a source of health information during quarantine: viewers trust their favorite YouTubers with health information

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Abstract

During quarantine, between March and May 2020, YouTubers disseminated information about Covid-19 and the quarantine. The objectives of this study are (1) to explore whether YouTubers are considered as reliable sources of information regarding quarantine by French social media users, (2) to evaluate the link between the parasocial relationship with a favorite YouTuber and the level of trust in the information provided by this YouTuber and (3) to test the effectiveness of the favorite YouTuber as a source of information about the benefit of quarantine. Data from 596 participants were collected through an online survey, among whom, 251 had a favorite YouTuber. Wilcoxon signed-rank tests and ordered logistic regressions were used to explore two research questions and to test two hypotheses. Results show that (1) information about the benefit of quarantine from the favorite YouTuber is considered just as reliable as information from journalists, friends or family members, (2) the intensity of the parasocial relationship with the favorite YouTuber is positively and significantly associated with the level of trust in that favorite YouTuber, (3) having received trusted information about the benefit of quarantine from one's favorite YouTubers is positively and significantly associated with the perception of the utility of quarantining. This study identifies YouTubers as important sources for health communication.

Keywords YouTubers · Parasocial relationships · Trust · Quarantine · Covid-19

1 Introduction

The internet has long been identified as a potentially useful tool for health education (Bernhardt and Hubley 2001). Nowadays, the internet and more specifically social media websites are major providers of health information. In Hong Kong, the internet has been found to be the first source of information for health issues (Chu et al. 2017). In the US, nearly 90% of individuals aged between 18 and 24 years old would be likely to engage in health activities or trust information found via social media (PwC Health Research Institute 2012). In France, 48.5% of all 15- to 30-year-olds use the internet for health purposes and 80% of them trust health information found online in 2010 (Beck et al. 2014). Thus, the internet and more specifically social media appear to be trusted sources of information for health purposes.

The current outbreak of Covid-19 highlighted the importance of health communication. Several factors are believed to improve adherence to lockdown measures such as demographic characteristics, perceived risk of the disease outbreak and perceived benefit of quarantine (Webster et al. 2020). To improve adherence to quarantine measures, public health officials should provide clear rationale for quarantine and information about protocols and they should underline social norms and enhance the perceived benefit that complying with confinement measures will have on public health (Webster et al. 2020). Indeed, one of the most important elements in reducing the spread of Covid-19 is to provide accurate information (Basch et al. 2020). On March 11, 2020, WHO made the assessment that Covid-19 could be characterized as a pandemic (World Health Organization 2020). After Italy and Spain, France enforced a mandatory home confinement over a

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55-day period starting at noon on March 17 and ending on May 11.

Alongside traditional sources of information such as government officials, medical experts and journalists; social media celebrities, also called social media influencers, such as these YouTubers, spread information among social media users about Covid-19, and the benefit of home confinement measures or barrier gestures. Several governments and health organizations have recognized the reach and social capital of social media influencers (Abidin et al. 2021, Archer et al. 2021). The Finnish and the British governments have formally enlisted influencers to disseminate health information on social media to reach younger audiences (Abidin et al. 2021).

In France, in March 2020, at the beginning of the first confinement, the French president Emmanuel Macron retweeted messages encouraging home confinement from popular French YouTubers, including "Le Joueur du Grenier," whose main channel counts more than 3 million subscribers. Squeezie, the most popular French YouTuber with more than 13 million subscribers (Social Blade 2020a), published a video encouraging his audience to respect home confinement measures the day after the beginning of the lockdown on March 18. His video had more than 4 million views. More recently, on February 19, 2021, the French president challenged two YouTubers from the YouTube channel "McFly et Carlito," to create a video to promote barrier gestures against Covid-19. Their video promoting barrier gestures has had more than 15 million views.

1.1 YouTube: a specific social medium

As the second most widely used website behind Google (Alexa 2020), with two billion users and more than one billion hours of videos watched per month (YouTube 2020), YouTube is the most commonly used social media website and has been identified as an important online source of information for health communication (Madathil 2015). Two types of YouTube users can be identified: the viewers, who watch and comment on videos on the platform, and the content creators, who upload videos. These two types of users are not mutually exclusive, which means that viewers can also be content creators. Content creators can be news agencies, organizations, politicians or independent users (Khan 2017). YouTubers are independent YouTube users. They are video bloggers who regularly upload videos on their personal YouTube channels (Jerslev 2016). The popularity of YouTubers is constantly increasing. The most highly followed YouTuber in the world, PewDiePie, has surpassed 100 million subscribers on YouTube (Social Blade 2020b).

1.2 Parasocial relationships with YouTubers

YouTubers are known to influence behaviors through special bonds they form with their viewers (Ferchaud et al. 2018). These bonds have been referred to as parasocial relationships. Parasocial relationships are defined as asymmetrical long-term relationships between media performers and their audience (Liebers and Schramm 2019). Parasocial relationships can be established with real people like celebrities or politicians but also with fictional characters. Parasocial relationships are considered to be conceptually close to real-life relationships (Dibble et al. 2016). It has also been argued that it is difficult for the human brain to distinguish real friends from parasocial relationships (Kanazawa 2002). Establishing parasocial relationships with media figures is a normal phenomenon every individual can experience (Stever 2017). However, parasocial relationships may become intense relationships that can modify viewers' perceptions. Horton and Wohl (1956) argued that once parasocial relationships are established, a media character can influence their audience through their opinions and values. Parasocial relationships are believed to promote different types of behaviors such as consumption behaviors (Himelboim and Golan 2019; Lee and Watkins 2016; Munnukka et al. 2019; Sokolova and Kefi 2020) and also health behaviors (Brown and Basil 2010; Brown and De Matviuk 2010; Sakib et al. 2020). In Indonesia, parasocial relationships with YouTubers appeared to influence the purchase of Covid-19 prevention product brands (Kusumawardhany 2021). More precisely, parasocial relationships with YouTubers had a positive influence on the brand-user-imagery fit and on brand value which had a positive influence on millennial purchase intention on Covid-19 prevention products. Parasocial relationships also influence information seeking. Parasocial relationships with the former president of the United States of America, Donald Trump, were negatively related to information seeking for Covid-19 (Kelly 2020). The stronger the parasocial relationship, the weaker the information seeking. Individuals who had high parasocial relationships with President Trump were likely to have positive attitudes about his views on Covid-19 and his ability to handle the virus, and therefore did not feel the need to seek additional information. During the pandemic, parasocial relationships with media personalities have increased over time, giving people a feeling of connection with others more than ever before (Bond 2021; Jarzyna 2020). Results from a longitudinal study showed that parasocial relationships with favorite celebrities and fictional characters grew stronger during Covid-19 pandemic (Bond, 2021).

1.3 YouTube and health communication

Parasocial relationships with nutritionist video bloggers appeared to have a positive impact on viewers' compliance intentions to follow healthy behaviors (Sakib et al. 2020). Parasocial relationships with weather forecasters are also believed to help viewers establish trust in them (Sherman-Morris et al. 2020; Sherman-Morris 2005). Both the intensity of parasocial relationships with weathercasters and trust in them were predictors of shelter taking during severe weather (Sherman-Morris 2005). Trust in sources of information plays a fundamental role in that people are more likely to trust information when someone for whom their level of trust is high was the one who shared it (Sterret et al. 2018). Regarding health communication, trust is also considered to be a key element (Clayman et al. 2010; Ozawa 2008) and as a prerequisite for the effectiveness of the information (Thiede 2005).

Several studies have examined the role of YouTube during virus outbreaks (Basch et al. 2020; Pandey et al. 2010; Pathak et al. 2015) and also during the current Covid-19 crisis (Atac et al. 2020; Basch et al. 2020; D'Souza et al. 2020; Khatri et al. 2020; Li et al. 2020). These studies relied on video coding and have examined the quality of information spread in YouTube videos. They generally conclude that a large proportion of YouTube videos on Covid-19 contain misleading information although they acknowledge that YouTube is an important platform for information dissemination which is insufficiently used by health officials. More specifically, independent YouTube users, such as the YouTubers, have been identified as more likely to post misleading information than other sources (D'Souza et al. 2020). However, the impact of YouTube videos on viewers has not been evaluated by these studies. We do not know if the viewers trusted the videos they had seen and if these videos modified their perception of the situation.

1.4 Objective and research questions

The objective of this research is to explore the impact of YouTube videos on viewers' perceptions and to evaluate if the YouTubers, through the parasocial relationships viewers establish with them, are considered to be trusted sources of information regarding health issues. Given that trust is a key element of health communication, a first research question (RQ) is formulated:

RQ1　Among French social media users, to what extent are YouTubers and specifically favorite YouTubers trusted (a) in general, (b) regarding information about the benefit of home confinement measures?

Many sources disseminated information about the benefit of home confinement measures during quarantine. However, it is difficult to know which source was actually informing people. Thus, a second research question is proposed:

RQ2　To what extent have French social media users been informed about the benefit of quarantine by (a) YouTubers in general and (b) by their favorite YouTubers?

In that the majority of the YouTubers have no health expertise, it is unclear if parasocial relationships with them can be associated with trust regarding health information. However, with time, parasocial relationships are believed to lead to high levels of trust, just as is the case for regular social relationships (Stehr et al. 2015). Previous studies highlighted positive associations between parasocial relationships with weather forecasters and trust in information about severe weather (Sherman-Morris et al. 2020; Sherman-Morris 2005). Thus, a first hypothesis is proposed:

H1 The intensity of a parasocial relationship with the favorite YouTuber is positively associated with the level of trust in information disseminated by the favorite YouTuber (a) in general and (b) regarding information about the benefit of home confinement measures.

Finally, the goal of disseminating health information is to influence individuals' behaviors through the modification of their perception of specific health issues. Regarding quarantine, individuals who received information they trusted about the benefit of home confinement measures should perceive these measures as more useful than individuals who did not receive such information. If favorite YouTubers were effective sources of information, individuals who received information which they trusted about home confinement from them should perceive quarantine measures as more useful than those who did not receive such information. Celebrities can successfully promote health behaviors among their audience (Brown and Basil 2010; Brown and De Matviuk 2010). Also, YouTubers are known to influence consumption behaviors (Lee and Watkins 2016; Munnukka et al. 2019; Sokolova et al. 2020) and also healthy behaviors of viewers (Sakib et al. 2020).

Then, a second hypothesis is proposed:

H2 Having received trusted information from favorite YouTubers about the benefit of home confinement measures is positively associated with the perceived utility of these measures.

2 Methodology

2.1 Sample

To investigate these research questions, an online survey was developed using Limesurvey, an open-source web surveying platform. The survey questions translated with descriptive statistics for each question are presented in Table 1. The survey was posted on 119 French Facebook groups (55 student groups, 29 city groups and 35 support groups during quarantine) during the French home confinement measures between April 29 and May 11, 2020. Student groups are groups whose main objective is to allow students from the same city or university to communicate and share content. City groups' objectives are usually to gather individuals from the same city and allow them to share and discuss local information about their city. Support groups during quarantine are new Facebook groups which have been created or renamed especially during the time of the home confinement measures. Individuals in these groups can communicate with others to reduce loneliness or share specific information about the updates on the global health crisis. In order to participate in this research, participants had to be over 18 years old and live in France during the home confinement measures. Participants were informed that their answers would remain strictly anonymous and confidential and that their participation was entirely voluntary. This research was conducted with ethical approval from the appropriate institutional ethics board. Participants were directed to the survey content after providing consent. The survey consisted of 39 items and took approximately 15 min to complete. A total of 839 individuals responded to the survey. The responses of 243 participants who stopped the questionnaire prematurely before its full completion were excluded from the data. In the end, the full sample included 596 responses.

2.2 Measures

Validated questionnaires were used to assess the intensity of the parasocial relationship with the favorite YouTuber and the level of loneliness. Loneliness has been added as a control variable because (1) loneliness is usually associated with parasocial relationships and (2) because the quarantine context is thought to exacerbate loneliness. For the other variables, specific items were created for this study and are presented in the following sections.

2.2.1 Parasocial relationship

Parasocial relationship intensity was assessed using the 10-item version of the Parasocial Interaction Scale (PSI-Scale) (Rubin and Perse 1987; Rubin et al. 1985). The scale has been adapted to the context of YouTube. The PSI-Scale is the most commonly used instrument to assess parasocial relationships (Dibble et al. 2016) and was adapted to several other media characters (Auter 1992; Grant et al. 1991; Kim and Song 2016; Rubin and Step 2000; Rubin and Perse 1987; Sun and Wu 2012; Thorson and Rodgers 2006; Wang et al. 2008). Only the participants who reported having a favorite YouTuber ($n = 251$) were asked to complete the PSI-Scale. They rated each item on a 5-point Likert-Type scale (1 = Strongly Disagree, 2 = Somewhat disagree, 3 = Neither disagree nor agree, 4 = Somewhat agree, 5 = Strongly agree). Scores of each item are added up to create a scale of parasocial relationship intensity with higher scores indicating greater degrees of parasocial relationship with the favorite YouTuber. The translation and adaptation of the scale into French was performed using the translation/back-translation method, generating a consensus among the translators. Cronbach's alpha in this study is 0.81 which indicates good internal consistency (Nunnally 1978).

2.2.2 Social isolation

Three different measures were used to assess social isolation. The French translation of the 3-item version of the University of California Los Angeles (UCLA) Loneliness Scale (De Grace et al. 1993; Hughes et al. 2004; Russell 1996) was used to assess loneliness. This scale provides a subjective measure of social isolation (Zavaleta et al. 2017). Each item is rated on a 4-point scale (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often). Scores for each item are added up to compute a total loneliness score with higher scores indicating higher levels of loneliness. Cronbach's alpha in this study is 0.78 which is acceptable (Nunnally 1978).

Two objective measures of social isolation were also used. Participants were asked to indicate if they were in a relationship or not (0 = I am single or separated or widowed; 1 = I am in a relationship). Participants were also asked if they were living alone during the quarantine or not (0 = I live alone during the quarantine; 1 = I don't live alone during the quarantine).

2.2.3 Trust

Trust in different sources of information was assessed using two items regarding nine different sources of information: medical or paramedical professionals, members of the government, journalists, family members, friends, YouTubers in general, other social media celebrities (Instagram users, streamers…), other traditional celebrities (actors, artists…) and the favorite YouTuber. For each source of information, participants were asked to rate their degree of agreement on a 5-point Likert-type Scale

Table 1 Survey questions with descriptive statistics (Mean/Frequency, Median and Standard Deviation)

Survey questions	Response options	Mean/ Frequency	Median	STD
Age	Numerical	27.71	23	10.60
Sex	Categorical			
Male		92		
Female		506		
Relationship status	Categorical			
In a relationship		315		
Not in a relationship		281		
Socio-professional category	Categorical			
Employed or independent		309		
Student		214		
Unemployed or retired		73		
Living alone during quarantine	Categorical			
Yes		121		
No		475		
In this period of confinement, indicate how often you feel as described in the following statements:	4-point Likert-type scale [a]			
I lack companionship		2.24	2	1.06
I feel left out		1.83	2	0.98
I feel isolated from others		2.44	3	1.10
Home confinement measures are useful in reducing the spread of the Covid-19	5-point Likert-type scale [b]	4.49	5	0.80
Home confinement measures are useful to protect myself from the Covid-19	5-point Likert-type scale [b]	4.27	5	0.93
Others respect home confinement measures	5-point Likert-type scale [b]	2.60	2	1.02
In general, I trust or would trust the information provided by…	5-point Likert-type scale [b]			
Medical or paramedical professionals		4.2	4	0.7
Members of the government		2.9	3	1.2
Journalists		2.8	3	1.0
Family members		3.0	3	0.9
Friends		3.0	3	0.9
YouTubers in general		2.1	2	0.9
Other social media celebrities		1.9	2	0.8
Other traditional celebrities		1.8	2	0.9
I trust or would trust the information on the value of home confinement measures provided by…	5-point Likert-type scale [b]			
Medical or paramedical professionals		4.4	4	0.7
Members of the government		3.1	3	1.2
Journalists		3.0	3	1.1
Family members		3.2	3	1.0
Friends		3.1	3	0.9
YouTubers in general		2.0	2	1.0
Other social media celebrities		1.8	2	0.9
Other traditional celebrities		1.8	1	0.9
These people gave me information about the value of home confinement measures	5-point Likert-type scale [b]			
Medical or paramedical professionals		4.2	4	0.9
Members of the government		3.4	4	1.2
Journalists		3.4	4	1.1
Family members		3.3	3	1.1
Friends		3.1	3	1.1
YouTubers in general		2.1	2	1.2
Other social media celebrities		1.9	1	1.1

Table 1 (continued)

Survey questions	Response options	Mean/ Frequency	Median	STD
Other traditional celebrities		1.8	1	1.0
Do you have a favorite YouTuber and what is their name? (Names cited are reported in this table)	Categorical			
Yes		251		
No		345		
Please indicate your level of agreement with the following statements	5-point Likert-type scale [b]			
In general, I trust or would trust the information provided by my favorite YouTuber		3.3	3	1.2
I trust or would trust the information on the value of home confinement measures provided by my favorite YouTuber		2.9	3	1.2
My favorite YouTuber gave me information about the value of home confinement measures		2.6	3	1.3
Please indicate your level of agreement with the following statements	5-point Likert-type scale [b]			
My favorite YouTuber makes me feel comfortable, as if I am with a friend		3.47	4	1.11
I see my favorite YouTuber as a natural, down-to-earth person		3.85	4	0.98
I look forward to watching my favorite YouTuber on his or her next video		3.69	4	1.05
If my favorite YouTuber appeared in a video on another YouTube channel, I would watch that video		3.71	4	1.00
My favorite YouTuber seems to understand the kinds of things I want to know		3.45	4	1.05
If I saw a story about my favorite YouTuber in a newspaper or magazine, I would read it		3.25	4	1.21
I miss seeing my favorite YouTuber when he or she is ill 3or on vacation		1.95	2	1.08
I would like to meet my favorite YouTuber in person		2.67	3	1.25
I feel sorry for my favorite YouTuber when he or she makes a mistake		2.65	3	1.10
I find my favorite YouTuber to be attractive		2.73	3	1.14

For categorical variables, frequencies are reported. For age and ordinal variables (likert-type scale), mean, median and standard deviation are reported

[a]Responses options for 4-point Likert scale are: never (1), rarely (2), sometimes (3), often (4)

[b]Responses options for 5-point Likert scale are: strongly disagree (1), disagree (2), neither disagree nor agree (3), agree (4), strongly agree (5)

(1 = Strongly Disagree, 2 = Somewhat disagree, 3 = Neither disagree nor agree, 4 = Somewhat agree, 5 = Strongly agree) with the following sentences: (1) "In general, I trust or would trust information from…"; (2) "I trust or would trust information regarding the benefit of home confinement measures from…".

2.2.4 Information received about the benefit of home confinement

To assess whether the participants received information about the benefit of home confinement measures from the different sources, they were asked to rate the following statement on a 5-point Likert-Type scale (1 = Strongly Disagree, 2 = Somewhat disagree, 3 = Neither disagree nor agree, 4 = Somewhat agree, 5 = Strongly agree) for each source of information: "This source of information brought me information about the benefit of home confinement measures."

2.2.5 Trusted and informative sources of information

For each source of information, a dummy variable that indicates whether or not the source of information is seen as trusted and informative about the benefit of home confinement measures was created. This variable was coded as 1 when individuals received trusted information about home confinement measures from a specific source, that is to say when they reported somewhat agreeing or strongly agreeing with both of the following statements regarding a specific source: (1) "I trust or would trust information regarding the benefit of home confinement measures from…" and (2) "This source of information brought me information about the benefit of home confinement measures." The variable was coded 0 if such was not the case.

2.2.6 Perceived benefit of quarantine

Two measures were used to assess the perceived benefit of quarantine. Participants were asked to rate the following

statements on a 5-point Likert-type scale (1 = Strongly Disagree, 2 = Somewhat disagree, 3 = Neither disagree nor agree, 4 = Somewhat agree, 5 = Strongly agree): "Home confinement measures are useful in reducing the spread of Covid-19" and "Home confinement measures are useful to protect myself from Covid-19." Both of these measures were positively oriented. A total of 58% of the respondents (n = 347) strongly agreed that home confinement measures were helpful in reducing the spread of the virus. A total of 48% of the respondents (n = 288) strongly agreed that home confinement measures were helpful to protect them from the virus. As long as the response options other than "Strongly agree" indicate some level of doubt regarding the benefit of quarantine measures, and that both of these measures of perceived benefit of quarantine were positively oriented, these variables were dichotomized as 1 for "Strongly agree" and 0 for "Other" ("Strongly disagree", "Somewhat disagree", "Neither disagree nor agree" and "Somewhat agree").

2.2.7 Social norm perception

To assess the perception of the social norm regarding quarantine, participants were asked to rate their degree of agreement on a 5-point Likert-type Scale (1 = Strongly Disagree, 2 = Somewhat disagree, 3 = Neither disagree nor agree, 4 = Somewhat agree, 5 = Strongly agree) with the following statement: "The rest of the population respects home confinement measures." In that only three respondents strongly agreed that the rest of the population respected home confinement measures, the response options "Strongly agree" and "Somewhat agree" were merged, and this variable was dichotomized as 0 for "Strongly disagree," "Somewhat disagree" and "Neither disagree nor agree" (n = 418, 70% of the sample) and 1 for "Somewhat agree" and "Strongly agree" (n = 178, 30% of the sample).

2.2.8 Socio-demographic measures

Control variables related to socio-demographic characteristics include age, sex, level of education and socio-professional category. Sex was dummy-coded (0 = female and 1 = male). The level of education was dummy-coded as 0 for a high school diploma or less and 1 for higher levels than a high school diploma. Three categories were used for socio-professional status: employed or independent; student; retired or unemployed.

2.3 Data analysis

The data was analyzed using STATA (version 14.2) for Windows. Due to the ordinal nature of the data, Wilcoxon signed-rank tests were used to explore research questions RQ1 and RQ2. Ordinal Logistic Regressions (OLR) were used to test H1a and H1b as the dependent variables; the level of trust in the favorite YouTuber in general and the level of trust in the favorite YouTuber regarding information about the benefit of home confinement measures; are ordinal variables. The proportional odds assumption was respected. Logistic regressions were used to test H2 as the dependent variables; the perceived benefit of quarantine to reduce the spread of Covid-19 and the perceived benefit of quarantine to protect myself; are binary variables. Multicollinearity was evaluated using variance inflation factor (VIF) values and tolerance. All VIF values were less than 1.68 and all tolerance values were greater than 0.59, which is considered as acceptable. For regression analyses, data were reweighted by sex in order to match the gender balance of the general population (50–50%).

3 Results

Tables 2 and 3 present the descriptive statistics for the study variables. The final sample consisted of 596 participants, 504 females (85%) and 92 males (15%). A total of 251 participants declared having a favorite YouTuber. The mean age of the respondents was 33.5 years (SD = 13.8).

3.1 Level of trust

Table 4 presents the differences in levels of trust between YouTubers in general and the other sources of information regarding information in general and information about the benefit of home confinement measures using Wilcoxon signed-rank tests (n = 596). Regarding both information in general and information about the benefit of home confinement measures, YouTubers in general are the sixth most trusted source of information, significantly behind medical and paramedical professionals, members of the government, journalists, family members and friends and significantly ahead other social media celebrities and traditional celebrities.

Table 5 presents the differences in levels of trust between the favorite YouTuber and the other sources of information regarding information in general and information about the benefit of home confinement measures using Wilcoxon signed-rank tests for the group of participants who have a favorite YouTuber (n = 251). Regarding information in general, the favorite YouTuber is the second most trusted source of information, significantly behind medical and paramedical professionals and significantly ahead members of the government, journalists, family members, friends, YouTubers in general, other social media celebrities and traditional celebrities. Regarding information about the benefit of home confinement measures, the favorite YouTuber is the third most trusted source

Table 2 Descriptive statistics (M and SD) of study variables for the full sample (*n*=596) and for the participants who have a favorite YouTuber (*n* = 251)

Variable	Total sample (*n* = 596)			Participants who have a favorite You-Tuber (*n*=251)		
	Mean	Median	SD	Mean	Median	SD
Age	33.5	28	13.8	27.7	23	10.6
Loneliness (α=0.78)	6.5	6	2.6	6.5	6	2.6
Parasocial relationship with the favorite YouTuber (α=0.81)	–		–	31.4	31	6.7
Level of trust in information in general from…						
Medical or paramedical professionals	4.2	4	0.7	4.2	4	0.7
Members of the government	2.9	3	1.2	3.0	3	1.1
Journalists	2.8	3	1.0	2.8	3	1.0
Family members	3.0	3	0.9	3.0	3	1.0
Friends	3.0	3	0.9	2.9	3	0.9
YouTubers in general	2.1	2	0.9	2.4	2	1.0
Other social media celebrities	1.9	2	0.8	2.0	2	0.9
Other traditional celebrities	1.8	2	0.9	1.9	2	0.9
The favorite YouTuber	–		–	3.3	3	1.2
Level of trust in information about the benefit of home confinement measures from…						
Medical or paramedical professionals	4.4	4	0.7	4.4	5	0.7
Members of the government	3.1	3	1.2	3.2	3	1.2
Journalists	3.0	3	1.1	3.0	3	1.1
Family members	3.2	3	1.0	3.1	3	1.0
Friends	3.1	3	0.9	3.0	3	0.9
YouTubers in general	2.0	2	1.0	2.2	2	1.1
Other social media celebrities	1.8	2	0.9	1.9	2	1.0
Other traditional celebrities	1.8	1	0.9	1.8	1	1.0
The favorite YouTuber	–		–	2.9	3	1.2
Level of information received about the benefit of home confinement measures from…						
Medical or paramedical professionals	4.2	4	0.9	4.2	4	0.9
Members of the government	3.4	4	1.2	3.5	4	1.2
Journalists	3.4	4	1.1	3.5	4	1.1
Family members	3.3	3	1.1	3.2	3	1.1
Friends	3.1	3	1.1	3.0	3	1.1
YouTubers in general	2.1	2	1.2	2.5	3	1.4
Other social media celebrities	1.9	1	1.1	2.0	2	1.2
Other traditional celebrities	1.8	1	1.0	1.8	1	1.0
The favorite YouTuber	–		–	2.6	3	1.3

Standard Deviation (SD). Mean (M)

of information alongside journalists, family members and friends and significantly behind medical and paramedical professionals and members of the government and significantly ahead of YouTubers in general, other social media celebrities and traditional celebrities. Figure 1 shows the level of trust in information in general and the level of trust in information about the benefit of home confinement among the participants who have a favorite YouTuber.

3.2 Levels of information received about the benefit of home confinement measures

Table 6 presents the differences in levels of information received about the benefit of home confinement measures between YouTubers in general and the other sources information (*n*=596) and between the favorite YouTuber and the

Table 3 Descriptive statistics (n and percentage) of study variables for the full sample (*n*=596) and for the participants who have a favorite You-Tuber (*n*=251)

Variable	Total sample (*n*=596)		Participants who have a favorite YouTuber (*n*=251)	
	n	Percentage	n	Percentage
Sex				
Male	92	15%	54	22%
Female	506	85%	197	78%
Relationship status				
In a relationship	315	53%	113	45%
Not in a relationship	281	47%	138	55%
Living alone during quarantine				
Yes	121	20%	48	19%
No	475	80%	203	81%
Socio-professional category				
Employed or independent	309	52%	95	38%
Student	214	36%	132	53%
Unemployed or retired	73	12%	24	9%
Home confinement measures are useful in reducing the spread of the Covid-19				
Strongly agree	347	58%	158	63%
Other [a]	249	42%	93	37%
Home confinement measures are useful to protect myself from the Covid-19				
Strongly agree	288	48%	126	50%
Other [a]	308	52%	125	50%
Others respect home confinement measures				
Strongly disagree, somewhat disagree, neither disagree nor agree	418	70%	186	74%
Strongly agree, somewhat agree	178	30%	65	26%
Participants who have received trusted information about the benefit of home confinement from… [b]				
Medical or paramedical professionals	493	83%	213	85%
Members of the government	236	40%	104	41%
Journalists	209	35%	95	38%
Family members	197	33%	77	31%
Friends	175	29%	65	26%
YouTubers in general	33	6%	27	11%
Other social media celebrities	11	2%	10	4%
Other traditional celebrities	7	1%	4	2%
The favorite YouTuber	54	9%	54	22%

[a]The two variables "Home confinement measures are useful in reducing the spread of Covid-19" and "Home confinement measures are useful to protect myself from Covid-19" have been dichotomized (1: "Strongly agree"; 0: "Other"). "Other": "Somewhat agree," "Neither disagree nor agree," "Somewhat disagree," "Strongly disagree."

[b]Participants who received trusted information about home confinement measures are participants who reported being in agreement or strongly agreeing with both of the following statements: (1) "I trust or would trust information regarding the benefit of home confinement measures from…" and (2) "This source of information brought me information about the benefit of home confinement measures."

other sources of information using Wilcoxon signed-rank tests (*n*=251). Among all the participants (*n*=596), You-Tubers in general are in sixth place as a source of information from which participants received the most information about the benefit of home confinement measures, falling significantly behind medical and paramedical professionals, members of the government, journalists, family members and friends and significantly ahead of other social media celebrities and traditional celebrities.

Among the participants who had a favorite YouTuber (*n*=251), the favorite YouTuber was in sixth position as a source of information from which participants received the

Table 4 Differences in levels of trust between YouTubers in general and the other sources of information regarding information in general and information about the benefit of home confinement measures using Wilcoxon signed-rank tests (*n* = 596)

| | YouTubers in general (*n* = 596) | | | |
| | Information in general | | Information about the benefit of home confinement measures | |
	Z-score	P	Z-score	P
Medical and paramedical professionals	− 21.05	0.000***	− 21.12	0.000***
Members of the government	− 12.82	0.000***	− 15.04	0.000***
Journalists	− 13.382	0.000***	− 15.361	0.000***
Family members	− 16.15	0.000***	− 17.78	0.000***
Friends	− 16.02	0.000***	− 17.54	0.000***
Other social media celebrities	8.18	0.000***	6.84	0.000***
Traditional celebrities	6.48	0.000***	5.78	0.000***

$*p < 0.05; **p < 0.01; ***p < 0.001$. Z-score is the test statistic produced by the Wilcoxon signed rank test

Table 5 Differences in levels of trust between the favorite YouTuber and the other sources of information regarding information in general and information about the benefit of home confinement measures using Wilcoxon signed-rank tests among the participants who have a favorite YouTuber (*n* = 251)

| | The favorite YouTuber (*n* = 251) | | | |
| | Information in general | | Information about the benefit of home confinement measures | |
	Z-score	P	Z-score	P
Medical and paramedical professionals	− 9.78	0.000***	− 12.25	0.000***
Members of the government	2.39	0.017*	− 2.24	0.025*
Journalists	5.17	0.000***	− 0.325	0.745
Family members	3.35	0.000***	− 1.92	0.055
Friends	4.58	0.000***	− 0.81	0.416
YouTubers in general	11.06	0.000***	8.71	0.000***
Other social media celebrities	12.20	0.000***	10.59	0.000***
Traditional celebrities	12.32	0.000***	11.22	0.000***

$*p < 0.05; **p < 0.01; ***p < 0.001$. Z-score is the test statistic produced by the Wilcoxon signed rank test

most information about the benefit of home confinement measures alongside YouTubers in general and significantly behind medical and paramedical professionals, members of the government, journalists, family members and friends and significantly ahead of other social media celebrities and traditional celebrities. Figure 1 shows the level of information received from the different sources among the participants who had a favorite YouTuber.

3.3 Parasocial relationships and the level of trust

Due to the ordinal nature of the data, OLRs were performed to test the relationship between the intensity of parasocial relationships with the favorite YouTuber and the level of trust in information, in general and regarding the benefit of home confinement measures, from this YouTuber. To test H1a and H1b, two OLRs were performed for the 251

participants who declared having a favorite YouTuber. Table 7 presents the two OLR results for each independent variable.

The intensity of the parasocial relationship with the favorite YouTuber is both positively and significantly associated with the general level of trust in the favorite YouTuber (OR: 1.110; *p* < 0.001) and with the level of trust in the favorite YouTuber regarding information about the benefit of home confinement measures (OR: 1.152, *p* < 0.001).

3.4 Perceived benefit of home confinement measures and effectiveness of the different sources of information

To test H2, two logistic regressions were run. Table 8 shows the results of the logistic regressions.

The fact of having received trusted information about the benefit of home confinement measures from journalists (OR:
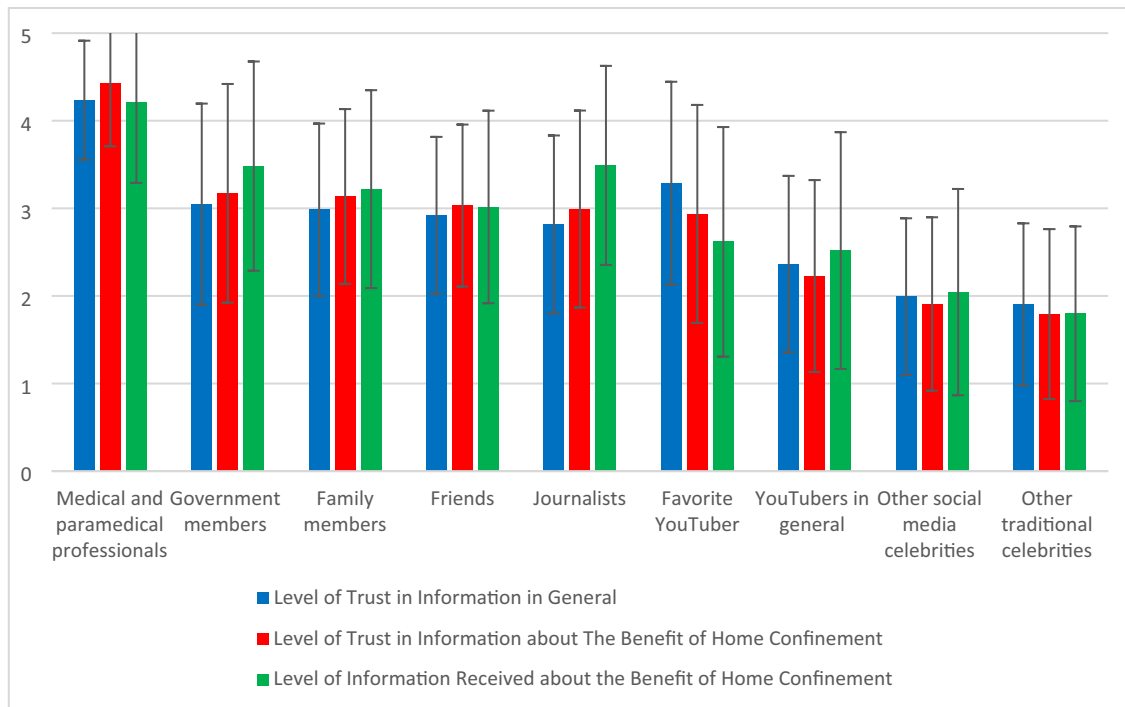
Note: 1=Strongly disagree, 2=Somewhat disagree, 3= Neither disagree nor agree, 4=Somewhat

agree, 5=Strongly agree.

Fig. 1 Means (± SD) of the levels of trust in information in general, the levels of trust in information about the benefit of home confinement measures and the levels of information about the benefit of home confinement measures received from the different sources among the participants who have a favorite YouTuber (*n*=251) *Note*: 1=Strongly disagree, 2=Somewhat disagree, 3=Neither disagree nor agree, 4=Somewhat agree, 5=Strongly agree

Table 6 Differences in levels of information received about the benefit of home confinement measures between YouTubers in general and the other sources information (*n*=596) and between the favorite YouTuber and the other sources of information using Wilcoxon signed-rank tests (*n*=251)

	YouTubers in general (*n*=596)		Favorite YouTuber (*n*=251)	
	Z-score	P	Z-score	P
Medical and paramedical professionals	− 19.84	0.000***	− 11.58	0.000***
Members of the government	− 15.31	0.000***	− 6.82	0.000***
Journalists	− 16.13	0.000***	− 6.92	0.000***
Family members	− 15.56	0.000***	− 5.68	0.000***
Friends	− 14.54	0.000***	− 3.76	0.000***
YouTubers in general	–	–	1.35	0.176
Other social media celebrities	6.39	0.000***	5.94	0.000***
Traditional celebrities	6.67	0.000***	8.12	0.000***

$*p<0.05; **p<0.01; ***p<0.001$. Z-score is the test statistic produced by the Wilcoxon signed rank test

1.931; p=0.030), members of the government (OR: 1.949; p=0.014) and the favorite YouTuber (OR: 4.334; p=0.008) was positively and significantly associated with the perceived utility of home confinement measures in reducing the spread of the virus.

The fact of having received trusted information about the benefit of home confinement measures from medical and paramedical professionals (OR: 2.360; p=0.006), members of the government (OR: 2.998; *p*<0.001) and the favorite YouTuber (OR: 3.054; p=0.014) was positively and

Table 7 Ordered logistic regressions of trust in general and about the benefit of home confinement measures among the participants who have a favorite YouTuber (*n* = 251)

Parameter	Trust in the favorite YouTuber in general			Trust in the favorite YouTuber regarding information about the benefit of home confinement measures		
	OR	P	95% CI	OR	P	95% CI
Parasocial relationship with favorite YouTuber	**1.110**	**0.000*****	**1.057–1.165**	**1.152**	**0.000*****	**1.097–1.210**
Age	0.978	0.227	0.944–1.014	0.986	0.342	0.958–1.015
Sex (male = 1)	0.889	0.689	0.500–1.580	0.855	0.569	0.498–1.467
Loneliness	0.995	0.936	0.888–1.116	0.903	0.067	0.810–1.007
I live alone during quarantine[a]	**2.431**	**0.016***	**1.180–5.008**	**2.804**	**0.011***	**1.271–6.187**
Relationship status[b]	0.824	0.512	0.461–1.471	0.895	0.745	0.460–1.742
Socio-professional category (Employed or independent = reference)						
Student	0.781	0.552	0.345–1.765	1.174	0.703	0.515–2.672
Unemployed or retired	1.041	0.920	0.480–2.255	1.734	0.164	0.799–3.764
Level of education[c]	1.098	0.794	0.543–2.221	1.279	0.497	0.629–2.602
Pseudo-R^2	0.065			0.101		

Bold values indicate statistical significance

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. OR: odd ratio. CI: confidence intervals. [a]I live alone during quarantine (Yes = 1, No = 0). [b]Relationship status (I am in a relationship = 1, I am single, separated, widowed = 0). [c]Level of education (higher than high school diploma = 1)

significantly associated with the perceived utility of home confinement measures as a personal protective measure against the virus.

Loneliness was significantly and negatively associated with both the perceived utility of home confinement measures in reducing the spread of the virus (OR: 0.900; $p = 0.024$) and with the perceived utility of home confinement measures as a personal protective measure against the virus (OR: 0.862; $p = 0.002$). This result may be explained by the fact that the lonelier people feel, the more difficult it may be for them to follow the quarantine rules, as they probably suffer more from this mandatory isolation. They might then tend to perceive it as less useful, probably because they would be tempted to respect these rules less.

4 Discussion

4.1 Favorite YouTubers influence our perceptions about health issues through parasocial relationships

The current findings contribute to the literature about parasocial relationships as we find that the intensity of parasocial relationships with the favorite YouTuber appears to be positively associated with the level of trust in information disseminated by this YouTuber. The more intense the parasocial relationship is, the more trusted the information from this YouTuber is, whether that information be about health

issues, such as the benefit of home confinement measures, or not. These results are in line with previous studies supporting a positive association between parasocial relationships with mediated figures and trust in these mediated figures (Sherman-Morris et al. 2020; Sherman-Morris 2005) and with the literature about the role of celebrities in promoting health (Brown and Basil 2010; Brown and De Matviuk 2010; Sakib et al. 2020) and more generally with the literature about the impact of social media influencers on viewers' behaviors (Himelboim and Golan 2019; Lee and Watkins 2016; Munnukka et al. 2019; Sokolova and Kefi 2020). Through parasocial relationships, media personalities might influence their audience, whatever their field of expertise is. These relationships appear to foster trust, which is a prerequisite for the effectiveness of information, especially for health information (Thiede 2005).

In this research, among the participants who declared having a favorite YouTuber, the favorite YouTuber was the second most trusted source of information in general behind medical and paramedical professionals. Among our respondents, information from this source was seen as more reliable than information from members of the government, journalists or family members and friends. Regarding information about the benefit of home confinement measures, information from the favorite YouTuber was considered to be as reliable as information from journalists, family members or friends. Regardless of the type of information, information from the favorite YouTuber was always thought to be more reliable than information from other YouTubers, other

Table 8 Logistic regressions of the perceived benefit of home confinement measures ($n = 596$)

Parameter	Perceived benefit of home confinement measures in reducing the spread of the virus (0: "Strongly disagree", "Somewhat disagree", "Neither disagree nor agree" and "Somewhat agree"; 1: "Strongly agree")			Perceived benefit of home confinement measures as a personal protective measure against the virus (0: "Strongly disagree", "Somewhat disagree", "Neither disagree nor agree" and "Somewhat agree"; 1: "Strongly agree")		
	OR	P	95% CI	OR	P	95% CI
Participant has received trusted information about the benefit of home confinement from… (Yes=1; No=0)						
Medical and paramedical professionals	1.322	0.371	0.717–2.437	**2.360**	**0.006****	**1.285–4.335**
Journalists	**1.931**	**0.030***	**1.067–3.495**	0.974	0.931	0.542–1.753
Government members	**1.949**	**0.014***	**1.148–3.311**	**2.998**	**0.000*****	**1.701–5.283**
Family members	0.799	0.494	0.420–1.520	1.631	0.149	0.839–3.173
Friends	1.793	0.109	0.878–3.662	1.256	0.511	0.636–2.480
Favorite YouTuber	**4.334**	**0.008****	**1.465–12.824**	**3.054**	**0.014***	**1.249–7.468**
YouTubers in general	0.478	0.115	0.191–1.198	0.827	0.719	0.293–2.331
Other Celebrities	0.530	0.550	0.066–4.266	0.601	0.671	0.058–6.271
Other social media celebrities	0.466	0.388	0.082–2.643	0.379	0.334	0.052–2.740
Age	0.989	0.460	0.962–1.018	1.007	0.589	0.981–1.034
Sex (male=1)	1.573	0.072	0.959–2.580	1.456	0.125	0.901–2.353
Loneliness	**0.900**	**0.024***	**0.822–0.986**	**0.862**	**0.002****	**0.783–0.949**
I live alone during quarantine[a]	0.599	0.141	0.303–1.185	0.721	0.337	0.370–1.406
Relationship status[b]	1.003	0.993	0.574–1.750	1.174	0.578	0.667–2.066
Socio-professional category (Employed or independent=reference)						
Student	1.124	0.765	0.521–2.425	1.480	0.245	0.765–2.865
Unemployed or retired	1.505	0.386	0.672–3.371	**2.258**	**0.049***	**1.003–5.082**
Level of education[c]	1.251	0.386	0.684–2.290	0.355	0.355	0.752–2.218
The rest of the population respects home confinement measures[d]	0.618	0.093	0.352–1.083	**0.468**	**0.004****	**0.278–0.790**
Pseudo-R^2	0.106			0.149		

Bold values indicate statistical significance

$*p < 0.05$; $**p < 0.01$; $***p < 0.001$. OR: odd ratio. CI: confidence intervals. [a]I live alone during quarantine (Yes=1, No=0). [b]Relationship status (I am in a relationship=1, I am single, separated, widowed=0). [c]Level of education (higher than high school diploma=1). [d]The rest of the population respects home confinement measures ("Strongly agree" and "Somewhat agree"=1; "Strongly disagree," "Somewhat disagree" and "Neither disagree nor agree"=0)

social media celebrities and traditional celebrities. Favorite YouTubers appear to be trusted by their audience, even on important and serious matters such as the benefit of home confinement measures during a global health crisis.

These findings are both promising and alarming. Indeed, several other studies have underlined the fact that a lot of YouTube videos about Covid-19 contain misleading information (Atac et al. 2020; Basch et al. 2020; D'Souza et al. 2020; Khatri et al. 2020; Li et al. 2020), especially videos posted by independent users (D'Souza et al. 2020). They conclude that health officials should increase efforts to disseminate accurate information to help mitigate disease spread and decrease panic in the general population. Misleading health information on social media had already been identified as a worrying issue before the current Covid-19 crisis (Bliss et al. 2018; Madathil et al. 2015). However,

the current research shows that social media celebrities in general are not especially trusted compared to other sources of information. Only the favorite YouTuber is particularly trusted. Moreover, having received trust-worthy information about the benefit of home confinement measures from the favorite YouTuber was positively associated with the general perception that quarantine measures were useful regarding the current crisis, which is one of the key elements to improve adherence to these measures (Webster et al. 2020). Thus, favorite YouTubers might be effective sources of health information, provided that they convey the correct information.

4.2 Implications regarding health communication and future research directions

Implications can be drawn from these results. This research, in line with previous research about YouTube regarding health communication (Madathil et al. 2015), underlines the great potential of this social media platform as a channel for health communication. First of all, YouTubers in general appear to be significantly more trusted than other social media celebrities and traditional celebrities regarding information in general and about home confinement measures. Moreover, results show that favorite YouTubers, who are independent users, can be considered as trusted sources of information regarding health issues. Information about the benefit of home confinement from them is considered to be as reliable as information from journalists, friends or family members. During this global health crisis, several YouTubers, who do not usually discuss health issues, have voluntarily created specific videos to inform their audience, which seems to have had a positive influence on their viewers' perception of the benefit of home confinement measures.

However, although favorite YouTubers are effective sources of information, participants did not receive much information about the benefit of home confinement measures from their favorite YouTuber. Indeed, although information about the benefit of home confinement measures from favorite YouTubers is considered just as trustworthy as that from other sources, participants have received less information from their favorite YouTuber than from journalists, family members or friends. These results imply that favorite YouTubers are potential channels of health communication in times of crisis that could be more auspiciously developed.

Several things can be done to help these YouTubers to better inform their audiences. To cope with the issue of misleading information spread by independent users during a global health crisis (D'Souza et al. 2020), specific health communication campaigns could target popular YouTubers in order to provide them with clear and correct information. Improving the awareness of popular YouTubers about health issues will allow them to better communicate about these topics with their audience, and could help reduce the amount of misleading information which is disseminated. It could also encourage some YouTubers to create informative videos for their audience. Another way to help YouTubers better communicate about health issues could be to develop videos with popular YouTubers featuring medical professionals and to post them on the YouTubers' channels. Special stream events hosted by popular social media celebrities during which the audience could directly interact with a health professional to ask questions could also be interesting and improve health awareness among social media users. Future studies should also analyze the quality of the information about home confinement and Covid-19 spread which is dispensed by the most popular YouTubers. Doing so would allow health specialists to potentially help YouTubers to improve the quality of their videos by identifying and then providing them with the information their videos lack the most.

4.3 Limitations

The first limitation is the fact that the sample is uneven regarding gender with only 15% of the participants being men. However, this is not surprising as women are believed to participate more in research because they are more likely to discuss emotional issues or problems than men (Young 1998).

Second, pseudo-R^2 values of the regression analyses range from 0.065 to 0.149, which is relatively low. R^2 and pseudo-R^2 are usually relatively lower in social sciences than in other research fields. Moreover, pseudo-R^2 of logit and ordered logit models, which measure the difference between the log-likelihood of the null (intercept) and tested models, are difficult to interpret, and it is then complicated to judge whether 0.065 or 0.149 represent good fits. In all four regressions, the p-values of the likelihood ratio Chi-square test were nevertheless lower than 0.00001 which indicated that the model was statistically significant.

Third, the recruitment of participants through Facebook constitutes a limitation because only Facebook users took part in this research. Further research with a representative sample should be done in order to properly generalize the results and confirm the current findings.

Fourth, although the perceived benefit of home confinement has been assessed here, this research did not evaluate the actual behaviors of the participants. Based on the theoretical framework provided by the Health Belief Model, the perceived benefit related to such health behavior is thought to influence the probability that individuals will take action to prevent, to screen for, or to control illness conditions (Champion 2008). Future studies should define objective measures to assess whether different sources of information have an impact on the adherence to home confinement measures of individuals.

Finally, the study uses only cross-sectional data. A longitudinal design could better explore the relationships between trust and parasocial relationships and also between the dissemination of health information and the evolution of individuals' benefit perception of health behaviors.

5 Conclusion

This study explores the extent to which favorite YouTubers are considered to be trusted sources of information in general and in regard to health issues. Results also contribute to

the parasocial phenomena literature by supporting the existence of a positive relationship between the level of trust in information from a source and the intensity of the parasocial relationship with the same source. Finally, trustworthy information about the benefit of home confinement which is spread by favorite YouTubers is positively associated with the perceptions of the benefit of home confinement measures of viewers. Favorite YouTubers seem to already be effective sources of information that could be improved with the support of health professionals to reduce the amount of misleading information disseminated. YouTube and, more precisely, YouTubers appear to be important sources of information during a global health crisis, and this fact should not be neglected by health officials.

Declarations

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