COVID-19 Scientific Facts Vs. Conspiracy Theories: 0 – 1: Science Fails to Convince Even Highly Educated Individuals

Marios Constantinou (CONSTANTINOU.M@UNIC.AC.CY)
University of Nicosia
Anthony Kagialis
University of Nicosia
Maria Karekla
University of Cyprus

Research Article

Keywords: COVID-19, Conspiracy Theories, Psychological State, Public Health, Social Distancing, Quarantine Measures

Posted Date: June 8th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-33972/v1

Abstract

Science may be failing to convince a significant number of people about COVID-19 scientific facts and needed public health measures. Individual and social factors are behind believing conspiracy theories. Adults (N = 1001) were asked to rate their beliefs in various conspiracy theories circulating in social media, rate their psychological distress relating to COVID-19, rate their trust in science to solve COVID-19 problems, and rate their willingness to adhere to measures regarding social distancing and quarantine. The findings showed conspiracy theories are widely believed even among highly educated individuals. Stronger conspiracy theory beliefs predicted science mistrust and unwillingness to adhere to public health measures. Psychological distress increased conspiracy beliefs. Recommendations, stemming from the findings, for reducing such beliefs and better serve public health are discussed.

Introduction

In the first 12 days of April, 2020, within the first 100 continuous posts of each day (total of 1200 posts in 12 days) on the Facebook news feed of the first author there were 24.62 (SD = 2.12) posts per day regarding COVID–19 related conspiracy theories or myths (e.g., COVID–19 was created for human population control,). An average of 2.56 (SD = 1.01) of those conspiracy theory posts called for some form of an action or uprising against the government measures taken for COVID–19. At the same time, many older conspiracy theories and myths were resurfacing on social media or even linked somehow to the current COVID–19 situation (e.g. 5G telephony, vaccinations relating autism etc.). This observation “provoked” the current study.

When ancient Greeks could not explain naturally occurring destructive events, such as devastating floods, earthquakes, and mass deaths by famine and illnesses, they would explain the inexplicable by creating myths and deities. A common function of myths was to alleviate the anxiety created by the unknown and pass responsibility on to deities in an attempt to feel that not all in life is random. Similarly, divine explanations were reported by Egyptians, Mayas, Incas and other ancient civilizations. It appears that even today, despite the advent of science, when events are inexplicable or anxiety provoking, we rush to rationalize and turn to myths and conspiracy theories to help us alleviate our fears and anxieties. Increased anxiety and other mental disorders, such as depression, have been indeed linked to higher levels of conspiracy theory believing (Grzesiak-Feldman, 2013).

People want to rationalize inexplicable events and diffuse the levels of their anxiety by believing in imagined (Vs. factual) conspiracy theories (Franks, Bangerter, & Bauer, 2013). Not unlike the ancient Greeks (Abu Taher, Mannan, Shahinoor, & Dulal, 2018), individuals today often form myths and conspiracy theories that entail partially some truth (e.g., coronaviruses are just another family of viruses with flu like symptoms) and partially some made-up components (e.g., this coronavirus is just a plot by the governments to install 5G telephony networks under our noses).

The COVID–19 pandemic is unlike most previous pandemics (e.g., the Spanish Flu 1918–1920) simply because today we live in a world of digital communications. Today we have the ability to be socially connected and continuously updated with real or fake (and often a combination of both) news. This virtual social connection helps myths and conspiracy theories spread quickly around the globe. Unfortunately, a large number of individuals choose to believe myths and conspiracy theories over scientific evidence. The internet and social media are also widely used as means to receive information regarding anxiety and other mental or physical health problems (REF) or simply as pastime and a venue for stress-relief and relaxation (REF). Thus, especially those who may be more prone to stress, a bombardment of conspiracy theories from social media, may feed their fears, provide plausible solutions and render them more susceptible to believing such myths and conspiracies.

In addition to myth or conspiracy theory believing as means to alleviate anxiety and uncertainty, other parameters are also linked with such beliefs. Researchers (Kareklas, Muehling & Weber, 2015; Weber, Muehlong & Kareklas, 2019) found that people believe questionable health-related information when the presenter appears credible, impressionable and/or effectively utilizes electronic communications (e.g., in the case of “vaccines cause autism”). Impressionable information (even if fake) is more easily recorded to our memory (Vlasceanou & Coman, 2018) than factual information. This appears to be the case for information coming out related to this pandemic, where we have been witnessing videos and social media comments that are delivered in a highly impressionable and intriguing) way, even when the content of the message (e.g., COVID–19 was created for population control) is not logical or supported by facts. Such convincing “fake news” presentations could confuse even the scientists among us and make us wonder what is or not true.

Believing in conspiracy theories is a combination of individual (e.g., personality traits and education; Swami, Weis, Lay, Barron, & Furnham, 2015) and social factors (e.g., who you “hang out” with; Klein, Clutton & Dunn, 2019). The following individual and social factors are very frequently related to believing conspiracy theories: lower self-esteem, political cynicism, social exposure to conspiracy theories, lower agreeableness, generalized distorted thinking and paranormal beliefs, chronic feelings of psychological and sociopolitical disempowerment, intense feelings of uncertainty, lower educational level, lower crystalized intelligence, feelings of belonging on the losing side of an inter-group social conflict, mistrust of government, paranoia/suspiciousness, lower analytical thinking, schizotypy, and stronger religiosity (Swami et al., 2011; Franks, Bangerter, & Bauer, 2013; Swami, Voracek, Stieger, Tran, & Furnham, 2014; Swami, Weis, Lay, Barron, & Furnham, 2015; van Prooijen & Douglas, 2018; Cherry, 2019). Furthermore, for some, a conspiracy theory is more appealing and satisfying than factual information (Douglas, Sutton, & Cichocka, 2017).

Health, relationships between people or groups, and public safety issues are the most frequent subject matters of conspiracy theories across cultures (van Prooijen & Douglas, 2018). However, the true prevalence of each specific conspiracy theory is hard to assess as the “believers” tend to be suspicious of the intentions of researchers and do not admit their beliefs in traditional assessments; thus, on-line

anonymous questionnaires, may be more amenable means of assessing conspiracy theory beliefs (Wood & Douglas, 2015).

The existence and intensity of beliefs in conspiracy theories becomes a social and individual health and safety risk, when such beliefs lead people to act against their own and/or others' best interests. For example, measles is resurging and advancing again due to the widespread myths and conspiracy theories behind vaccinations (Cherry, 2020). Studies are reporting that refusing empirically supported medications and lifesaving vaccinations, rejecting the use of sunscreens, and turning to unsupported alternative medicine and rejecting the need for physical check-ups, are often linked to believing myths and conspiracy theories (Oliver & Wood, 2014). These behaviors of course are not only affecting the individual and their immediate families, but also others in the wider community (e.g., unvaccinated children passing on diseases to others).

In the times of COVID–19, most mental health professionals have become full-time internet-based psychologists (Van Daele et al., 2020), who are often called to educate our clients regarding the pandemic, many of whom are believers of conspiracy theories or science sceptics. For example, we had clients with obsessive compulsive disorder (OCD) develop new obsessions related to conspiracy theories and myths they read online (e.g., to prevent COVID–19 transmission we should drink hot water at a minimum of 5 times per day or ingest bleach), whereas our clients with paranoid ideation are more worried than ever about internet-based conspiracy theories.

This study aimed to ascertain the prevalence of conspiracy beliefs in the first half of April, 2020, during strictly enforced social isolation and quarantine regulations. Secondly, it explored the impact of such beliefs on public health and safety behaviors (i.e., adherence to governmental regulations and recommendations) by assessing whether conspiracy belief predicts willingness to adhere to such measures. Thirdly, the study assessed whether the subjective reporting of psychological distress relating to COVID–19 predicts higher (or lower) levels of conspiracy theory beliefs and higher (or lower) adherence to social distancing and health recommendations. The study also evaluated the relationship between trust in scientists and believing in conspiracy theories.

It seems that the prevalence of believing is specific to the content of each conspiracy theory (Goreis & Voracec, 2019); therefore, the prevalence of conspiracy theory beliefs in this study cannot be securely predicted. However, in line with the aforementioned research it was hypothesized that believing in conspiracy theories will be related to lower willingness to adhere to enforced measures aimed at maintaining public health, such as social distancing and quarantines. It was also hypothesized, that higher subjective reports of psychological distress due to COVID–19, would be predictive of higher conspiracy theory beliefs. Finally, in line with past studies, trust in scientists was hypothesized to be lower in conspiracy theories' believers.

Methods

Participants

The study took place in Cyprus and Greece. One thousand and one (1001) individuals participated during the week that the questionnaire remained posted online (April, 2020). provided their electronic informed consent and they had to be 18 years old or above to participate. The average age was 35.59 years (*SD*=10.07, range= 19–73 years). Participants were highly educated with 93% having at least a bachelor's degree. Sixty percent lived in an urban setting (town with more than 100,000 inhabitants) and the median individual income was 995 euros per month (due to a large number of outliers on both ends the mean was deemed not representative) with the lowest individual income being zero and the highest 8,720 euros per month.

Only one person noted that they were personally diagnosed with COVID-19 and 11 individuals reported one family member who was diagnosed. Only six people reported that a member of their family passed away due to COVID-19.

Materials and Procedure

The Cyprus National Bioethics Committee approved the study. Invitation calls for the study were posted online via Facebook and Twitter and also emailed to friends and colleagues to share on their social media. The study did not receive any funding and does not have any conflict of interest to report. The material and data are available upon request.

The study was completed about a month after the first measures of self-isolation and quarantine were enforced. Participation was open for seven days in April 2020, during which social distancing and quarantine measures were enforced with monetary punishments for offenders in both countries and an increasing curve of COVID-19 incidences being recorded.

Participants completed a 10-minute-long internet-based questionnaire (in Google forms). The questionnaire required the completion of demographic information (living area, personal income, age, sex, and education). Participants then reported on a Likert scale (1 – 10; with one being "certainly no" and 10 being "certainly yes") the strength of their belief on 13 statements related to COVID-19 (9 statements) and other popular conspiracy theories circulating Facebook and Twitter at the time (see Table 1). Specific conspiracy theories were chosen by the authors, and agreed between them, as being the most frequent in Facebook and Twitter conspiracy discussions during the past few weeks.

In addition, participants rated on a Likert scale (1-10) the likelihood of following the regulations for social distancing and quarantine related to COVID-19; and their trust in science for finding solutions for COVID-19. Also, participants rated on a Likert scale (1-10) their subjective feelings of anxiety, stress, hopelessness, and sadness, all of which were assessed with single-item responses, in an attempt to keep the questionnaire short and maximize participant completion. Single-item screening tools for anxiety, melancholy, and stress have been used in the past and found to be sensitive for screening purposes (Turon et al., 2019; Mackenzie, et al., 2014; Young, Nguyen, Roth, Broadberry, & Mackay, 2015).

Results

In order to evaluate the prevalence of beliefs(1st aim of the study) in each of the 13 conspiracy theory statements, three percentile groupings (quartiles) were calculated as follows: a. 1-25th percentile, b. 26th to 75th percentile, and c. 76th to 99th percentile, which represented no-to-weak belief, moderate belief, and strong belief, respectively (see Table 1). Subsequently, the percentage of 1001 participants belonging in each of the three groups was calculated and reported in Table 1.

Table 1. Average Responses, Factor Loadings, and Percentage of Weak, Moderate and Strong Belief Endorsements for Each Conspiracy Theory statement.

Item	Avg (SD)	S.E.M.	Factor CB Loading	% No-to-Weak Belief	% Moderate Belief	% Strong Belief
1. COVID-19 is not real	1.99 (1.75)	0.06	.620	63.70	12.70	23.60
2. There is already a vaccine for COVID-19 and will be released when millions are infected	4.27 (2.83)	0.90	.815	35.80	16.90	47.30
3. Deaths from COVID-19 in Italy, Spain, and USA are not as many as reported	3.48 (2.73)	0.09	.611	36.20	40.50	23.30
4. Nobody died from COVID-19	2.24 (2.53)	0.08	.382	72.00	16.70	11.30
5. People dying from COVID-19 would have died very soon, anyway	3.05 (2.51)	0.08	.539	45.80	36.00	18.20
6. We are being sprayed and poisoned with chemicals by airplanes' (chemtrails)	3.25 (2.67)	0.08	.769	40.70	41.30	18.00
7. Swine flu was created by pharma companies	4.13 (2.64)	0.08	.852	35.00	38.40	26.60
8. Most countries' presidents are in a conspiracy to keep us home so they can pass unwanted policies	4.01 (2.79)	0.09	.854	26.90	43.70	29.40
9. I am generally a believer of conspiracy theories	3.55 (2.70)	0.09	.794	33.70	43.60	22.70
10. With COVID-19 vaccinations we will be microchipped unwillingly	3.78 (2.97)	0.09	.786	34.50	40.90	23.60
11. COVID-19 and Ebola were created for population control	4.37 (3.01)	0.10	.856	26.30	54.90	18.80
12. Vaccinations before the age of 3 cause	2.44	0.06	.493	63.70	21.40	14.90

autism	(1.94)					
13. COVID-19 was created on purpose in a laboratory by scientists	5.20 (3.04)	0.10	.781	26.6	29.90	43.50

Note: Avg = Average on Likert scale 1 -10 where 1 = «Certainly No» and 10 = «Certainly Yes»; **S.E.M.=**Standard Error of the Mean; Factor CB Loading= loading on Factor "Conspiracy Belief; % No-to-Weak Belief = Percentage of Sample in 1st to 25th %ile; Moderate Belief= 26^{th} to 75^{th} %ile; and Strong Belief= 76^{th} to 99^{th} %ile.

A factor analysis (Principal Component Analysis, two-tailed) of the 13 conspiracy theory statements produced only one factor (conspiracy beliefs, CB) with 51.33% of the variance explained. With a sample of 1001 participants the critical value for loading on a factor is suggested to be .162 (Stevens, 2002); all 13 statements loaded strongly on the one factor (see Table 1). The internal reliability (listwise deletion) of the 13 conspiracy theory items was high, Cronbach's alpha = .89. Thus, there was no statistical reason for dividing the conspiracy theory items into COVID-19 items and other items, and the total score (CB) of all 13 statements was calculated and treated as one variable in regression analyses.

In order to evaluate the need for entering covariates in further statistical analyses, the correlations between the total CB score and sex (dichotomous; point biserial), age (continuous; Pearson r), income (continuous; Pearson r), living area (continuous measured with size town; Pearson r), and education (continuous) were calculated (See Table 2).

Table 2. Correlations Between Variables

	CB	AB	PS	TS	Sex	Age	Education	Living Area	Income
CB	1.00								
AB	-.33**	1.00							
PS	.13**	.05	1.00						
TS	-.47**	.33**	.01	1.00					
Sex	-.10**	-.14**	-.13**	.06	1.00				
Age	-.14**	.14**	-.03	.10**	.08*	1.00			
Education	-.19**	.10*	-.06*	.06	-.05	-.04	1.00		
Living Area	-.17**	.15**	-.04	.02	.03	.07*	.04	1.00	
Income	-.18**	.10*	-.01	.09*	.14**	.39**	.17**	.05	1,00

CB = Conspiracy Belief, AB = Adherence Behavior, PS = Psychological Stage, & TS = Trust in Science

*p < .05 & **p < .01

There were two statements assessing the willingness of individuals to adhere to scientifically recommended and government mandated measures (i.e., social distancing and quarantine). The two statements "I will adhere to the mandated measures" and "I will adhere to the mandated measures for as long as it takes" were highly correlated (Pearson r = .85, r^2 = .72, N = 1001) and were treated, for further

analyses, as one total variable, Adherence Behavior (AB). The correlations between AB and demographics are presented in Table 2.

Four statements assessed subjective feelings of COVID-19 related psychological states: anxiety, stress, hopelessness, and sadness. A Principal Component factor analysis with these four items, proposed only one factor (Psychological State; PS), 68.02% of the variance explained, with each item loading strongly (i.e., anxiety=.79, sadness=.88, hopelessness=.82, and nervous breakdown=.80). The four items reliably measured the same factor (Cronbach's Alpha=.84, listwise deletion, N = 1001). The correlations between PS and demographics are reported in Table 2.

Participants were also asked to rate their trust in scientists in relation to COVID-19 with two statements, "I believe science is useful for solving the COVID-19 problem" and "Only science can solve the COVID-19 problem." The two statements were moderately correlated (Pearson r = .51, $p < .01$, $r^2 = .27$), and a new variable total trust in science (TS) was calculated. The correlations between TS and demographics are presented in Table 2.

Conspiracy theory belief and Adherence behavior

The second aim of the study was to examine whether higher levels of conspiracy beliefs (CB) would predict lower Adherence Behavior (AB) to COVID-19 measures imposed by the governments. The linear regression assumptions were tested as follows: a) The observations were independent (Durbin-Watson Statistic = 1.95); b) The relationship between the two variables was significantly negative (see Table 2) and linear; c) The plotted residuals were about normally distributed; d) The scatterplot of standardized residuals against standardized predicted values showed no discernible pattern and the assumption of homoscedasticity was met; and e) No observations had a large influence (Mean Cook's distance = .001, SD = .006; Mean Centered Leverage = .001, SD = .001).

The regression was significant, $F (1, 999) = 16.77$, $p < .001$, with R^2 of .02 and standard error of the estimate being 2.93. The Standardized beta for CB was -.33, $t = - 11.05$, $p < .001$. The regression equation was AB = 19.98 - .04 * CB. Thus, AB decreased .04 points for every point increase in CB.

In a hierarchical multiple regression, demographics (sex, age, education, living area, and income) were entered along CB as independent variables. The highest VIF was equal to 1.24 and the highest tolerance was .98, thus meeting the collinearity assumption (none of the variables correlated highly between them, either, see Table 2).When compared to the above simple linear regression, the new R^2 (0.12) improved significantly, $p < .01$, with the multiple regression being significant $F (5, 995) = 27.78$, $p < .001$, and its equation being AB = 18.23 – .04 * CB + .03 * age. The other demographics did not have a significant (slope) input in the prediction equation. Running a multiple regression with only CB and age as independent variables did not improve significantly the model and R^2 of the previous multiple regression.

Conspiracy Theory Beliefs and Psychological State

The third aim of the study was to evaluate whether the subjective report of psychological state (PS), due to COVID-19, was predictive of stronger Conspiracy Beliefs(CB). The linear regression assumptions were met as follows: a) The observations were independent (Durbin-Watson Statistic = 1.37); b) The relationship between PS and CB was significant and linear at observation ($r = .13$, $p < .001$); c) The plotted residuals were about normally distributed; d) The plot of standardized residuals against standardized predicted values showed no discernible pattern and the assumption of homoscedasticity was met; and e) No observations showed a large influence (Mean Cook's Distance = .001, SD = .002; Mean Centered Leverage = .001, SD = 0.001).

The regression was significant, $F (1, 999) = 16.78$, $p < 0.001$, with an R^2 of .02, Standard Error of the Estimate = 24.31. The standardized Beta for PS was .13, $t = 4.10$, $p < .001$. The participants' predicted CB was equal to 37.64 + .35 * PS. Thus, CB increased .35 points for each point increase in PS (distress).

In a hierarchical multiple regression demographics (sex, age, education, living area, and income) were entered along CB as independent variables. None of the VIF of variables was above 1.22 (well below 5) and the highest tolerance was .99, thus meeting the collinearity assumption (none of the variables correlated between them highly, either, see Table 2).When compared to the simple linear regression, the new R^2 (0.11) improved significantly, $p < .001$, with all of the demographics' slopes being significant at the $p < .001$ and the CB predicted by 101.87 + .30 * PS - .27 * (age) – 2.59 * (living area) – 5.22 * (education) – .03 * (income).

Conspiracy Theory Beliefs and Trust in Science

The final target of the study was to examine the hypothesis that stronger Conspiracy Beliefs (CB) would be predictive of lower Trust in Science (TS) to solve the COVID-19 problem. The assumptions for the linear regression mode were met as follows: a. The observations were independent (Durbin-Watson Statistic = 1.92); b. There was a significant linear relationship between the two variables ($r = .47$); c. The plotted residuals were about normally distributed; d. The plot of standardized residuals against standardized predicted values showed no discernible pattern and the assumption of homoscedasticity was met; e. No observations showed a large influence (Mean Cook's Distance = .001, SD = .004; Mean Centered Leverage = .001, SD = 0.001).

The Regression was significant, $F (1, 999) = 277.83$, $p < .001$, with an R^2 of .22, Standardized B = - .47, $t = -16.67$, $p < .001$. The participants predicted TS was equal to 20.53 - .06 (CB), thus TS decreased by .06 points for every point increase in CB.

In hierarchical a multiple regression demographics (sex, age, education, living area, and income) were entered along CB as independent variables. The VIF was equal to 1.24 and tolerance was .97, thus meeting the collinearity assumption (none of the variables correlated between them highly, either). When compared to the simple linear regression, the new R^2 (0.22) did not improve significantly, $p > .05$, with most of the demographics' slopes being insignificant at the $p > .05$, apart from the living area slope, $p < .05$, and the CB predicted by 21.60 - .06 * TS - .06 * (living area). Running a multiple regression with only

CB and living area as the independent variables did not improve the R^2 of the original simple linear regression.

Discussion

The first aim of the study was to examine the prevalence of some of the most common conspiracy theories circulating on social media during the social distancing and lock-downs for COVID-19. The reported percentages of beliefs in such theories (see Table 1) are alarming, with about half of the sample strongly believing that “there is already a vaccine for COVID-19 and will be released when millions are infected” (see Table 1). Even more disconcerting was the fact that our sample was highly educated with 9 out of 10 participants having at least a bachelor’s degree.

Like Allington (2018, 2020), who has been warning about the risks of conspiracy theories for the greater public, the current study revealed that as the strength of conspiracy theory beliefs increases, the willingness to adhere to public health recommendations and government enforced measures (in this instance for COVID-19) decreases significantly. At the same time, conspiracy theory believers were less trustful of scientists and therefore less likely to follow their COVID-19 recommendations and measures. The seriousness of these findings can be further appreciated, when combined with past studies, which found that many people are rejecting scientific facts due to conspiracy theories “criminalizing” medicine and medications (Douglas et al., 2019); for example, by avoiding vaccinations to the point that eradicated illnesses are returning and avoiding the use of condoms because of conspiracy beliefs, and therefore having higher risk for contracting HIV (Nattrass, 2012). During this pandemic, we witnessed, waves of citizens’ groups pushing for uprising and asking others to join them in breaching the “stay-at-home” and “social distancing” regulations enacted by governments and strongly recommended by scientists. The call for uprising is often based and/or strengthened by conspiracy theories and uprisers, may endanger themselves and others in their community. Thus, it is evident that conspiracy theory believing is not merely a benign phenomenon.

Higher psychological distress was also a predictor of stronger conspiracy theory beliefs. Age, education, living area, and income significantly improve this prediction, with lower age, lower education, living in less densely populated areas, and lower income being associated with stronger conspiracy theory beliefs. Therefore, easily accessible psychological support for people coming from all socioeconomic levels could have a large role in keeping, at least partly, conspiracy theories at lower points.

At the same time, mental health professionals have an immense impact on their individual clients’ and ought to offer reliable and valid psychoeducation along with psychotherapy. Mental health professionals need to be constantly updated not only about valid scientific facts, but also about circulating internet and media-based fake news, myths and conspiracy theories; by doing so, mental health professionals are joining forces with medical professionals and other scientists in the fight against myths and conspiracy theories relating to COVID-19 and other pathogens. Our psychoeducation should also instigate analytical

thinking which appears to decrease conspiracy theory adherence (Swami, Voracek, Stieger, Tran, & Furnham, 2014).

The direct competition science has with conspiracy theories is intense. Is science failing to communicate effectively its messages about COVID-19? Are conspiracy theories winning over sciences? Unfortunately, we believe that often that is the case. Conspiracies, in opposition to scientific jargon, appeal to emotions, tell interesting stories and use simple, comprehensible, and impressionable language. Thus, science and its findings, need to be delivered in more receptive and emotion inducing ways. Science can borrow from the impressionable methods used by conspiracy theorists and myth-spreaders. Science tends to present numbers, jargon, and difficult concepts to comprehend even when informing the public in news. For instance, even in prime-time news broadcasts scientists speak every day about COVID-19 and use acronyms such as RNA virus, ACE2 receptor binding, interaction with angiotensin, virus lipid membrane, glycoproteins etc., without comprehensible explanations. Also, science should be presenting a story of what its scientific facts mean for an individual, their relatives, their city, and their country. Science, in other words, should heavily invest in marketing and learning from consumer behavior research (Kareklas, Muehling, and Weber 2015; Weber, Muehlong, and Kareklas 2019) about capturing the attention of the public when it comes to public health and safety. Scientists should be leveling with people and be flooding social media and the internet, in general, with scientific facts that “talk” to everybody. For these actions we need all sciences (e.g. medical, biological, social, educational, political, etc.), in coordination with local and international health organizations, working side by side.

Declarations

1. The authors declare that they have no conflict of interest.
2. The current study was performed in accordance with the ethical standards as described in the 1964 Declaration of Helsinki and only after receiving ethical approval by the Cyprus National Bioethics Committee.
3. Informed consent was obtained by all 1001 individuals taking part in this study. The following was the online informed consent (participant information about the study and click statements denoting comprehension of the information).

Reference number: ΕΕΒΚ ΕΠ 2020.01.67 (Cyprus National Bioethics Committee approval number)

Title of Project: Beliefs about COVID-19 and other subjects

The current study would like to evaluate the extent of popular beliefs about COVID-19 and other currently discussed issues. Also, it attempts to map the psychological wellbeing of people during this time. The questionnaire can be completed in about 10 – 12 minutes. After filling out the following consent form you can proceed to the online questionnaire. After completion of the questionnaire, by clicking “send” at the end, you are consenting to the use of the data, which will be collected completely anonymously.

The data will be deleted after they are transferred to a statistical package for analysis and your anonymity is guaranteed at all points of the process as no identifying information is required by you. The study was reviewed and approved by the Cyprus National Bioethics Committee. This study is not considered to carry any known risks for the participants and at any time during the completion of the questionnaire you can abort your completion of the questionnaire without providing a reason to the researchers. If you have any questions about the study please feel free to contact the main researcher: Dr. Marios Constantinou, University of Nicosia, Department of Social Sciences, Constantinou.m@unic.ac.cy.

If you have any concerns or complains about the study, please contact the Cyprus National Bioethics Committee. ■ Telephone: +357 22 353 878 ■ ■ Email : cnbc@bioethics.gov.cy

References

Abu Taher M., Mannan, A., & Dulal, S. (2018); Contribution of Greek Mythology and Civilization on Medical Science- A Brief Analysis. *International Journal of Advanced Research 6* (11), 1095-1102, DOI: 10.21474/IJAR01/8098.

Allington, D. (2018). Why conspiracy theories are not just a harmless joke. *NewStatesman, Observations, 14 November 2018,* https://www.newstatesman.com/politics/uk/2018/11/why-conspiracy-theories-are-not-just-harmless-joke.

Allington, D. (2020). COVID-19 conspiracy theories present 'substantial' health risk, new research finds. *Kings College London News Center Spotlight on Research (9 April 2020),* https://www.kcl.ac.uk/news/covid-19-conspiracy-theorists-present-substantial-health-risk-new-research-finds .

Cherry, K. (2020). Why People Believe in Conspiracy Theories. *Verywellmind, https://www.verywellmind.com/why-people-believe-in-conspiracy-theories-4690335* .

Creative Research Systems (2012). Sample Size Calculator, *https://www.surveysystem.com/sscalc.htm#one* .

Douglas, K. M., Sutton, R. M., & and Cichocka, A. (2017). The Psychology of Conspiracy Theories. *Current Directions in Psychological Science, 26(*6), 538–542, https://doi.org/10.1177/0963721417718261.

Douglas, K.M., Uscinski, J.E., Sutton, R.M., Cichocka, A., Nefes, T., Ang, C.S. and Deravi, F. (2019). Understanding Conspiracy Theories. *Political Psychology, 40*, 3-35. doi:10.1111/pops.12568.

Franks, B., Bangerter, A., & Bauer, W. M. (2013). Conspiracy theories as quasi-religious mentality: an integrated account from cognitive science, social representations theory, and frame theory. *Frontiers in Psychology, 4,* article 424, doi.org/10.3389/fpsyg.2013.00424.

Goreis, A., & Voracec, M. (2019). A Systematic Review and Meta-Analysis of Psychological Research on Conspiracy Beliefs: Field Characteristics, Measurement Instruments, and Associations With Personality Traits. *Frontiers in Psychology, 10,* 205, DOI=10.3389/fpsyg.2019.00205.

Grzesiak-Feldman, M. (2007). Conspiracy Thinking and State-Trait Anxiety in Young Polish Adults. *Psychological Reports, 100*, 199–202. https://doi.org/10.2466/pr0.100.1.199-202 .

Grzesiak-Feldman, M. (2013). The Effect of High-Anxiety Situations on Conspiracy Thinking. *Curr Psychol 32,* 100–118. https://doi.org/10.1007/s12144-013-9165-6 .

Kareklas, I., Muehling, D. D., & Weber, T. J. (2015), Reexamining Health Messages in the Digital Age: A Fresh Look at Source Credibility Effects. *Journal of Advertising, 44* (2), 88-104, doi.org/10.1080/00913367.2015.1018461.

Klein C., Clutton P., Dunn, A.G. (2019). Pathways to conspiracy: The social and linguistic precursors of involvement in Reddit's conspiracy theory forum. *PLoS ONE 14*(11): e0225098. https://doi.org/10.1371/journal.pone.0225098.

Mackenzie, L. J., Carey, M. L., Sanson-Fisher, R. W., D'Este, C. A., Paul, C. L., & Yoong S. L. (2014). Agreement between HADS classifications and single-item screening questions for anxiety and depression: a cross-sectional survey of cancer patients. *Annals of Oncology, 24*(4), 889-895, doi: 10.1093/annonc/mdu023.

Nattrass, N. (2012). Understanding the origins and prevalence of AIDS conspiracy beliefs in the United States and South Africa. *Sociology of Health & Illness, 35*, 113-129, doi:10.1111/j.1467-9566.2012.01480.x.

Weber, T.J., Muehling, D. D., & Kareklas, I. (2019). How Unsponsored, Online User-Generated Content Impacts Consumer Attitudes and Intentions toward Vaccinations. *Journal of Marketing Communications,* DOI: 10.1080/13527266.2019.1671479.

Oliver J. E., & Wood, T. (2014). Medical Conspiracy Theories and Health Behaviors in the United States. *JAMA Intern Med*, *174,* 817–818. doi:10.1001/jamainternmed.2014.190

Southwell, B. G., Thorson, E. A., & Sheble, L. (eds.) (2018). *Misinformation and mass audiences (pp.307).* Austin, TX: University of Texas Press.

Stevens, J. (2002). *Applied multivariate statistics for the social sciences (4th ed.)*. Hillsdale, NJ: Erlbaum.

Swami, V., Coles, R., Stieger, S., Pietschnig, J., Furnham, A., Rehim, S., & Voracek, M. (2011). Conspiracist ideation in Britain and Austria: Evidence of a monological belief system and associations between individual psychological differences and real-world and fictitious conspiracy theories. *British Journal of Psychology (2011),* 102, 443–463, https://doi.org/10.1111/j.2044-8295.2010.02004.x.

Swami, V., Voracek, M., Stieger, S., Tran, U. S., Furnham, A. (2014). Analytic thinking reduces belief in conspiracy theories. *Cognition, 133,* 572-585, https://doi.org/10.1016/j.cognition.2014.08.006 .

Swami, V., Weis, L., Lay, A., Barron, D., & Furnham, A. (2015). Associations Between Belief in Conspiracy Theories and the Maladaptive Personality Traits of the Personality Inventory for DSM-5. *Psychiatry Research, 236,* 86-90, doi.org/10.1016/j.psychres.2015.12.027.

Turon, H., Carey, M., Boyes, A., Hobden, B., Dilworth, S., & Sanson-Fisher, R. (2019). Agreement between a single-item measure of anxiety and depression and the Hospital Anxiety and Depression Scale: A cross-sectional study. *PloS one, 14*(1), e0210111. https://doi.org/10.1371/journal.pone.0210111 .

van Prooijen, J. W., & Douglas, K. M. (2018). Belief in conspiracy theories: Basic principles of an emerging research domain. *European Journal of Social Psychology, 48,* 897–908, https://doi.org/10.1002/ejsp.2530.

van Prooijen, J.-W., & Jostmann, N. B. (2013). Belief in conspiracy theories: The influence of uncertainty and perceived morality. *European Journal of Social Psychology, 43*(1), 109–115. https://doi.org/10.1002/ejsp.1922 .

Vlasceanu, M., & Coman, A. (2018). Mnemonic accessibility affects statement believability: the effect of listening to others selectively practicing beliefs. *Cognition, 180*, 238-245, https://doi.org/10.1016/j.cognition.2018.07.015.

Wood, M. J., & Douglas, K. M. (2015). Online communication as a window to conspiracist worldviews. *Frontiers in psychology, 6,* 836. https://doi.org/10.3389/fpsyg.2015.00836.

World Population Review (2020). *https://worldpopulationreview.com* .

Young, Q.-R., Nguyen, M., Roth, S., Broadberry, A., & Mackay, M. H. (2015). Single-item measures for depression and anxiety: Validation of the Screening Tool for Psychological Distress in an inpatient cardiology setting. *European Journal of Cardiovascular Nursing, 14*(6), 544–551. https://doi.org/10.1177/1474515114548649 .