Belief in Conspiracy Theory about COVID-19 Predicts Mental Health and Well-being

– A Study of Healthcare Staff in Ecuador

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Abstract

Objective:

We aim to provide the first evidence of belief in conspiracy theory regarding the COVID-19 virus as a predictor of the mental health and well-being of healthcare workers.

Methods:

We conducted a survey of 252 healthcare workers in Ecuador from April 10 to May 2, 2020.

Results:

In Ecuador, 32.54% of the sampled healthcare workers experienced distress disorder, and 28.17% had anxiety disorder. Compared to healthcare workers who were not sure where the virus originated, those who believed the virus was developed intentionally in a lab reported higher levels of distress and anxiety, and lower levels of job satisfaction and life satisfaction. Older healthcare workers and those who exercise more reported higher job satisfaction. Married healthcare workers, those who exercise more, and those not infected reported higher life satisfaction.

Conclusion:

This paper identifies belief in a COVID-19 conspiracy theory as an important predictor of distress, anxiety, and job and life satisfaction of healthcare workers. It enables mental health
services to better target and help mentally vulnerable healthcare workers during the ongoing COVID-19 pandemic.

**Keywords:** Coronavirus; 2019-nCoV; Mental health; Psychiatric identification; Latin America
INTRODUCTION

During the COVID-19 pandemic, social media are populated with conspiracy theories— attempts to explain the ultimate causes of significant social events as secret plots by powerful and malicious groups[1]. The most popular examples include: “the coronavirus was developed in a lab”; “people developed COVID-19 to destroy the governance of President Trump”; “the coronavirus was Bill Gates’ attempt to take over the medical industry”[2, 3]. Merely the last one has been mentioned 295,052 times across social media, broadcast, traditional media and online sites during one week in May 2020[4]. A national survey in UK found that approximately 50% of the population endorsed conspiracy theories to some degree[5].

Individuals’ belief in conspiracy theories has been linked to maladaptive personality traits[6], mental disorders and lower well-being[7]. However, no research has studied whether the conspiracy belief about COVID-19 is associated with mental health and well-being. This association is important because the specific COVID-19 conspiracy belief in social media is directly assessable and hence more useful to identify people with mental health and well-being issues during the pandemic.

This paper explores a COVID-19 specific conspiracy belief that the coronavirus was developed intentionally in a lab as a predictor of individuals’ mental health and well-being during the pandemic. We examined the mental health and well-being of healthcare workers in Ecuador, for whom the COVID-19 crisis presents a particularly serious threat. The
identification of COVID-19 conspiracy belief as a marker of mental health issues in healthcare
workers uncovers a new channel for psychiatric screening and health communication, opening
new avenues of research for medical informatics.

METHODS

Contexts and Participants

We focus on Ecuador where the COVID-19 crisis presents a particularly serious threat for
healthcare workers, given the country’s scarce healthcare resources. We surveyed healthcare
workers in Ecuador from April 10 to May 2, 2020. During this period, in the small country of
Ecuador, there were 26,336 total confirmed cases of COVID-19 in Ecuador and 1063 deaths,
representing one of the highest cases and death per capita in the world. The online survey used
a region-stratified, two-stage cluster sampling to reach 401 healthcare workers who worked in
hospitals, clinics, first emergency responders, medical wards, nursing homes, dental clinics,
and pharmacies in Ecuador’s 24 provinces.

We received completed surveys from 252 healthcare workers (response rate: 62.8%) who
worked in 54 healthcare facilities in 13 provinces (29 facilities in Carchi, 9 facilities in Quito,
and 16 facilities from 11 other provinces). Therefore, our sample of healthcare workers from 13
provinces should not be taken as a representative national sample but rather a sample that
covered a wide spectrum of provinces that vary in the severity of the COVID-19 crisis. The
survey was approved ethically, and online written informed consent was provided by all survey
participants before their enrolment. The recruited participants could terminate the survey at any
time they wished. The survey was anonymous, and confidentiality of information was assured.

Measures

We assessed the participants’ socio-demographic characteristics, including gender, age,
educational level, marriage status, COVID-19 status, and their exercise hours per day during
the past week. We used a measure of conspiracy belief specific to COVID-19, asking
participants “from what you’ve seen or heard, what do you think is most likely the origin of the
coronavirus”: 1) It came about naturally; 2) It was developed intentionally in a lab (conspiracy
belief); 3) It was most likely made accidentally in a lab; 4) I am not sure where the virus
originated[8].

We used a brief measure of generalized anxiety disorder (GAD-7)[9], which has been used
broadly to measure anxiety. GAD-7 consists of seven questions, with a cutoff of 10 or greater
indicating cases of generalized anxiety disorder ($\alpha = 0.87$). Psychological distress was
measured with the six-item K6 screening scale ($\alpha = 0.90$)[10], with a cutoff of 13.

We used life satisfaction and job satisfaction to measure healthcare workers’ well-being[11,
12]. Life satisfaction was measured by the satisfaction with life scale with five items, including
“In most ways my life is close to my ideal” (1 = strongly disagree, 7 = strongly agree; $\alpha =
0.81$)[13]. Job satisfaction was measured with five items, including “I feel fairly satisfied with
my present job” (1 = strongly disagree, 7 = strongly agree; $\alpha = 0.78$)[14].
RESULTS

Descriptive findings

Table 1 presents the descriptive findings of the sampled healthcare workers. Of the sample, 65.5% (165) were female, 71.8% (181) reported negative for COVID-19, 0.4% (1) reported positive, and 27.8% (70) were unsure whether they had COVID-19. In terms of education, 4.3% (11) had completed secondary school, 3.6% (9) had completed technician training, 63.1% (159) had completed university, 17.1% (43) had master degrees, and 11.9% (30) obtained specialty diploma.
| Variables                             | Description    | Anxiety case | Distress case | Life satisfaction | Job satisfaction |
|--------------------------------------|----------------|--------------|---------------|-------------------|------------------|
|                                      |                | OR (95%CI)   | P-value       | OR (95%CI)        | P-value          | OR (95%CI)        | P-value          |
|                                      |                | Reference group | Reference group | Reference group | Reference group | Reference group | Reference group |
| Developed intentionally              | Naturally      | 0.34 (0.15 to 0.78) | 0.011          | 0.44 (0.19 to 1.03) | 0.058 | 0.63 (0.19 to 1.08) | 0.006 | 0.42 (-0.02 to 0.89) | 0.062 |
|                                      | Created accidentally | 0.23 (0.09 to 0.64) | 0.004          | 0.38 (0.15 to 0.95) | 0.039 | 0.29 (-0.25 to 0.84) | 0.290 | 0.11 (-0.44 to 0.67) | 0.684 |
|                                      | Not sure       | 0.21 (0.10 to 0.44) | 0.000          | 0.41 (0.20 to 0.83) | 0.014 | 0.60 (0.19 to 1.00) | 0.004 | 0.42 (0.03 to 0.81) | 0.036 |
| Married                              | Yes            | 1.16 (0.63 to 2.14) | 0.636          | 0.74 (0.41 to 1.32) | 0.307 | 0.39 (0.09 to 0.69) | 0.010 | 0.10 (-0.20 to 0.39) | 0.522 |
|                                      | No             | 137 (54.4%) |                |                   |                   |                   |                   |                   |
| Education                            | High school    | 11 (4.4%)  | 1.27 (0.91 to 1.76) | 0.163 | 1.24 (0.89 to 1.71) | 0.202 | 0.17 (-0.02 to 0.35) | 0.076 | 0.06 (-0.13 to 0.25) | 0.533 |
|                                      | Technician     | 9 (3.6%)   |                |                   |                   |                   |                   |                   |
|                                      | Undergraduate  | 159 (63.1%) |               |                   |                   |                   |                   |                   |
|                                      | Master         | 43 (17.1%) |                |                   |                   |                   |                   |                   |
|                                      | Specialty      | 30 (11.9%) |                |                   |                   |                   |                   |                   |
| Age                                  | 18–24          | 26 (10.3%) | 0.98 (0.94 to 1.01) | 0.237 | 0.97 (0.94 to 1.01) | 0.127 | 0.01 (-0.01 to 0.03) | 0.233 | 0.03 (0.01 to 0.04) | 0.006 |
|                                      | 25–34          | 125 (49.6%) |               |                   |                   |                   |                   |                   |
|                                      | 35–44          | 61 (24.2%) |                |                   |                   |                   |                   |                   |
|                                      | 45–54          | 32 (12.7%) |                |                   |                   |                   |                   |                   |
|                                      | 55–69          | 8 (3.2%)   |                |                   |                   |                   |                   |                   |
| Gender                               | Male           | 87 (34.5%) | 1.44 (0.78 to 2.65) | 0.244 | 0.96 (0.55 to 1.70) | 0.897 | 0.27 (-0.04 to 0.58) | 0.089 | 0.05 (-0.26 to 0.36) | 0.751 |
|                                      | Female         | 165 (65.5%) |               |                   |                   |                   |                   |                   |
| Exercise                             | 0              | 90 (35.7%) | 0.84 (0.69 to 1.01) | 0.069 | 0.91 (0.77 to 1.07) | 0.234 | 0.09 (0.02 to 0.16) | 0.009 | 0.07 (-0.01 to 0.14) | 0.075 |
|                                      | 1              | 78 (31.0%) |                |                   |                   |                   |                   |                   |
|                                      | ≥2             | 84 (33.3%) |                |                   |                   |                   |                   |                   |
| Infected by COVID-19                 | Don’t know     | Reference group | Reference group | Reference group | Reference group | Reference group | Reference group |
|                                      | No             | 181 (71.8%) |               |                   |                   |                   |                   |
|                                      | Yes            | 1 (0.4%)   |                |                   |                   |                   |                   |
|                                      |                | -           |               | -                 | -                 | -                 | -                 |
Of the sample, 24.2% (61) believed the virus was developed intentionally in a lab; 20.6% (52) believed the virus came about naturally; 13.9% (35) believed it was made accidentally in a lab; and the remaining 41.3% (104) were unsure where it originated.

Almost one third (32.5%) of the healthcare workers surpassed the cutoff of distress disorder, and 28.2% of the healthcare workers had anxiety disorder. The proportion of healthcare workers who had anxiety disorder was lower (d = -5.8%, 95% CI: -12.3% to 1.1%; $\chi^2 (1) = 2.73; p = 0.098$) than a sample of 603 healthcare workers (34.0% by the cutoff of 9) in China during February 3–10, 2020[15] but higher (d = 5.6%, 95% CI: 0.3% to 11.6%; $\chi^2 (1) = 4.26; p = 0.039$) than another sample of 4872 individuals (22.6% by the cutoff at 10) in China surveyed during January 31 to February 2, 2020[16]. The proportion of distressed healthcare workers in Ecuador was significantly higher (d = 12.4%, 95% CI: 5.07% to 19.68%; $\chi^2 (1) = 11.07; p = 0.001$) than in workers in Iran surveyed on February 28–30, 2020 (20.1%, N = 304)[17]. Our sample in Ecuador averaged 5.19 (SD = 1.27) on life satisfaction and 5.48 (SD = 1.22) on job satisfaction.

**Predictors of healthcare workers’ mental health**

As presented in Table 1, healthcare workers who believed the virus was developed intentionally in a lab were more likely to experience distress disorder than those who believed the virus was made accidentally and those who were unsure of the origin of the virus.

Healthcare workers who believed the virus was developed intentionally in a lab were more likely to have anxiety disorder than those who believed the virus came about naturally, those
who believed the virus was made accidentally, and those who were unsure how the virus originated.

Predictors of healthcare workers’ well-being

Healthcare workers who were married or exercised more hours in the past week had higher life satisfaction. Those who were negative to COVID-19 were more satisfied with life than those who were unsure. Healthcare workers who viewed the virus as having been developed intentionally in a lab had lower life satisfaction than those who believed the virus came about naturally and those who were unsure how the virus originated.

Healthcare workers who believed the virus was developed intentionally in a lab had lower job satisfaction than those who were unsure how the virus originated. Older healthcare workers had higher job satisfaction. Figure 1 shows the predicted scores of anxiety, distress, life satisfaction and job satisfaction by the predictors.

DISCUSSION

This study found that the conspiracy belief in the origin of COVID-19 was associated with lower mental health, life satisfaction, and job satisfaction of healthcare workers. From a health informatics perspective, the belief in a COVID-19 related conspiracy theory provides a marker to identify potentially mentally vulnerable people, who may browse, search, follow, like, further discuss, or disseminate COVID-19 related conspiracy theories via social media and other information channels. Such information can serve as a risk factor to identify individuals more susceptible to mental disorders in psychiatric screening via social media[18], at a time
when the psychological screening, diagnosis and intervention are rapidly moving online for the COVID-19 pandemic[19]. In addition, the followers of a COVID-19 related conspiracy theory also provide a specific target group not only for scientific communications but also for mental health information dissemination. Previous research has found that believers of conspiracy theories tend to cluster[3]. Therefore, healthcare services can also target social media interest groups related to COVID-19 related conspiracy theories to offer mental health guidance and services.

Moreover, our results highlight the importance of information on the origin of the virus for mental health and well-being. The pandemic leaves opportunities for conspiracy theories to provide a resolute explanation of a crisis to reduce people’s feelings of uncertainty and threat[20, 21]. Previous research suggests that scientific communication can mitigate the impact of conspiracy theories[1], and preemptive evidence presented before conspiracy theories emerge and spread are more effective in changing people’s behavioral intentions than those presented after[1]. Scientists to date have indicated that the virus causing COVID-19 is more likely to have come from nature than a lab[22]. Therefore, communication about the COVID-19 crisis should debunk scientifically invalid conspiracy theories and introduce scientific hypotheses about the information related to the virus at the same time so that the general population and our healthcare staff have lesser a chance to believe in conspiracy theory during COVID-19.

In particular, a conspiracy belief that the virus was developed intentionally in a lab was associated with reduced job satisfaction of healthcare workers. This association may be because
this belief undermined the meaning of healthcare workers’ jobs, which then became more a
remedy for an intentional harmful act, rather than saving lives from natural disaster. On the
other hand, healthcare workers’ belief in conspiracy theory may be induced by the
overwhelming working conditions during the crisis, and a higher threat usually calls for a
bigger cause of the crisis[23]. Previous research has suggested that conspiracy theories that are
very difficult to disprove can be adopted even by experts[1]. Therefore, restoring the work
meaning of healthcare workers is especially important during the COVID-19 crisis, both for the
benefit of their mental health and for the well-being of themselves and the population.

Limitations and future research

There are several limitations of this study. First, the cross-sectional design limits our ability
to make causal arguments about the relationship between a conspiracy belief about COVID-19
and mental health. Future research should adopt experimental designs to establish the causal
relationship between conspiracy theory and mental health. Second, our sampling was not
nationally representative, because our aim was to provide evidence on mental health and its
predictors to enable rapid screening of mentally vulnerable healthcare workers in the ongoing
COVID-19 pandemic in Ecuador. It is worth investigating if the effects of conspiracy belief
generalize to the general population in a national sample. Finally, Ecuador is a country that is
suffering a serious toll from the pandemic. It remains to be seen to what extent conspiracy
belief is a marker of mental health in other countries, which face different degrees of threat
from the pandemic. For instance, it may be interesting to investigate if conspiracy theory about
COVID-19 predicts mental health in countries where the social and political systems are
severely threatened by the pandemic, because system threat is an important cause of adopting conspiracy theory[24].

**Conclusion**

In conclusion, this study provides the first empirical evidence that COVID-19 related conspiracy belief was associated with mental health and well-being of healthcare workers. Hence, belief in COVID-19 related conspiracy theory may help to use media and interest groups to identify people who may be more mentally vulnerable to enable more targeted identification and potential intervention from a health informatics perspective.

**Declaration of Competing Interest**

The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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## Figure legends

| Figure 1 | Predicted value and 95% confidence intervals (CIs) of healthcare workers’ anxiety (GAD-7≥10), distress (K6≥13), life satisfaction, and job satisfaction. |
