Fear of COVID-19 and Preventive Health Behavior: Mediating Role of Post-Traumatic Stress Symptomology and Psychological Distress

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Abstract

The COVID-19 pandemic has been implicated in several mental health challenges faced by many people. These challenges can also arise due to the fear of being infected with COVID-19 and engaging in preventative behavior. This study investigated the mediating role of post-traumatic stress symptomology and psychological distress in the relationship between fear of COVID-19 and preventive health behavior. A sample of 1172 individuals (mean age = 22.9 years, 54.5% females) participated in the online survey. Correlation analysis revealed that preventive health behavior has a positive relationship with fear of COVID-19 and post-traumatic stress symptomology but a negative relationship with psychological distress. Further analysis indicated that post-traumatic stress symptomology and psychological distress mediated the relationship between fear of COVID-19 and preventive health behavior. Post-traumatic stress symptomology caused by the fear of COVID-19 could contribute to improving preventive health behavior while psychological distress caused by the fear of COVID-19 tends to hinder preventive health behavior. It is recommended that public and private agencies should assist in promoting COVID-19 targeted education. Attention should also be focused on people's mental health status as means of preventing COVID-19.

Keywords Preventive health behavior · Fear of COVID-19 · COVID-19 · Post-traumatic stress symptomology · Psychological distress · Mediation

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Coronavirus disease 2019 (COVID-19) pandemic confirmed that an infectious disease can travel from one continent to another in a matter of hours. As of July 23, 2020, there are 14,765,256 confirmed cases and 612,054 deaths worldwide due to the disease (Worldometer, 2020). People everywhere are concerned about the risk posed by the coronavirus (Ahorsu et al., 2020). As the world awaits a vaccine or an effective drug, the World Health Organization (World Health Organization, 2020) recommended preventive health behavior such as regular hand washing or sanitization, wearing a facemask, staying indoors, and social distancing to curb the spread of the novel coronavirus. Governments around the world also enforced lockdowns, curfews, isolation, and stay-at-home orders in addition to social distancing as means of reducing transmission of the novel virus (Anderson et al., 2020). Although a majority of the people are knowledgeable about the infection (Olapegba et al., 2020) and may support public health protocols to end it (De Coninck et al., 2020), it is the enforcement of social distancing and lockdown measures, and the relatively deadly nature of COVID-19 that tend to negatively affect people, trigger and exacerbate mental illness among them (Pakpour & Griffiths, 2020; Satici et al., 2020).

Post-traumatic stress symptomology in this study is operationalized as symptoms developed from experiencing a psychological trauma which cause substantial distress and disrupt daily functioning for over a month. The COVID-19 pandemic as an event has persisted since the beginning of the year 2020 (over 6 months in some places), threatened people's lives, and interfered with people's social and occupational function through the implementation of social distancing, closure of schools, offices and public place, and quarantine of infected persons as well as stigmatization and social isolation. It can, therefore, be perceived as a traumatic event that can cause post-traumatic stress disorder symptomology among its victims (Xiao et al., 2020). Since the outbreak, studies have predicted and confirmed the existence of post-traumatic stress symptomology among COVID-19 survivors and community samples (Fekih-Romdhane et al., 2020; Xiao et al., 2020). Similarly, Liang et al. (2020) indicated that more than a tenth of adolescents and young adults in China exhibited symptoms of post-traumatic stress. Many survivors and their caregivers in Africa still remember the psychological trauma caused by the Ebola disease between 2013 and 2016 (Jalloh et al., 2018).

According to Potter (2007), psychological distress can be defined as "an affective, cognitive and behavioral response to a crisis-precipitating event perceived as threatening and manifested by anxiety and depressive symptoms." Reports of heightened psychological distress among the general public as a result of the COVID-19 outbreak are alarming. A nationwide survey conducted in Iran revealed that about half of the sample suffered mild to moderate distress due to COVID-19 (Jahanshahi et al., 2020) while the fear of COVID-19 was implicated in the exacerbation of probable pre-existing psychological disorders in a case report of a teenager (Colizzi et al., 2020). The majority of Nigerians were reported to have experienced psychological distress during the COVID-19 lockdown (Olaseni et al., 2020).

The fear of COVID-19 can potentially affect the state of one's mental health (Ahorsu et al., 2020) and was implicated in work stress among Chinese nurses (Mo et al., 2020), chloroquine overdose in Nigeria (Busari & Adebayo, 2020), abuse of alcohol in Iran (Jahanshahi et al., 2020), stigmatization and xenophobia around the world (White, 2020), suicidal ideation in South Asia (Mamun & Griffiths, 2020), and a wide range of mental problems in Europe and Americas (Harper et al., 2020; Satici et al., 2020; Taylor et al., 2020).

Apart from knowledge's contributions to taking precautionary measure against being exposed to coronavirus (Iorfa et al., n.d.), the fear of COVID-19 has also been reported as capable of motivating an increased engagement in healthy behavior and reduced risky

behaviors (Harper et al., 2020; Pakpour & Griffiths, 2020). A study conducted in the US, the UK, and Germany found that fear of being infected with coronavirus predicted engagement in social distancing and handwashing (Kuper-Smith et al., 2020). Similarly, the perceived fear of infection among Belgians was related to stricter support for public health measures (De Coninck et al., 2020).

The Present Study The present study aimed to test whether the relationship between fear of COVID-19 and preventive health behavior is mediated by post-traumatic stress symptomology and psychological distress. To our knowledge, no studies have tested whether *post-traumatic stress* symptomology and *psychological distress* mediate the relation between *fear of COVID-19* and *preventive health behavior* among the African general public. Besides, Nigeria, being a non-WEIRD society (Henrich et al., 2010), is not well represented in the literature on the relationship between mental health and COVID-19 *prevention*. To fill the knowledge gap, we hypothesize that *fear of COVID-19* will be positively related to *preventive health behavior*. We also anticipate that the relationship between fear of COVID-19 and preventive health behavior will be mediated by both post-traumatic stress symptomology and psychological distress. A summary of the hypotheses is displayed in Fig. 1.

Methods

Participants and Procedure

The present study used a cross-sectional design to recruit 1172 participants in Nigeria, between June 21 and 27, 2020. An online survey was adopted with convenient sampling and snowball sampling methods used to collect samples. Link to the Google-hosted questionnaire was advertised through Whatsapp, Facebook, and Google groups (convenient sampling). Enrolled participants were encouraged to invite their contacts to participate (snowball sampling). These sampling techniques were used due to the COVID-19 protocol on social distance and lockdown. This study was carried out in full compliance with the ethical approval protocol

Fig. 1 Structural model of the hypothesis

of the Faculty of the Social Sciences Ethical Review Board, the University of Ibadan before data collection. All participants consented before participating in the study. Participation was voluntary, anonymous, and confidential.

Measures

Socio-demographic Factors

Participants completed a demographic questionnaire including gender, age, relationship status, educational qualification, socio-economic status, and religion.

Preventive Health Behavior Scale

A preventive health behavior scale was used to assess the levels of compliance with recognized preventive protocol against infectious diseases such as COVID-19 (Ayandele et al., 2020). The 12-item scale was adapted from Barr et al. (2008) and Duncan et al. (2009). Sample items include: “I frequently sanitize/wash my hands with soap and water,” and “I avoid wearing face mask” (reverse scored). Items 4 and 6 are reverse scored. A 7-point response scale (1 = strongly disagree, 7 = strongly agree) was used. The 12 items’ scores are summed to obtain a composite preventive health behavior score. A total score is calculated by adding up each item score (ranging from 12 to 84). Higher scores indicated the greater practice of preventive health behavior. The scale’s goodness of fit indices were found to be at an acceptable level ($\chi^2/df = 4.54$, GFI = .995, CFI = .974, TLI = .968, RMSEA = .071, and SRMR = .067) and it has a reliability coefficient (Cronbach’s alpha) of .82.

Fear of COVID-19 Scale

The FCV-19S is a seven-item scale used to measure fears of COVID-19 among the general population (Ahorsu et al., 2020). The two-factor model is used (Huarcaya-Victoria et al., 2020; Reznik et al., 2020; Tzur Bitan et al., 2020). The seven items (e.g., “When I watch news and stories about coronavirus 2019 on social media, I become nervous or anxious”) are rated on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree) with scores ranging from 7 to 35. Higher scores mean greater fear of COVID-19. Taking a cue from Perz et al. (2020), we changed some words in the original English translation (Ahorsu et al., 2020) to avoid confusion and misinterpretation which might have resulted when using the items with a Nigerian sample. Item 3 initially read, “My hands become clammy when I think about Coronavirus-19.” “My hands become clammy” is a less commonly used expression in Nigerian English, so we changed the clause to “My body ‘do somehow’ when I think about coronavirus” Item 7 originally read, “My heart races or palpitates when I think about getting coronavirus-19. “Races or palpitates” was changed to “beats rapidly” for easier understanding by this population. The wordings of the other items remained. Ahorsu et al. (2020) reported internal consistency of .82. The Cronbach alpha in the present study is .84.

General Health Questionnaire

General Health Questionnaire 8 (GHQ-8) (Kalliath et al., 2004) is a shortened version of the original 60-item screening tool that is a widely used screening instrument for mental ill-health

among the general public (Goldberg et al., 1997). Its major value lies in its ability to identify likely threats to respondents' psychological health and segregate those who are mentally healthy from those who are mentally ill. The scale has been adapted, validated, and used extensively in Nigeria (Fatoye & Morakinyo, 2003; Gureje & Obikoya, 1990) with an internal consistency of up to .90 reported. The Cronbach's alpha is .73 in this study. Scoring is done using the Likert scale (0-1-2-3). Higher scores on the instrument imply a greater probability of psychological distress.

Post-traumatic Stress Symptomology

Post-traumatic stress symptomology was measured by the Impact of Event Scale-6 (IES-6) (Thoresen et al., 2010), which is a validated, shortened version of the full IES-revised (IES-r) (Hyer & Brown, 2008; Weiss, 2004). It is widely used for screening at-risk patients with PTSD, not to diagnose PTSD in clinical settings. The IES-6 includes a total of six items (scored from 0 to 24 on a Likert scale ranging from 0 (not at all) to 4 (extremely), two items from each of the three subscales of the measure, namely, intrusion, hyper-arousal, and avoidance. Higher scores are interpreted to indicate a high level of post-traumatic stress symptomology. The shortened IES-6 scale has been used in Africa and it demonstrated acceptable internal reliability (Cronbach's alpha = .78) (Jalloh et al., 2018). The internal consistency score is .70 in this study.

Statistical Analysis

SPSS 24 statistical package was used for descriptive data. In making the analyses, normal distribution assumptions were verified. Seeing that the data were normally distributed, correlation analysis using structural equations (SEM) was performed. JASP 12.2 (JASP Team, 2020) was used for bootstrapping (5000 samples) of SEM analysis to test the mediating research model. We tested the structural model using unweighted least squares (Brown, 2015). Several goodness-of-fit indices were used as criteria for the selection of the above model. We used $\chi^2/df < 5$, GFI, CFI, NFI, TLI, $> .90$, SRMR, and RMSEA $< .08$ as the model fit index evaluation standards (Hu & Bentler, 1999). Likewise, to be considered a mediator in a partial category, the direct and indirect effects are considered significant ($p < .05$), and for a total category mediation, the indirect effect is considered non-significant ($p > .05$) (Ato & Vallejo, 2015). SEM analysis was used in tests of the mediation hypothesis instead of Sobel's test, due to the latter's weakness in taking into account the possible skewed distribution of the indirect effect and its lack of statistical power (Hayes & Scharkow, 2013; Preacher & Hayes, 2004). Data and materials are publicly available on Harvard Dataverse: <https://doi.org/10.7910/DVN/UHG6YI>

Results

Demographic Variables

The demographic characteristics of 1172 participants are shown in Table 1. Among the participant are 639 (54.5%) women, 553 (50.3%) were aged between 15 and 21 years, 591 (50.4%) single persons, 723 (61.7%) were Christians, 638 (54.4%) belonged to low socioeconomic status, and 719 (61.3%) had high school certificate.

Table 1 Demographic characteristics of the participants (n = 1172)

Variables	N	%
Gender		
Female	639	54.5
Male	533	45.5
Age		
15–21	553	50.3
22 and above	547	49.7
Relationship status		
Single	591	50.4
Dating	425	36.3
Married	75	6.4
Others	9	0.8
Religion		
Christianity	723	61.7
Islam	373	31.8
Others	4	0.3
Socioeconomic status		
Lower	638	54.4
Middle	295	25.2
Upper	167	14.2
Education		
High school	719	61.3
Degree	403	34.4
Postgraduate	48	4.1

Preliminary Analyses

Descriptive statistics and correlation of study variables are shown in Table 2. Results indicated that asymmetry ranged from $-.79$ to $.13$ and kurtosis ranged from $-.81$ to $.20$, which were within the criteria of normality, and goodness-of-fit indices of (χ^2 (820, $N = 1172$) = 175; $p < .001$; $\chi^2/df = 4.69$; GFI = .97; CFI = .97; NFI = .97; TLI = .97; SRMR = .072; RMSEA = .072). The correlation values were calculated using structural equations method (SEM). Preventive health behavior was positively associated with fear of COVID-19 ($r = .53$, $p < .01$), and post-traumatic stress symptomology ($r = .58$, $p < .01$), and negatively with psychological distress ($r = -.11$, $p < .05$). Fear of COVID-19 was positively associated with post-traumatic stress symptomology ($r = .76$, $p < .01$) and psychological distress ($r = .22$, $p < .01$). Psychological distress was positively associated with post-traumatic stress symptomology ($r = .23$, $p < .01$). With respect to the effects of the socio-demographic variables, we only found a significant

Table 2 Means, standard deviations, and correlations

Variable	Mean	SD	AS	KU	1	2	3	4
1. Preventive health behavior	64.55	0.12	−0.79	0.21	—			
2. Fear of COVID-19	22.74	13.08	−0.22	−0.81	0.53**	—		
3. Post-traumatic stress	14.22	14.22	−0.24	−0.32	0.58**	0.76**	—	
4. Psychological distress	9.01	4.34	0.13	−0.11	−0.11*	0.22**	0.23**	—

Notes: *SD* standard deviations, *AS* asymmetry, *KU* kurtosis

** $p < .01$

** $p < .05$

effect of gender toward preventive health behavior ($B = .09$, $p < .05$) favorable to women, while there are no differences with respect to the other study variables.

Findings of the Research Model

In the first instance, a mediation model was determined with goodness-of-fit indices from the study's mediation model (χ^2 (762, $N = 1172$) = 147; $p < .001$; $\chi^2/df = 5.18$; $GFI = .98$; $CFI = .95$; $NFI = .94$; $TLI = .94$; $SRMR = .076$; $RMSEA = .077$). Later, we included the specification of error covariance of dimensions “Avoidance” and “Hyperarousal” components to represent the characteristics of post-traumatic stress symptomology. The mediational model was then re-run with acceptable values: (χ^2 (678, $N = 1172$) = 146; $p < .001$; $\chi^2/df = 4.65$; $GFI = .99$; $CFI = .96$; $NFI = .95$; $TLI = .95$; $SRMR = .071$; $RMSEA = .072$).

Confirming the first hypothesis that “fear of COVID-19 will be positively related to preventive health behavior,” the study found a positive direct effect of fear of COVID-19 on preventive health behavior (total effect; $B = .524$, $p < .001$). Analysis of the mediating role of post-traumatic stress symptomology and psychological distress regarding the extent to which the fear of COVID-19 related to preventive health behavior revealed a reduction in the coefficient and the result was not significant (direct effect, $B = .155$, $p > .05$).

The second hypothesis that “the relationship between fear of COVID-19 and preventive health behavior will be mediated by both post-traumatic stress symptomology and psychological distress,” was also confirmed as fear of COVID-19 was a positive predictor of post-traumatic stress symptomology ($B = .798$, $p < .001$) and the mediation of post-traumatic stress symptomology have a predictive positive effect on preventive health behavior ($B = .530$, $p < .001$) while fear of COVID-19 was also positively predicted by psychological distress ($B = .213$, $p < .001$) its mediation negatively predicted preventive health behavior ($B = -.255$, $p < .001$). The results confirmed the hypothesis of total double mediation with significant indirect effects of both mediated variables. The research model is presented in Fig. 2.

An initial analysis was conducted to determine whether the prediction coefficients obtained in the research model were significant. This start-up analysis was performed to corroborate the

Fig. 2 Mediation model of the effects of fear of COVID-19 on preventive health behavior through post-traumatic stress and psychological distress. C', total effect; c, direct effect

significance of the effects through replications. The results related to the start-up analysis are presented in Table 3. As seen in Table 3, all indirect effects with trajectory coefficients were considered significant, across the range of lower and upper limit values it was not zero for all these results were significant. While the direct effect was not significant indicating a total mediating effect, that is, there is an indirect relationship of post-traumatic stress symptomology and psychological distress between fear of COVID-19 and preventive health behavior.

Discussion

The present study found that the relationships between preventive health behavior, fear of COVID-19, post-traumatic stress symptomology, and psychological distress were significant. Nigeria had approximately 24,567 COVID-19 cases and 565 deaths, as of June 27, 2020, when the last data for this survey were collected (Oyeleke, 2020); the number has increased to 37,801 confirmed cases and 805 deaths as of July 22, 2020 (Nigeria Centre for Disease Control, 2020). The government at the end of May started a gradual easing of lockdown rules. This means Nigerians are informed about COVID-19 and they understood the preventive health behavior (Olapegba et al., 2020) and lived under restrictive policies to curb the pandemic.

The findings indicated that the mediation model employed in the study model was confirmed. Findings obtained from the model revealed that the fear of COVID-19 predicted preventive health behavior positivity both directly and through post-traumatic stress symptomology and psychological distress. This was confirmed by Harper et al. (2020) which stated that those participants who were more fearful of COVID-19 tend to engage more in regular hand washing, social distancing, and other preventive health behaviors. Another study conducted in the US, the UK, and Germany (Kuper-Smith et al., 2020) found a similar effect of the fear of coronavirus in determining social distancing and hand washing. Additionally, in their COVID-19 study on perceived vulnerability to disease and attitudes toward public health measures in Belgium, De Coninck et al. (2020) discovered that fear of being infected prompted people to support preventive health behavior and canvas for stricter public health measures. These results revealed that the fear of COVID-19 could serve a protective function of helping to keep us safe by elevating preventive health behavior.

At the same time, there were positive correlations between fear of COVID-19 and post-traumatic stress symptomology and psychological distress in this study. This implies that participants who indicated high levels of fear of COVID-19 were more likely to report an increased level of post-traumatic stress symptomology and psychological distress. This is not

Table 3 Bootstrapping analysis results of the model

Pathway	Coefficient	Lower bound	Upper bound
FCV-19→ Distress trauma → PHB	0.423	0.210	0.608
FCV-19→ Distress → PHB	−0.054	−0.090	−0.002
Total effect	0.524	0.360	0.530
Direct effect	0.155	−0.131	0.289
Indirect effect	0.369	0.169	0.568

Notes: *FCV-19* fear of COVID-19, *Distress* psychological distress, *Trauma* post-traumatic stress, *PHB* preventive health behavior

surprising as the fear of COVID-19 has been reported to facilitate the development of psychiatric symptoms among those who previously did not experience mental illness (Shigemura et al., 2020). The fear of COVID-19 has also been linked to heightened psychological distress (Jahanshahi et al., 2020) and various mental problems (Harper et al., 2020; Satici et al., 2020; Taylor et al., 2020) including suicidal ideation and suicide (Mamun & Griffiths, 2020) in different parts of the world. Moreover, psychological distress and post-traumatic stress symptomology caused by the COVID-19 pandemic can lead to fear of COVID-19, forming a cyclic relationship (Ahorsu et al., 2020; Pakpour & Griffiths, 2020; Satici et al., 2020). There is a need to provide psychological and psychiatric services to people who have suffered from the negative effects of COVID-19. Psycho-education, counseling services, and other targeted interventions should be provided.

While the mediation of post-traumatic stress symptomology in the relationship between fear of COVID-19 and preventive health behavior encouraged preventive health behavior, the mediation of psychological distress potentially reduced preventive health behavior. This means that higher levels of trauma are likely to lead to higher levels of preventive health behavior while individuals experiencing a higher level of distress are more likely to report lower levels of preventive health behavior. These double-edged effects of fear demonstrate the need to pay attention to early intervention and prevention of psychological disorders among the general public, as the world tries to curb the pandemic (Xiao et al., 2020). It is also important to be knowledgeable about one's level of fear about COVID-19 and the consequences of such fear. Pakpour and Griffiths (2020) opined that knowledge about the fear of COVID-19 could contribute to developing targeted education that could assist people in overcoming and/or using the fear of COVID-19 to promote preventive health behaviors.

Limitations and Future Research

The present study had some limitations. It used a cross-sectional design that cannot provide strong evidence for causality. The longitudinal study and/or diary method would be better at demonstrating if the correlations between the variables in this study are stable over time. Interpretation of the findings is also limited by the sample characteristics as participants were primarily young adults and individuals with access to the Internet and smartphones. Future studies need to replicate the findings in other samples such as older adults or individuals without an internet-enabled smartphone.

Conclusion

In conclusion, the present research flourishes our understanding of the connections between fear of COVID-19 and preventive health behavior. These results revealed that the fear of COVID-19 could serve a protective function of helping to keep us safe by elevating preventive health behavior. It also explicates the mediating roles of post-traumatic stress symptomology and psychological distress in this relationship. Fear of COVID-19 might increase post-traumatic stress symptomology and consequently improve preventive health behavior, but the fear of COVID-19 might also increase psychological distress which is likely to increase the risk of poor preventive health behavior. In line with these findings, mental health professionals could develop interventions to mitigate psychological distress. This study's findings can help mental health professionals better understand the complex psychological processes activated

during periods of infectious disease outbreaks and people's responses to keep themselves safe. The use of targeted education on traditional and social media is equally recommended to assist people in overcoming and/or using the fear of COVID-19 to promote preventive health behaviors. It is also important for the government and non-government agencies to implement appropriate psychological intervention measures and build positive awareness among the general public, with a special focus on patients with confirmed and suspected infections, frontline healthcare professionals, and vulnerable age groups.

Declarations

Ethics Approval Approval for this study was granted by the University of Ibadan Faculty of the Social Sciences Ethical Board and the study was conducted according to the ethical approval protocol and the 1975 Helsinki Declaration. Informed consent was signed by all the participants.

Conflict of Interest The authors declare that they have no conflict of interest.

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