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Fear of contagion, emotional stress and coping strategies used by adults during the first wave of the COVID-19 pandemic in Nigeria

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Abstract

Background: The COVID-19 pandemic has induced high levels of stress. The aim of the study was to assess the relationship between emotional stress (COVID-19 related fear, anger, frustration, and loneliness) and the use of coping strategies among adults in Nigeria during the COVID-19 pandemic.

Methods: Data from adults aged 18 years and above were collected through an online survey from July to December 2020. The dependent variables were COVID-19 related fear (fear of infection and infecting others with COVID-19), anger, frustration, and loneliness. The independent variables were coping strategies (use of phones to communicate with family and others, video conferencing, indoor exercises, outdoor exercises, meditation/mindfulness practices, engaging in creative activities, learning a new skill, following media coverage related to COVID-19) and alcohol consumption. Five logistic regression models were developed to identify the factors associated with each dependent variables. All models were adjusted for sociodemographic variables (age, sex at birth, and the highest level of education).

Results: Respondents who consumed alcohol, followed media coverage for COVID-19 related information, and who spoke with friends or family on the phone had higher odds of having fear of contracting COVID-19 or transmitting infection to others, and of feeling angry, frustrated, or lonely ($p < 0.05$). Respondents who exercised outdoors (AOR: 0.69) or learned a new skill (AOR: 0.79) had significantly lower odds of having fear of contracting COVID-19. Respondents who practiced meditation or mindfulness (AOR: 1.47) had significantly higher odds of feeling angry. Those who spoke with friends and family on the phone (AOR: 1.32) and exercised indoors (AOR: 1.23) had significantly higher odds of feeling frustrated. Those who did video conferencing (AOR: 1.41), exercised outdoors (AOR: 1.32) and engaged with creative activities (AOR: 1.25) had higher odds of feeling lonely.

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Conclusion: Despite the significant association between emotional stress and use of coping strategies among adults in Nigeria during the COVID-19 pandemic, it appears that coping strategies were used to ameliorate rather than prevent emotional stress. Learning new skills and exercising outdoors were used to ameliorate the fear of contracting COVID-19 in older respondents.

Keywords: Emotional Stress, Mental health, Coping strategies, Pandemic

Introduction

Emotional stress is a feeling of psychological strain or tension that can challenge the ability to adapt and cope with certain situations and experiences [1]. The COVID-19 pandemic has been a source of emotional stress, inducing a range of feelings from fear to frustration and loneliness [2]. In addition to fears related to falling ill or dying from COVID-19, fears related to economic adversity were heightened during the pandemic [3]. There is also anxiety associated with the demand to understand and develop new habits and preventive behaviours over a short amount of time; behaviours that ordinarily may take longer to fully incorporate into habitual practice. For example, refraining from touching one's face was strongly urged as a COVID-19 preventive behaviour. Yet, we touch our faces about 23 times in an hour [4] and it takes 68–254 days to permanently adopt a new behaviour [5]. Communication about risks and the behaviour changes required to cope with the pandemic challenged personal sense of stability and evoked fear and uncertainty for many [6].

Feelings of anger, frustration, and irritability increased during the pandemic in response to stress [7]. Individuals who experienced significant financial difficulties perceived themselves to be at greater risk for COVID-19. Those who obtained information about COVID-19 from social media and people of younger age were more likely to experience anger [8]. Stress may result from having to adapt to a new way of life during the extended period of the pandemic. The abrupt transition from in-person to remote modalities of studies and work forced many people to adjust and learn new technological skills and grapple with new roles and responsibilities. The move to the virtual environment also created limited access to the communities, people, and places that would usually be a source of comfort, relief, or support. One negative coping response to new and sudden stresses may be to lash out in anger [9].

Social isolation causes loneliness, characterized by feelings of emptiness, being unwanted, and cut off from other human beings [10]. Loneliness is a negative emotional response to the discrepancy between desired and attained relationships and is just one aspect of the "behavioural epidemic." The phenomenon is termed as such because of the high global prevalence of loneliness

and emotional dysfunction [11–16]. The behavioural epidemic refers to a multitude of mental health disorders such as depression, anxiety, substance abuse, domestic abuse, and suicide [17–20]. It is directly associated with the global increase in prevalence of chronic diseases since many mental health conditions are comorbid with many health conditions [21, 22]. Specific to COVID-19, a link has been shown between COVID-19 pandemic related loneliness and alcohol abuse and dependency symptoms, and avoidance behaviour as negative coping strategies [23]. Being required to quarantine or socially isolate for lengthy periods may induce emotional stress caused by loneliness, anger, and frustration [23]. In general, prevalence of emotional stress is lower in communitarian societies like Nigeria, where there is a greater emphasis on interdependence, tight social networks, and strong family connections [24].

The theoretical framework applied in this study is psychological stress theory [25]. The theory hypothesizes that emotional stress results when the demands of a particular environment exceed an individual's ability to cope and respond, taxing their sense of wellbeing [25]. This relational transaction between the individual and their environment is appraised through the lens of an individual's expectations and the significance they place on a specific encounter. Thus, the quality, intensity, and duration of emotional stress will differ between individuals in the same demanding environment [26]. Adaptation to emotional stress occurs through primary or secondary adaptation processes. Primary adaptation involves gaining control over the situation, perhaps through obtaining information to gain mastery, to alleviate stress while secondary adaptation is aimed at fitting in and coping with the situations [26].

Applied to this study, we consider the environment to be the health and social context created by the COVID-19 pandemic. Adaptive responses to the COVID-19 environment took many forms. Social media can be a source of knowledge and information. It also offers a mechanism to stay socially connected [27], although the use of the social media as a substitute for physical connection during the pandemic has been associated with negative impacts [28]. Other coping strategies employed to alleviate emotional stress associated with COVID-19 can include the consumption of alcohol and use of other

psychoactive substances [29]. Positive coping strategies can include meditation or mindfulness practices [30, 31], exercise [32, 33], creative activities [34], learning new skills [35], phones and video conferencing [36], and or following media coverage of pandemic [37]. The aim of the study was to determine the association between emotional stress (fear, anger, frustration, and loneliness) and the use of coping strategies among adults in Nigeria during the first wave of COVID-19 pandemic. We hypothesised that 1) positive coping strategies would be associated with lower odds of emotional stress and 2) the use of negative coping strategies would be associated with higher odds of experiencing emotional stress.

Methods

The data for these analyses were extracted from a multi-country global survey. The global survey assessed information about mental health and wellness from a global convenience sample of adults aged 18 years and older, from July to December 2020 [38]. Data were collected using an online survey platform. Study participants for the global survey were recruited through respondent-driven sampling. Initial participants reached by 45 data collectors were asked to share the survey link with their contacts within their countries. The survey links were also posted on social media groups (Facebook, Twitter, and Instagram), network email lists, and WhatsApp groups. Ethical approval for the study was obtained from the Human Research Ethics Committee at the Institute of Public Health of the Obafemi Awolowo University Ile-Ife, Nigeria (HREC No: IPHOAU/12/1557).

The data collection tool was initially developed for a study targeting a specific population in the United States [39] and was consequently adapted and validated for global use [40]. The overall validation score for the instrument was 0.83. The questionnaire took an average of 11 min to complete and was administered in English. Study participants were asked to complete an anonymous, closed-ended questionnaire about their mental health and well-being during COVID-19. Data collected into sociodemographic information, alcohol consumption, and COVID-19 related experiences of emotional stress (COVID-19 related fear—fear of getting infected and fear of giving someone else COVID-19, anger, frustration and loneliness). Data from a subset of participants who indicated that they lived in Nigeria were extracted for this study.

Dependent variables

COVID-19 related fear

Respondents were asked if they experienced COVID-19 related fear during the pandemic; the fear of getting COVID-19 infection and the fear of giving COVID-19 to

someone else (yes/no). The question was adopted from the Multi-Center AIDS Cohort Study [41].

COVID-19 related anger, frustration, and loneliness

The respondents were also asked if they had experienced anger, frustration and loneliness in response to the pandemic. The possible responses were: “Yes” or “No”.

Independent variables

Coping strategies

The respondents were asked, “*what are the things you have done to take care of your mental health during the pandemic?*” with available options including “use of phones to communicate with family and others”, “video-conferencing”, “indoor exercises”, “outdoor exercises”, “meditation or mindfulness practices”, “engaging in creative activities”, “learning a new skill”, and “following media coverage related to COVID-19”. Respondents could select as many options as applicable.

Consumption of alcohol

Respondents were asked if they had experienced any change in the use of alcohol during the pandemic. The response options include “increase”, “decrease”, no change” and “not applicable”. These responses were further coded as “alcohol use” when they reported an increase, decrease or no change in alcohol consumption; and “no alcohol use” when they checked that alcohol consumption was not applicable.

Confounders

Sociodemographic variables

Data collected included age, sex at birth, and highest level of education attained (none, primary, secondary, college/university).

Data analysis

We performed multiple best-practice procedures to ensure the quality of the data collected [40]. Each participant could only complete the questionnaire once through IP address restrictions, though they could edit their answers freely until they choose to submit. We removed responses that were completed under seven minutes ($n = 77$) which was the lower limit of the time needed to complete the survey and removed data from participants with incomplete data on the study variables ($n = 125$).

Data were analysed using SPSS Version 23.0 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp). Chi squared test (and t-test for age) were used to assess the association between the dependent variables (emotional stress—fear of getting COVID-19, fear of giving COVID-19 to someone else, anger, frustration and loneliness), and the independent variables (mental health

maintaining modalities) as well as covariates (age, sex, educational status). Five binary logistic regression models were developed to identify the associations between the independent variables and each of the five dependent variables. Adjusted odds ratios (AOR) and 95% confidence intervals (CI) were calculated. The model fitness was assessed using the Nagelkerke R^2 , the Hosmer Lemeshow goodness of fit test and the Omnibus test of model coefficients. Statistical significance was set at $< 5\%$.

Results

Complete data were available from 4,471 participants. The age of the respondents ranged from 18 to 85 years with a mean of 37.3 (SD = 11.6) years. There were 2,395 (52.9%) non-male participants, 3,615 (80.9%) had a college/university education and 1,034 (23.1%) consumed alcohol. To cope during the pandemic, 2,557 (57.2%) respondents used their phones to interact with family members and significant others in their lives; 1,868 (41.8%) engaged in video conferencing, 900 (20.1%) engaged in meditation or mindful practices, 1,554 (34.8%) exercised indoors, 469 (10.5%) exercised outdoors, 1,225 (27.4%) engaged in creative activities, 1,102 (24.6%) learned new skills, and 2,094 (46.8%) followed media coverage related to COVID-19.

As shown in Table 1, respondents with fear of contracting the COVID-19 virus were significantly older ($p < 0.001$) and had no or primary education ($p < 0.001$). They were also significantly more likely to report alcohol consumption ($p < 0.001$), use the phone to interact with family members and significant others ($p < 0.001$), engage in video conferencing ($p < 0.001$), exercise indoors ($p < 0.001$), and follow media coverage related to COVID-19 ($p < 0.001$).

Respondents who had fear of infecting others with the virus were significantly younger ($p = 0.017$) and more likely to be male ($p < 0.001$). They were also more likely to consume alcohol ($p < 0.001$), use the phone to interact with family members and significant others ($p < 0.001$), engage in video conferencing ($p < 0.001$), exercise outdoors ($p = 0.005$), and follow media coverage of COVID-19 ($p < 0.001$).

Respondents who were younger ($p < 0.001$), with no formal education ($p < 0.001$), consumed alcohol ($p < 0.001$), meditated and used mindful practices ($p < 0.001$), engaged with creative activities ($p < 0.001$), and followed media coverage of COVID-19 ($p < 0.001$) were more likely to report feeling anger, frustration, and loneliness during the pandemic.

Respondents who used the phone to interact with family members and significant others and engaged in video conferencing ($p < 0.001$), exercised indoors and outdoors,

and learned new skills ($p < 0.05$) were more likely to report feeling frustrated and lonely during the pandemic.

Results from the logistic regression models indicate that the proportion of variance in the dependent variables explained by the independent variables were low. New models with the independent variables included are an improvement over the baseline model as indicated by the Nagelkerke R^2 , Lemeshow goodness of fit test, and the Omnibus test of model coefficients.

Table 2 shows that respondents who consumed alcohol and who followed media coverage for COVID-19 related information had greater odds for fear of contracting COVID-19 or transmitting infection to others, and had greater odds for feeling angry, frustrated, and lonely ($p < 0.05$). Increase in age (AOR; 1.01; 95% CI: 1.01–1.02; $p < 0.001$) was associated with increased odds for fear of contracting COVID-19 but lower odds for fear of transmitting COVID-19, feeling angry, frustrated, and lonely. College/ university educated participants had lower odds for fear of contracting COVID-19 ($p < 0.001$), transmitting COVID-19 ($p = 0.972$), feeling anger ($p = 0.001$), frustration ($p = 0.044$), and loneliness ($p < 0.001$).

Respondents who spoke with friends or family on the phone (AOR: 2.07; 95% CI: 1.80–2.39; $p < 0.001$) had significantly higher odds for fear of contracting COVID-19. People who exercised outdoors (AOR: 0.69; 95% CI: 0.56–0.85; $p = 0.001$) and learned a new skill (AOR: 0.79; 95% CI: 0.67–0.93; $p = 0.004$) had significantly lower odds for fear of contracting COVID-19. Respondents who spoke with friends and family on the phone (AOR: 2.17; 95% CI: 1.72–2.74; $p < 0.001$) and males (AOR: 1.50; 95% CI: 1.24–1.82; $p < 0.001$) had significantly higher odds for fear of transmitting COVID-19 to someone else.

Respondents who practiced meditation or mindfulness (AOR: 1.47; 95% CI: 1.08–2.01; $p = 0.016$) had significantly higher odds of feeling angry. Those who spoke with friends and family on the phone (AOR: 1.32; 95% CI: 1.11–1.56; $p = 0.002$) and exercised indoors (AOR: 1.23; 95% CI: 1.04–1.46; $p = 0.017$) had significantly higher odds of feeling frustrated. Those who video conferenced (AOR: 1.41; 95% CI: 1.15–1.74; $p = 0.001$), exercised outdoors (AOR: 1.32; 95% CI: 1.01–1.71; $p = 0.041$), and engaged in creative activities (AOR: 1.25; 95% CI: 1.01–1.54; $p = 0.42$) had higher odds of feeling lonely.

Discussion

Findings suggest that many respondents in the survey used positive and negative coping strategies in response to emotional stress rather than to prevent emotional stress. Respondents with COVID-19 related fears and those who reported feelings of anger, frustration, and/or loneliness had higher odds of consuming alcohol and actively seeking information about COVID-19 through

Table 1 Factors associated with COVID-19 related emotional stress (Fear of contracting COVID-19, Fear of infecting someone else with COVID-19, Anger, frustration and loneliness among Nigerians (N=4471)

Variables	Total n (%)	Emotional stress			Fear of contracting COVID-19			Fear of infecting someone else with COVID-19			Anger			Frustration			Loneliness		
		Yes n (%)	No n (%)	p value	Yes n (%)	No n (%)	p value	Yes n (%)	No n (%)	p value	Yes n (%)	No n (%)	p value	Yes n (%)	No n (%)	p value	Yes n (%)	No n (%)	p value
Age	37.3 (11.6)	38.0 (11.6)	36.5 (11.6)	<0.001	36.1 (10.3)	37.5 (11.8)	0.017	33.6 (11.2)	37.2 (11.6)	<0.001	33.6 (11.6)	38.4 (11.4)	<0.001	32.9 (11.4)	38.0 (11.5)	<0.001			
Sex																			
Male	2076 (46.4)	1075 (51.8)	1001 (48.2)	0.162	283 (13.6)	1793 (86.4)	<0.001	119 (5.7)	1957 (94.3)	0.232	500 (24.1)	1576 (75.9)	0.178	297 (14.3)	1779 (85.7)	0.863			
Not Male	2395 (52.9)	1190 (49.7)	1205 (50.3)		222 (9.3)	2173 (90.7)		158 (6.6)	2237 (93.4)		536 (22.4)	1859 (77.6)		347 (14.5)	2048 (85.5)				
Educational status																			
No formal education	48 (1.1)	37 (77.1)	11 (22.9)	<0.001	5 (10.4)	43 (89.6)	0.994	9 (18.8)	39 (81.2)	<0.001	13 (27.1)	35 (72.9)	0.001	15 (31.2)	33 (68.8)	<0.001			
Primary	84 (1.9)	66 (78.6)	18 (21.4)		9 (10.7)	75 (89.3)		11 (13.1)	73 (86.9)		20 (23.8)	64 (76.2)		15 (17.9)	69 (82.1)				
Secondary	724 (16.2)	421 (58.1)	303 (41.9)		81 (11.2)	643 (88.8)		51 (7.0)	673 (93.0)		209 (28.9)	515 (71.1)		143 (19.8)	581 (80.2)				
College/University	3615 (80.9)	1741 (48.2)	1874 (51.8)		410 (11.3)	3205 (88.7)		206 (5.7)	3409 (206)		794 (22.0)	2821 (78.0)		471 (13.0)	3144 (87.0)				
Alcohol consumption																			
No alcohol consumption	3437 (76.9)	1649 (48.0)	1788 (52.0)	<0.001	339 (9.9)	3098 (90.1)	<0.001	171 (5.0)	3266 (95.0)	<0.001	740 (21.5)	2697 (78.5)	<0.001	442 (12.9)	2995 (87.1)	<0.001			
Yes, alcohol consumption	1034 (23.1)	616 (59.6)	418 (40.4)		166 (16.1)	868 (83.9)		106 (10.3)	928 (89.7)		296 (28.6)	738 (71.4)		202 (19.5)	832 (80.5)				
Phone																			
No	1914 (42.8)	774 (40.4)	1140 (59.6)	<0.001	136 (7.1)	1778 (92.9)	<0.001	109 (5.7)	1805 (94.3)	0.230	350 (18.3)	1564 (81.7)	<0.001	238 (12.4)	1676 (87.6)	0.001			
Yes	2557 (57.2)	1491 (58.3)	1066 (41.7)		369 (14.4)	2188 (85.6)		168 (6.6)	2389 (93.4)		686 (26.8)	1871 (73.2)		406 (15.9)	2151 (84.1)				
Video conferencing																			
No	2603 (58.2)	1259 (48.4)	1344 (51.6)	<0.001	248 (9.5)	2355 (90.5)	<0.001	148 (5.7)	2455 (94.3)	0.095	509 (19.6)	2094 (80.4)	<0.001	310 (11.9)	2293 (88.1)	<0.001			
Yes	1868 (41.8)	1006 (53.9)	862 (46.1)		257 (13.8)	1611 (86.2)		129 (6.9)	1739 (93.1)		527 (28.2)	1341 (71.8)		334 (17.9)	1534 (82.1)				

Meditation or mindfulness practices

Table 1 (continued)

Variables	Total n (%)	Emotional stress				Fear of contracting COVID-19				Fear of infecting someone else with COVID-19				Anger				Frustration				Loneliness			
		Yes		No		Yes		No		Yes		No		Yes		No		Yes		No		Yes		No	
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
No	3571 (79.9)	1786 (50.0)	1785 (50.0)	0.085	390 (10.9)	3181 (89.1)	0.116	200 (5.6)	3371 (94.4)	787 (22.0)	2784 (78.0)	0.001	475 (3.3)	3096 (86.7)	<0.001										
Yes	900 (20.1)	479 (53.2)	421 (46.8)		115 (12.8)	785 (87.2)		77 (8.6)	823 (91.4)	249 (27.7)	651 (72.3)		169 (18.8)	731 (81.2)											
Indoor exercises																									
No	2917 (65.2)	1418 (48.6)	1499 (51.4)	<0.001	314 (10.8)	2603 (89.2)	0.125	174 (6.0)	2743 (94.0)	588 (20.2)	2329 (79.8)	0.381	365 (13.5)	2522 (86.5)	<0.001										
Yes	1554 (34.8)	847 (54.5)	707 (45.5)		191 (12.3)	1363 (87.7)		103 (6.6)	1451 (93.4)	448 (28.8)	1106 (71.2)		249 (16.0)	1305 (84.0)	0.024										
Outdoor exercises																									
No	4002 (89.5)	2045 (51.1)	1957 (48.9)	0.086	434 (10.8)	3568 (89.2)	0.005	241 (6.0)	3761 (94.0)	890 (22.2)	3112 (77.8)	0.160	543 (13.6)	3459 (86.4)	<0.001										
Yes	469 (10.5)	220 (46.9)	249 (53.1)		71 (15.1)	398 (84.9)		36 (7.7)	433 (92.3)	146 (31.1)	323 (68.9)		101 (21.5)	368 (78.5)											
Creative activities																									
No	3246 (72.6)	1627 (50.1)	1619 (49.9)	0.243	353 (10.9)	2893 (89.1)	0.149	183 (5.6)	3063 (94.4)	668 (20.6)	2578 (79.4)	0.012	412 (2.7)	2834 (87.3)	<0.001										
Yes	1225 (27.4)	638 (52.1)	587 (47.9)		152 (12.4)	1073 (87.6)		94 (7.7)	1131 (92.3)	368 (30.0)	857 (70.0)		232 (18.9)	993 (81.1)											
Learning new skills																									
No	3369 (75.4)	1729 (51.3)	1640 (48.7)	0.122	367 (10.9)	3002 (89.1)	0.138	208 (6.2)	3161 (93.8)	704 (20.9)	2665 (79.1)	0.917	447 (13.3)	2922 (86.7)	<0.001										
Yes	1102 (24.6)	536 (48.6)	566 (51.4)		138 (12.5)	964 (87.5)		69 (6.3)	1033 (93.7)	332 (30.1)	770 (69.9)		197 (17.9)	905 (82.1)											
Following media coverage related to COVID-19																									
No	2377 (53.2)	1111 (46.7)	1266 (53.3)	<0.001	220 (9.3)	2157 (90.7)	<0.001	118 (5.0)	2259 (95.0)	437 (18.4)	1940 (81.6)	<0.001	296 (12.5)	2081 (87.5)	<0.001										
Yes	2094 (46.8)	1154 (55.1)	940 (44.9)		285 (13.6)	1809 (86.4)		159 (7.6)	1935 (92.4)	599 (28.6)	1495 (71.4)		348 (16.6)	1746 (83.4)											

Table 2 Logistic regression analysis showing the factors associated with COVID-19 related emotional stress (Fear of contracting COVID-19, Fear of infecting someone else with COVID-19, Anger, Frustration and Loneliness among Nigerians (N = 4471)

Variables	Fear of getting COVID-19			Fear of giving COVID-19 to someone else			Anger			Frustration			Loneliness		
	AOR (95% CI)	p value		AOR (95% CI)	p value		AOR (95% CI)	p value		AOR (95% CI)	p value		AOR (95% CI)	p value	
Age	1.01 (1.01–1.02)	<0.001		0.98 (0.97–0.99)	0.004		0.97 (0.96–0.98)	<0.001		0.96 (0.95–0.97)	<0.001		0.96 (0.95–0.97)	<0.001	
Sex at birth															
Male (ref: Not male)	1.04 (0.92–1.18)	0.537		1.50 (1.24–1.82)	<0.001		0.78 (0.60–1.01)	0.055		1.11 (0.95–1.28)	0.190		0.98 (0.82–1.18)	0.850	
Educational status															
Primary (ref: no formal education)	1.19 (0.49–2.85)	0.704		1.05 (0.32–3.43)	0.930		0.77 (0.28–2.11)	0.608		0.84 (0.36–1.96)	0.688		0.50 (0.21–1.19)	0.117	
Secondary (ref: no formal education)	0.49 (0.24–1.01)	0.052		0.96 (0.36–2.57)	0.929		0.27 (0.12–0.62)	0.002		0.65 (0.33–1.31)	0.229		0.34 (0.17–0.68)	0.002	
College/University (ref: no formal education)	0.28 (0.14–0.57)	<0.001		0.98 (0.37–2.58)	0.972		0.25 (0.11–0.54)	0.001		0.50 (0.25–0.98)	0.044		0.24 (0.12–0.47)	<0.001	
Alcohol consumption															
Yes (ref: no alcohol consumption)	1.55 (1.34–1.80)	<0.001		1.52 (1.23–1.87)	<0.001		2.11 (1.62–2.76)	<0.001		1.34 (1.3–1.59)	0.001		1.53 (1.26–1.85)	<0.001	
Phone															
Yes (ref: No phone use)	2.07 (1.80–2.39)	<0.001		2.17 (1.72–2.74)	<0.001		0.98 (0.74–1.31)	0.906		1.32 (1.11–1.56)	0.002		1.04 (0.85–1.27)	0.736	
Video conferencing															
Yes (ref: No video conferencing)	1.01 (0.87–1.17)	0.904		1.17 (0.93–1.46)	0.176		1.06 (0.78–1.43)	0.720		1.16 (0.97–1.38)	0.100		1.41 (1.15–1.74)	0.001	
Meditation or mindfulness practices															
Yes (ref: No)	0.99 (0.84–1.18)	0.963		0.97 (0.76–1.23)	0.777		1.47 (1.08–2.01)	0.016		0.93 (0.77–1.12)	0.423		1.18 (0.95–1.47)	0.138	
Indoor exercises															
Yes (ref: No)	1.06 (0.92–1.24)	0.423		0.83 (0.66–1.03)	0.096		0.94 (0.69–1.51)	0.661		1.23 (1.04–1.46)	0.017		0.89 (0.73–1.10)	0.293	
Outdoor exercises															
Yes (ref: No)	0.69 (0.56–0.85)	0.001		1.15 (0.86–1.54)	0.341		1.02 (0.69–1.51)	0.917		1.08 (0.86–1.36)	0.524		1.32 (1.01–1.71)	0.041	
Creative activities															
Yes (ref: No)	0.93 (0.79–1.09)	0.353		0.89 (0.71–1.13)	0.339		1.21 (0.89–1.64)	0.235		1.15 (0.96–1.38)	0.122		1.25 (1.01–1.54)	0.042	
Learning new skills															
Yes (ref: No)	0.79 (0.67–0.93)	0.004		0.92 (0.72–1.17)	0.485		0.73 (0.53–1.00)	0.053		1.10 (0.92–1.31)	0.312		0.98 (0.79–1.22)	0.882	
Following media coverage related to COVID-19															
Yes (ref: No)	1.40 (1.22–1.60)	<0.001		1.38 (1.12–1.69)	0.003		1.65 (1.25–2.17)	<0.001		1.64 (1.40–1.93)	<0.001		1.33 (1.10–1.61)	0.003	
Nagelkerke R²	0.102			0.059			0.081			0.116			0.100		
Hosmer Lemeshow goodness of fit test	9.56	0.297		10.58	0.227		7.92	0.441		11.03	0.200		10.19	0.252	
Omnibus test of model coefficients	354.11	<0.001		134.61	<0.001		137.33	<0.001		355.51	<0.001		259.13	<0.001	

AOR Adjusted odds ratio, CI Confidence interval

the media. Respondents who had COVID-19 related fears and those who felt frustrated had higher odds of using phone communication while those who felt lonely had higher odds of using coping strategies that involved visual contact with other people like video communication and exercising outdoors. Those who felt anger had higher odds of using introspective coping strategy (meditation or mindfulness practices). The two strategies that were more closely associated with preventing emotional stress were exercising outdoors and learning new skills as they were associated with lower odds of having the fear of contracting COVID-19. Our study hypotheses were, therefore, partially supported.

The modest values of the Nagelkerke R^2 suggest that there are other independent variables that are likely to be associated with emotional stress that were not included in the regression analysis, and this is one of the limitations of our study. Another limitation is the cross-sectional design. Like with all cross-sectional studies, we are unable to determine with certainty, the direction of the associations. The data were collected at a single point in time and thus, the relationships between these variables may have shifted as people adapt to the new realities – called the new normal – created by the pandemic. In addition, the non-probability sampling design limits the broad generalisability of study findings, as responses were not representative of the general population of Nigeria. Also, the use of web-based methods for recruitment and data collection may exclude participants with low socioeconomic status who may not have access to a smart phone or the internet [42]. The large sample size however, allows for a more precise estimate of effect so that findings are reasonably generalizable to the demographic represented in the study [43]. Despite the limitations, our findings suggests that a large proportion of people experienced emotional stress during the COVID-19 pandemic.

In this study, we were unable to identify the possible impacts of the use of coping strategies by those who felt emotionally stressed. However, prior research suggests that positive coping can decrease vulnerability to poor mental health outcomes [44] such as depression [45, 46] and other psychological disorders [47, 48]. Alcohol consumption is a method that some individuals use for distancing themselves from stressors or challenges [49]. It slows down the central nervous system, creating feelings of relaxation, but also reduces inhibition, judgment, and memory [50]. Relying heavily on alcohol consumption as a coping strategy is generally discouraged because of the risk for developing alcohol-related disorders. Alcohol consumption can become a maladaptive behaviour when an individual lacks alternative coping strategy [51]. It is recommended that as part of the COVID-19 response,

the public should be informed of the use of positive adaptive coping strategies for the management of the emotional stress that may be faced during a pandemic.

A viable tool for disseminating information on coping strategies is the media. We found that more respondents dealing with emotional stress turned to the media to seek information about COVID-19. Information-seeking, coping behaviour during a crisis may reflect a spectrum of passive or reflexive monitoring of a situation to seek solutions to a specific problem [52]. This behaviour is time bound, and specific to cultural and education contexts [52, 53]. Most respondents did not seek COVID-19 related information from the media, and we do not know if they sought information through other sources. However, the educational variability in information-seeking behaviour as demonstrated in this study, and possibly the cultural variability also, makes it important to conduct context-specific studies to understand how people use information management to cope with the COVID-19 pandemic. This can help in identifying possible ways of disseminating factual COVID-19 related information during this infodemic period [54].

We observed a pattern whereby individuals who were afraid of contracting COVID-19 used coping strategies that reduced contact with humans (e.g., used the phone to interact with others, engaged in video conferencing, exercised indoors, and followed media coverage of COVID-19). This may be an indication that respondents who have a strong perception of risk for contract COVID-19 are possibly less likely to be risk-takers and they therefore adopt coping strategies that promote social distancing. We also acknowledge that not all forms of COVID-19 related fears are dysfunctional so future studies may need to make a distinction between functional and dysfunctional fears in the study analyses [55].

In the present study, exercising outdoors and learning new skills were associated with lower odds for fear of contracting COVID-19. Learning new skills can buffer the detrimental effects of stress through access to new information, knowledge, and skills to enhance feelings of competency, self-efficacy, and resilience [56]. There is little clarity on how outdoor exercise may ameliorate the fear of contracting COVID-19 though the bi-directional relationship between the variables may infer that individuals with less concern about contracting the virus, may be more comfortable with leaving their homes to exercises outside [57–60]. There are, however, other factors that may restrict people from outdoor activities such as the severity of lockdown implemented by the government [61]. This study finding needs to be explored further.

Like prior studies, we found a negative association between age and anger [62], frustration, loneliness [63] and fear [63, 64] and a positive association between age

and fear of contracting COVID-19 [65]. Older individuals are less likely to have interpersonal estrangement that leads to anger [62] and there is a general decline in negative affect as a function of age [63, 66]. Thus, increased age is associated with less of a tendency to feel fearful, angry, or frustrated. It is not unusual that older age was associated with higher odds for fear of contracting COVID-19 as older adults are the more severely affected by the pandemic. Risk for mortality and morbidity related to COVID-19 was significant higher for older adults, especially in the earlier waves of the pandemic [67].

The influence of age, gender, and cultural background on loneliness should be acknowledged. Respondents from collectivist societies like Nigeria are less likely to feel lonely and among these societies, loneliness is less common in women than in men [68]. We found only that gender was associated with fear whereby men had higher odds of being fearful of giving COVID-19 to others. There are different social contexts that shape gender differences around fear [69]. It is possible that the COVID-19 context is one where men are more fearful than women of transmitting COVID-19 to their family and peers. In a patriarchal society like Nigeria, this may be feasible as men are typically the breadwinners [70] and are therefore, more likely to contract COVID-19 through physical and social interactions at the workplace. Further studies are needed to validate this postulation.

Finally, the study showed that respondents with higher education had lower odds of COVID-19 related emotional stress. This may be because they are able to access reliable information to manage situations that causes emotional stress. Some studies have suggested a relationship between higher education and greater control over feelings of anger [71]. Since anger is linked to frustration [72, 73], education may be a resource that reduces vulnerability to anger, frustration, and loneliness [74].

Conclusion

Although we found a positive association between emotional stress (fear, anger, frustration, and loneliness) and the use of coping strategies among adults in Nigeria during the COVID-19 pandemic, it seems that coping strategies were used to ameliorate rather than prevent emotional stress. Two coping strategies may have been used to ameliorate fear of contracting COVID-19: learning new skills and exercising outdoors. Findings from the present study indicate that there may be a need to conduct further studies that can identify coping strategies to prevent COVID-19 related stress. Evidence-based information about most effective strategies for preventing COVID-19 related stress could then be shared with the public.

Abbreviations

AOR: Adjusted odds ratio; CI: Confidence interval; COVID-19: Corona virus disease 2019.

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Authors' contributions

The manuscript was conceptualized by MOF. OI conducted the data analysis. MOF, OI, BB, MET, NMA, RAAZ, GFA, EA, PE, BG, NMA-K, II, AOI, MJ, AT-AK, ZK, FBL, JL, NPN, NOP, MFAQ, MR, JCO and ALN contributed to several versions of the manuscript. All authors contributed to the article and approved the submitted version. The authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to ongoing analysis using the dataset but are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval of the current study was obtained from the Human Research Ethics Committee at Institute of Public Health of the Obafemi Awolowo University Ile-Ife, Nigeria (HREC No: IPHOAU/12/1557) as the lead partner for this study. The protocol was in accordance with the Declaration of Helsinki and the National Code of Ethics guiding the regulation of ethical conduct of research in Nigeria. All participants provided informed consent before taking the survey.

Consent for publication

Not applicable.

Competing interests

Morenike Oluwatoyin Folayan and Maha El Tantawi are Sectional Editors with BMC Oral Health. All other authors declare no conflict of interest.

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