

Social Media Use and Covid-19 Risk Perception among Nigerians: The Roles of Affects, Gender and Information Sources

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Abstract

Social media technologies have become significant sources of public health information, especially in times of infectious disease outbreaks such as COVID-19. Using online survey data collected from social media users in Nigeria, this study investigates the influence of social media exposure for COVID-19 risk information on risk perception and affective responses towards the outbreak of COVID-19. It also explores gender and information sources' roles in the construction of perceived risk towards the pandemic. Findings showed that social media exposure tends to significantly influence risk perception, fear, and anger towards COVID-19, which varies across gender. However, social media's COVID-19 information sources are not significant predictors of public risk perception and affective responses towards COVID-19. Therefore, public health stakeholders should ensure correct health information to reduce panic and increase volitional control in public during risky situations.

Keywords: Coronavirus, emotional appraisal, online news, public health, risk communication, Web 2.0

Introduction

Since the Coronavirus disease 2019 (hereafter referred to as COVID-19) broke out in Wuhan city of China on December 12, 2019, not less than 135,057,587 people around the world have been infected, with an estimated 2,919,932 deaths as of April 11, 2021 (World Health Organization [WHO], 2021). The disease is a severe acute respiratory syndrome Coronavirus (SARS-CoV-2) which the WHO affirmed as a public health emergency of global proportion on January 30, 2020 (Lu et al., 2020; Zhu et al., 2020). At present, its reservoir remains unknown (Guo et al., 2020). Nigeria's COVID-19 index case was recorded on February 27, 2020, and the number has reached about 164,000, with an estimated 2,061 deaths as of April 16, 2021 (Nigeria Center for Disease Control [NCDC], 2021).

Contagious disease outbreaks like the COVID-19 pandemic are often characterised by rapid community spread with overwhelming health implications (Wurz, Nurn & Ekhadhl, 2013). Under such fragile circumstances, effective public health communication becomes necessary (Toppenberg-Pejcic et al., 2019). Essentially, communicating public health-related information to people empowers them to fully comprehend the complexity of the issues at stake, make necessary behavioural adjustments, and respond to the situation accordingly

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(Vos & Buckner, 2016; Choi, Yoo, Noh, & Park, 2017). Mass media platforms are veritable sources of the correct information on diseases and other public health issues; hence, many people rely on them for health information (Zexin, 2016; Whitely & Wang, 2017). Besides informing the audience on emerging public health issues, the mass media also play significant roles in shaping public responses and constructing realities surrounding the issues (Shim & You, 2015; Zexin, 2016).

When new diseases break out, their effective communication is often limited by the dearth of timely accurate information concerning the rate of infection, contamination/transmission route, and appropriate control measures (Lin, McCloud, Bigman & Viswanath, 2016). Such challenge may result from either the dearth of the needed information or deliberate attempt by concerned public institutions to withhold its disclosure as part of panic control measures (Oh, Lee & Han, 2020). Consequently, many people seek out requisite information using alternative media platforms, including social media (Jang & Baek, 2019). People using social media worldwide, and particularly in Nigeria, have grown geometrically (Giustini, Ali, Fraser & Boulos, 2018; Erubami, 2020). The usage of Web 2.0 based technologies spans an array of cognitive and affective purposes, including sharing and receiving public health news and information. Expectedly, public health institutions also utilise social media to disseminate public health information (Giustini et al., 2018). In Nigeria, for example, the Federal Ministry of Health and the NCDC are actively on Twitter and Facebook, with which they share information on daily case reports on COVID-19 infection, fatality rate, and appropriate prevention protocols.

Social media are beneficial in several fields, including communication. However, this media category also suffers from the spread of fake news (Shafi & Ravikumar, 2018). Fake news is getting rampant on many social media platforms, particularly health-related information (Apuke & Omar, 2020; Ali, Khalid & Zahid, 2021). Social media risk information are often laced with different psychological or emotional affects, such as fear, worry, anger, and happiness (Do, Lim, Kim, & Choi, 2016; Han & Liu, 2018; Guidry, Meganck, Perrin, Messner, Lovari, & Caryle, 2020). Studies suggest that these affects significantly influence public risk perception and risk attitude (Loewenstein, Weber, Hsee & Welch, 2001; Wu & Li, 2017). Therefore, health and policy stakeholders must understand the multipart relationship between the cognitive and emotional dispositions that may sway public risk perception during health crises. Although scholars have investigated social media's role during the outbreak of diseases, theoretical studies investigating social media's influence on public risk perception and affective responses to contagious disease outbreaks seem limited. This study seeks to bridge this gap using data collected from social media consumers in Nigeria during the country's COVID-19 nationwide lockdown.

Literature Review

Risk Perception

Risk perception has long assumed a critical place in public health management discourses, especially in health behaviour theories like the persuasion adoption process and the health belief model (Rudisill, 2013; Abraham & Shareen, 2015; Wu & Li, 2017). This is understandably so as people tend to perceive risk on the notice of any health challenge of public magnitude (Pask & Rawlins, 2016). Risk is generally conceptualised as the odds that an adverse event's debilitating effect will affect an individual (Rosa, 2003; Paek & Hove, 2017). Thus, risk perception measures an individual's evaluation of the chance that an adverse event will occur with some likely consequences (Sjoberg, Moen & Rundmo, 2004).

Within a health communication context, risk perception denotes an individual's subjective assessment of the chance that an adverse health-related incidence (such as disease, infection, or morbidity) can occur (Choi et al., 2017; El-Toukhy, 2015; Sjoberg et al., 2004).

People perceive the risk to determine their behaviour towards health-related issues, like the decision to embrace protective actions, practise healthier lifestyles, attend clinical screenings and abide by recommended medical guidelines (Renner, Gamp, Schmalzle & Schupp, 2015). Perceived susceptibility and perceived severity are the two main dimensions of constructing risk perception (Pask & Rawlins, 2016), although other dimensions, such as perceived likelihood (Brewer et al., 2007; Wu & Li, 2017), and perceived benefits and barriers (Imoh, 2008; Mojaye, 2008; Paek & Hove, 2017) have also been proposed and widely adopted by scholars. Perceived susceptibility explains a person's subjective assessment of vulnerability to a given health problem. Perceived severity explains the subjective assessment of a given health problem's seriousness or gravity and its potential consequences (Imoh, 2008; Mojaye, 2008; Qiao et al., 2021).

Social media and Risk Perception

Generally, mass media outlets play vital roles during public health challenges (Wahlberg & Sjober, 2000; Wakefield, Loken & Hornik, 2010). They shape risk perception on emerging issues through the attention, frame, valence, and tone of reportage on the issue (Paek & Hove, 2017). When new diseases occur, especially when people are yet to get direct experience with the infection and lack necessary coping mechanisms, mass media platforms are habitually relied on for diverse information regarding the disease (Paek, Oh & Hove, 2016; Wu & Li, 2017). In meeting these needs, the mass media help the public understand the gravity of the issue at stake and shape the perception of its associated risk (Catalán-Matamoros, 2011; Zexin, 2016). In recent times, however, social media appear to have gained wide popularity globally (Tripathi, Singh, Ghimire, Shukla, & Kumar, 2018; Oji & Erubami, 2020), and their uses cut across various purposes, including health information gathering and sharing (Giustini et al., 2018). As digital platforms for interpersonal and mass communication, social media generate conversations among users and facilitate information exchange on various issues and their associated risks, thereby stimulating the processing of the cognitive and affective scopes of risk perceptions (Wu & Li, 2017).

In times of infectious disease outbreak, mainly when the mainstream media are unable to meet public information needs immediately, the social media present a ready stock of both factual information and subjective news related to the symptoms, prevention, and management of diseases (Austin, Liu & Jin, 2012; Choi et al., 2017; Guidry et al., 2020). For example, a recent Nigerian study showed that 70% of the respondents used social media sources to satisfy their needs related to COVID-19 risk information (Olapegba et al., 2020). Research indicates that using social media recurrently for health-related purposes is associated with increased patients' health awareness and higher risk perception (Grosberg, Grinvald, Reuveni, & Magnezi, 2016). For instance, a Chinese study affirmed that people who relied on online media sources tended to have a higher food safety risk perception than those who relied on the mainstream media and interpersonal communication (Han & Liu, 2018). Similarly, exposure to risk information through social media was related to higher risk perceptions towards the Middle East Respiratory Syndrome, MERS, in South Korea (Choi et al., 2017). Scholars argue that social media exposure may influence public perception of COVID-19 risk since the pandemic has been subjected to broad social media discussions (Huynh, 2020).

Thus, we proposed that public exposure to COVID-19 related information via social media would influence the perception of its associated risk. Scholars generally conceive risk perception by its two primary constructs of perceived susceptibility and severity, although both dimensions are somewhat distinct and inversely related (El-Toukhy, 2015). However, we integrated both constructs as widely used in previous studies (Shim & You, 2015; Pask & Rawlins, 2016; Choi et al., 2017). Hence, we proposed our first hypothesis thus:

H1: Social media exposure for COVID-19 information will be positively related to COVID-19 risk perception.

Role of Emotions in Risk Perception

The affective dimension of a problem may influence public risk perception around it, given that reactions to dangerous occurrences are partly influenced by personal emotions, like worry, fear, anxiety, optimism, and trust (Wu & Li, 2017). The risk-as-feeling hypothesis suggests that emotions not only influence risk perception in risky situations but can also directly stimulate preventive behaviours (Loewenstein et al., 2001). The panic over a staid public challenge is often more significant than the associated risk (Loewenstein et al., 2001; Ramalingaswami, 2001). The occurrence of contagious diseases is often unexpected and can create wild emotion-filled dialogues that may directly or indirectly shape risk perception or subsequent behaviour concerning the disease (Oh et al., 2020).

Since the dawn of the digital age, social media have become some of the fastest platforms for expressing public concerns about new diseases (You, Joo, Park, Noh & Ju, 2017). Because many online media are generally less regulated and inundated with users' subjective information (Erubami, 2020), most social-mediated public health discussions are often wrapped in negative emotions (Do et al., 2016; Han & Liu, 2018; Guidry et al., 2020). Proponents of the Social Amplification of Risk Framework (SARF) contend that how a risk event is communicated may magnify or attenuate how people perceive its associated risk (Kasperson & Kasperson, 2005). In this regard, the valence theory posits that getting exposed to positive emotional content leads to optimistic risk perception, whereas negative affects promote pessimism towards risk (Lerner & Keltner, 2000).

When infectious diseases occur, social media consumers tend to get exposed to diverse emotions when exchanging information online (Oh et al., 2020). Arguably, these affects may intensify or assuage their risk perception towards the disease as espoused by the SARF. Previous research indicates that fear and anger are the often expressed emotions during severe public health crises. For instance, fear and anger were reported as the most prevalent emotions/affects associated with the Ebola virus disease outbreak in Nigeria (Ogoina, 2016) and South Korea's MERS outbreak (Do et al., 2016; Oh et al., 2020). Studies have also shown the predominance of both emotions among the public since the occurrence of COVID-19 (Choi, Hui & Wan, 2020; Malta, Rimoin & Strathdee, 2020; Peeri et al., 2020; Ali et al., 2021).

Although both fear and anger are listed as negative emotions in the Positive and Negative Affect Schedule (PANAS), scholars suggest that both emotions play differential roles in risk perception (Lerner & Keltner, 2000; Oh et al., 2020). For example, while proposing the Appraisal Tendency Framework (ATF), Lerner and Keltner (2000) affirmed that fear and anger- two emotions of equivalent valence but dissimilar appraisals- relate in discrete ways to risk perception. Their experiments showed that fearful people see risky situations as unclear and uncontrollable. In contrast, angry people exhibit reduced uncertainty, increased sense of efficacy, and volitional control, leading them to believe in their capacity to manage perceived risks. Although functional fear may motivate preventive

behaviours during disease outbreak (Ogoina, 2016; Khosravi, 2020; Harper et al., 2020), this emotion tends to hamper individuals' cognitive ability and diminish their tendency to act rationally when exposed to risky situations (Broche-Pérez, Fernández-Fleites, Jiménez-Puig, Fernández-Castillo & Rodríguez-Martin, 2020).

Conversely, anger generally tends to provide a bulwark against emotional distress, shrink vulnerability feelings and foster positive outcomes through volitional control. Considering previous theoretical accounts and empirical findings, we assumed that the frequency of getting exposed to social media for COVID-19 information would interact significantly with emotions and risk perception towards the disease. Hence, we proposed the following hypotheses:

H2.1: Social media exposure for COVID-19 information will positively relate to fear towards COVID-19.

H2.2: Social media exposure for COVID-19 information will positively relate to anger towards COVID-19.

H3.1: Fear towards COVID-19 will positively relate to COVID-19 risk perception.

H3.2: Anger towards COVID-19 will negatively relate to COVID-19 risk perception.

Information Sources and Risk Perception

While some researchers argue that general mass media exposure can influence people's perception of issues in specific ways (Catalán-Matamoros, 2011; Zexin, 2016; Choi et al., 2017), others go a step further to contend that the pattern of media use also plays significant roles in defining public understanding and response to emerging problems. In this regard, studies indicate significant variations in risk perception among individuals who are reliant on the mainstream media and internet sources (Han & Liu, 2018). For example, individuals who were frequently exposed to online media sources during South Korea's MERS outbreak reported a higher risk perception measure than those with less exposure to such information (Choi et al., 2017). Similarly, a Vietnamese study found that media use was positively linked to COVID-19 risk perception (Huynh, 2020).

Nevertheless, the likely influence exerted by social media information sources on risk perception and emotional responses to infectious diseases has not been fully explored. In the networked community, netizens usually get exposed to diverse social media sources, such as friends, family, government sources, and news media (Choi et al., 2017). These multiple information sources may probably exert a significantly varied level of influence on individuals' emotional responses, perceived risk, and behaviours towards infectious diseases (Oh et al., 2020). Besides, considering that many people generally build close online networks of acquaintances via social media, they are probably likely to express vivid sympathies for the emotions shown by other people within their networks and with whom they have closer ties than those they hardly know in the real world. Hence, we proposed the following hypotheses:

H4: Risk perception towards COVID-19 will vary significantly along with social media risk information sources.

H5.1: Fear towards COVID-19 will vary significantly along with social media risk information sources.

H5.2: Anger towards COVID-19 will vary significantly along with social media risk information sources.

Gender Differences in COVID-19 Risk Perception

Previous psychometric studies have demonstrated that women perceive risks in significantly different ways from men (Finucane, Slovic, Mertz, Flynn, & Satterfield, 2000; Loewenstein et al., 2001; Choi et al., 2017). More so, sociologists also contend that because risks are socially and culturally constructed, individuals' responses to a pandemic may be affected by gender (Yiwei, 2018; Khosravi, 2020). Accordingly, studies show that women usually perceive higher risks than men, even in similar risky situations. For example, a Japanese study on nuclear energy risk perception showed that women viewed the issue as an environmental problem; therefore, they tend to perceive a higher level of nuclear risk than men who considered nuclear energy a scientific matter (Yiwei, 2018). Another study concluded that South Korean women perceived greater MERS risk than their male counterparts (Choi et al., 2017).

Furthermore, early studies on public reactions to COVID-19 also suggest a gender difference in emotional responses to the deadly disease. Females tend to experience significantly greater fear towards COVID-19 than their male counterparts (Broche-Pérez et al., 2020). To provide more precise insights into the connection between demographic variables and risk perception, the study proposed the following hypotheses:

- H6:** There is a significant gender difference in social media users' perception of COVID-19 risk in Nigeria.
- H7.1:** There is a significant gender difference in social media users' fear of COVID-19 in Nigeria.
- H7.2:** There is a significant gender difference in social media users' anger towards COVID-19 in Nigeria.

Methodology

Procedures and Participants

We carried out an online survey of COVID-19 risk perception and emotional responses towards social media exposure for COVID-19 risk information. The survey spanned April 5, 2020, to June 14, 2020, when Nigeria was under COVID-19 lockdown. The survey's questionnaire was developed using Google Forms, a free online survey software. We selected 385 participants from the Nigerian population using Cochran's sample size determination formula developed in 1963 (Asemah, Gujbawu, Ekhareafu & Okpanachi, 2017).

The instrument was shared on the internet using a snowball sampling technique, otherwise nuanced as chain referral. Initially selected participants identified/referred potential participants within their network to complete the survey. The sampling process lasted until we reached the required number of participants. Compared to probability sampling, online surveys have the advantages of reduced cost and broader geographical reach (Baltar & Brunet, 2012). Nevertheless, online surveys are liable to sample bias and generalisability problems; hence, the need to compare online sample results with the national demographic statistics to ascertain their representativeness of the study's population (Sadler, Lee, Limn, & Fullerton, 2010; Baltar & Brunet, 2012; Apuke & Omar, 2020). The descriptive statistics presented in the results section showed that the collected sample did not vary much with the general Nigerian population (National Bureau of Statistics [NBS], 2018).

The study participants' eligibility was premised on being 18 years old or above and active social media usage. To achieve this, we included screening questions at the beginning of the survey (Apuke & Omar, 2020). Thus, respondents who didn't meet the criteria were

automatically redirected to the survey's appreciation and closing page for abrupt submission. Although the participants had the liberty to discontinue the study whenever they felt to, they were required to answer the entire instrument's questions: there was no missing data in the submitted responses.

Measures

Social Media Exposure

We adapted this measure from previous studies (Choi et al., 2017; Oh et al., 2020; Rivas, 2021). Respondents were asked the question, "How often do you see information about COVID-19 when using social media like Facebook, Twitter, Blogs, or Youtube?" Possible answers ranged from 1 = never to 5 = very often. High scores represented greater exposure to COVID-19 risk information via social media (Oji & Erubami, 2020) ($\bar{X} = 4.00$, $SD = .93$)

Risk Perception

We evaluated risk perception using four items on a 5-point Likert scale, ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree." (1) "I would likely be affected by COVID-19"; (2) "I am worried that I would be affected by COVID-19"; (3) "The consequence of COVID-19 infection is serious to me"; (4) "I feel that COVID-19 infection is dangerous". These questions were adapted from previous studies with slight modifications (Choi et al., 2017; Oh et al., 2020; Sung, Hu, & King, 2021) ($\bar{X} = 3.62$, $SD = 1.27$).

Fear

This was assessed with the following two items adapted and modified from the COVID-19 fear scale developed by Ahorsu et al. (2020). The scale comprised initially 7 items on a 5-point Likert scale, ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree." Previous studies have affirmed the scale's excellent internal reliability and other psychometric properties (Sakib et al., 2020; Alyami, Henning, Krägeloh & Alyami, 2020). The adapted questions were: (1) "I am afraid of getting Coronavirus disease" (2) "I'm fearful about the widespread Coronavirus disease" ($\bar{X} = 3.36$, $SD = 1.18$).

Anger

Relying on previous studies (Griffin et al., 2008; Oh et al., 2020; Nasir, Yagoub & Alhag, 2020), we measured anger towards COVID-19 using two items on a 5-point Likert scale, ranging from 1 = Strongly Disagree to 5 = "Strongly Agree." (1) "I am angry with the Coronavirus outbreak" (2) "I am irritated at the Coronavirus' consequences" ($\bar{X} = 2.94$, $SD = 1.15$).

Demographic Variables

Three demographic variables were explored: sex/gender (1= male; 2= female), highest level of education (1= none to 4= tertiary education) and age.

Social Media Risk Information Sources

This variable was measured with the question, "Which among the following is your main information source on Coronavirus when using social media?", with possible responses being (1) Friends (2) Family (3) Government ministries, departments, agencies and (4) Online news media.

Data Analysis

We conduct a descriptive evaluation of all main variables and bivariate correlation analysis between key variables using SPSS version 23 (see Table 1) for the preliminary analysis. The proposed hypotheses were tested using linear regression, independent sample t-test, and one-way analysis of variance (ANOVA) to ascertain the predictive relationship and variability of variables. For the regression analysis, our prediction equation was designed using the formula, $Y' = a + bX$, where Y' denotes the dependent variable, X represents the independent variable. In contrast, a and b denote the unstandardised coefficients (B) (Cronk, 2008). Regarding effect size, Cohen's d was calculated by entering the relevant data in a free online statistical calculator available at www.socscistatistics.com/effectsize/default3.aspx

Results

Three hundred and ninety-one respondents participated in the survey, but seven responses were identified as significant outliers; hence, they were removed entirely (Cronk, 2008). The analysis was done using the remaining 384 responses, representing a 99.7% response rate. The results show that 51.8% of the study's participants were males, while 48.2% were females. Among the respondents, 33.6% were between 18-24 years old, 39.8% were 25-34 years old, 10.9% were 35-44 years old, 4.2% were 45-54 years old, 6.0% were 55-64 years old, and the remaining 5.5% were 65 years and above. All the respondents have attained different levels of formal education, with 4.4% having primary education, 25% had secondary education, and 70.6% having tertiary education. Regarding the frequency of obtaining social media risk information on COVID-19, 33.9% of the respondents get exposed very often, 40.1% are exposed often, 19.3% do so occasionally, 5.5% rarely get exposed to such information. In comparison, 1.3% of the study's participants have never been exposed to COVID-19 risk information via social media sources. Online news media constitute the primary source of COVID-19 risk information for the respondents (47.9%), followed by government sources (28.4%), friends (10.8%), and family members (3.9%). The descriptive and correlation analysis is shown in Table 1.

Table 1. Descriptive and bivariate correlations between crucial variables

	Mean	SD	1	2	3	4	5	6
1 SM exposure	4.00	.93	—					
2 Sex	1.48	.50	.389**	—				
3 Age	1.74	.73	.034	.059	—			
4 Education	3.93	.27	-.022	.020	.054	—		
5 Risk perception	3.62	1.27	.469**	.613**	.064	.042	—	
6 Fear	3.56	1.18	.399**	.668**	.044	.101*	.599**	—
7 Anger	2.94	1.15	-.337**	-.578**	.000	-.019	-.362**	-.429**

** $p < 0.01$ (2-tailed); * $p < 0.05$ (2-tailed)

Social Media Exposure and COVID-19 Risk Perception

A simple linear regression was calculated to predict respondents' perception of COVID-19 risk due to exposure to online media information concerning the infectious disease. The results presented in Table 2 yielded a significant regression equation ($F(1, 382) = 107.799$, $p < .001$), with an R^2 of .220. The regression coefficient ($B = 0.636$, 95% CI [.516, .757])

indicates that the respondents' level of risk perception increases by .636, on average, for every unit increase in their exposure to online media for COVID-19 risk information. Thus, the findings supported **H1**.

Social Media Exposure and Affects

H2 tested whether using social media for COVID-19 risk information would positively relate to COVID-19 fear (**H2.1**) and anger (**H2.2**). The calculated regression equation presented in Table 2 shows that using social media for COVID-19 risk information is positively related to fear towards COVID-19, ($F(1,382) = 72.409, p < .001$), with an R^2 of .159. Relying on the prediction equation and the corresponding regression coefficient ($B = .503, 95\% CI [.387, .619]$), respondents' fear towards COVID-19 tends to increase by .503, on the average, for every unit rise in their frequency of getting exposed to COVID-19 risk information via social media; thus, **H2.1** was supported. Similarly, we found a significant regression output between exposure to social media for COVID-19 risk information and anger towards the disease ($F(1,382) = 48.779, p < .001$), with an R^2 of .113. However, the obtained regression coefficient ($B = -.416, 95\% CI [-.533, -.299]$) implies that a unit increase in the regularity of using social media for COVID-19 risk information tends to result in a .416 decrease in the level of anger towards COVID-19; hence, the results did not support **H2.2**.

Affects and COVID-19 Risk Perception

H3 examined the interaction between two discrete emotions of identical valence but different appraisals (fear and anger) and the perception of COVID-19 risk among social media consumers in Nigeria. Specifically, we examined whether fear would correlate positively with COVID-19 risk perception (**H3.1**) and if anger is negatively associated with COVID-19 risk perception (**H3.2**). The regression equation calculated for the assumed relationship suggests that fear is significantly and positively linked to COVID-19 risk perception among the respondents ($F(1, 382) = 213.204, p < .001$), with an R^2 of .358. Accordingly, the regression coefficient ($B = .644, 95\% CI [.557, .731]$) shows that the respondents' COVID-19 risk perception tends to rise by .644, on average, for every unit increase in their extent of fear towards the disease. Therefore, the results supported **H3.1**. Similarly, the data presented in Table 2 show that anger correlates negatively with the respondents' perceived risk towards COVID-19 ($F(1, 382) = 57.692, p < .001$), with an R^2 of .131. The regression results ($B = .397, 95\% CI [-.500, -.294]$) indicate that every additional unit in the respondents' anger towards COVID-19 tends to result in a concomitant .397 decrease in their intensity of risk perception towards the disease. This validated **H3.2**.

Table 2. Regression analysis predicting variables

H _a	R ²	SE of E	F	Df	B		P-value	95% CI for B	
					A	b		Lower	Upper
H1	.220	.82454	107.799	1, 382	1.073	.636	<0.001	.516	.757
H2-1	.159	1.07908	72.409	1, 382	1.548	.503	<0.001	.387	.619
H2-2	.113	1.08720	48.779	1, 382	4.600	-.416	<0.001	-.533	-.299
H3-1	.358	1.01440	213.204	1, 382	1.324	.644	<0.001	.557	.731
H3-2	.131	1.18023	57.692	1, 382	4.782	-.397	<0.001	-.500	-.294

H_a = Hypotheses; R² = Coefficient of regression; SE of E = Standard Error of the Estimate; F = Variance; df = degree of freedom; B = unstandardised beta; p = probability value; CI = Confidence Interval

Risk Perception and SM Information Sources

A one-way between-group analysis of variance was used to test **H4**, which stated that risk perception towards COVID-19 would vary significantly based on respondents’ social media risk information sources concerning the disease. Although Levene’s homogeneity test yielded no violation (.96 >.05), there was no statistically significant difference in the respondents’ perception of COVID-19 related risk based on their sources of information concerning the disease ($F [3, 380] = 1.30, p = .29$). Thus, the result did not support **H4**. Given the non-significant result, there was no basis to proceed to post-hoc comparisons and effect size determination.

Affects and SM Information Sources

H5 tested if there were significant variations in respondents’ emotional reactions to COVID-19 based on their social media information sources on the disease. Specifically, we sought to ascertain if fear towards COVID-19 will vary significantly along with respondents’ social media risk information sources (**H5.1**). and If anger towards COVID-19 will vary considerably along with the respondents’ social media risk information (**H5.2**). Levene’s homogeneity test yielded no violation for **H5.1** (.46>.05) and **H5.2** (.68>.05). However, the results presented in Table 3 show that respondents’ extent of fear towards COVID-19 did not vary significantly along with their sources of information about the disease ($F [3, 380] = 1.24, p = .30$); hence, **H5.1** was rejected. The data in Table 3 also show that respondents’ anger towards COVID-19 did not vary significantly along with the different sources of COVID-19 risk information available to them ($F [3, 380] = 1.08, p = .36$); therefore, the assumption of **H5.2** was not supported.

Table 3. Homogeneity of variance Tests and ANOVA

H _a		Sum of Squares	Df	Mean Square	F	Levene Sig.	P-Value
H4	Between Groups	6.08	3	2.03	1.30	.96	.29
	Within Groups	606.39	380	1.60			
	Total	612.47	383				
H5.1	Between Groups	5.11	3	1.70	1.24	.46	.30
	Within Groups	524.01	380	1.38			
	Total	529.12	383				
H5.2	Between Groups	4.30	3	1.43	1.08	.68	.36
	Within Groups	504.89	380	1.33			
	Total	509.19	383				

H_a = Hypotheses; df = degree of freedom; F = Variability; P-value = probability value

Gender, Affects, and COVID-19 Risk Perception

The general focus of **H6** and **H7** was to test whether there are significant gender disparities in COVID-19 risk perception among Nigerian social media consumers (**H6**) and determine the gender variations in the fear towards COVID-19 (**H7.1**) and anger towards the infection among the respondents (**H7.2**). An independent sample *t*-test was conducted to compare male and female social media users’ risk perception scores. The results presented in Table 4 show that on average, females tend to perceive greater risk towards COVID-19 ($\bar{X} = 4.42, SD = .40$) than males ($\bar{X} = 2.87, SD = 1.34$); $t(382) = -15.64, p <.001$. The proportion of the difference (mean difference = 1.55, 95% CI: -1.75, -1.35) was large (Cohen’s *d* = 1.56). Thus, the result supported **H6**.

Similarly, the results show that on average, female respondents who use social media for COVID-19 risk information tend to exhibit a significantly greater measure of fear towards COVID-19 ($\bar{X} M = 4.37, SD = .50$) than males ($\bar{X} = 2.80, SD = 1.12$); $t(382) = -17.97, p < .001$. The size of the difference (mean difference = 1.57, 95% CI: -1.74, -1.40) was large (Cohen's $d = 1.81$); this validated **H7.1**. Conversely, male respondents exposed to COVID-19 risk information via social media tend to, on average, exhibit a greater measure of anger towards COVID-19 ($\bar{X} = 3.58, SD = 1.03$) than their female counterparts ($\bar{X} = 2.25, SD = .83$); $t(382) = 13.95, p < .001$. The magnitude of the difference (mean difference = 1.33, 95% CI: 1.14, 1.52) was large (Cohen's $d = 1.42$). Hence, the results supported **H7.2**.

Table 4. Independent sample t-test for gender disparities in COVID-19 risk perception, fear, and anger

	Male	Female	95% CI				
	(n = 199)	(n = 185)	T	p	D	Lower	Upper
	\bar{X} (SD)	\bar{X} (SD)					
H6-1	2.87 (1.34)	4.42 (.40)	-15.64	.000	1.56	-1.75	-1.35
H7-1	2.80 (1.12)	4.37 (.50)	-17.97	.000	1.81	-1.74	-1.40
H7-2	3.58 (1.03)	2.25 (.83)	13.95	.000	1.42	1.14	1.52

\bar{X} = Mean; SD = Standard deviation; CI = Confidence Interval; t = t-statistics; p = probability value; d = Cohen's effect size

Discussion

Analysing data collected from an online survey of Nigeria's social media consumers during the 2020 outbreak of COVID-19, this study attempts to extend the frontiers of empirical discourse on how new media platforms, like social media, sway risk perception related to severe public health challenges. The study essentially seeks to provide empirical insights into the role of discrete affective responses (as in fear and anger), gender, and information sources in public perception of risk around staid transmittable illnesses like COVID-19.

The study results indicated that exposure to COVID-19 risk information via social media is significantly associated with increased risk perception towards the disease, suggesting that people who frequently utilise social media in gathering information on COVID-19 tend to perceive themselves as being at greater risk of contracting the disease. This is consistent with previous studies, which showed that using social media sources for health risk information can significantly shape public perception of risk towards a disease (Grosberg et al., 2016; Choi et al., 2017; Han & Liu, 2018). Earlier studies have also assumed that social media contents can influence public risk perception related to COVID-19, considering that the virulent disease has been subjected to broad social media discussions (Huynh, 2020). Social media represent reliable sources of COVID-19 risk information for many Nigerians (Olapegba et al., 2020). However, given social media prosumers' high negativity bias during public health crises (Choi et al., 2017), a rise in exposure for risk information via social media could significantly shape risk perception towards the disease in diverse ways.

The tendency for this interaction may be partly explained by the premise that utilising social media for COVID-19 risk information can significantly increase fear and reduce anger towards the disease. As shown in our results, respondents who are afraid of their susceptibility to COVID-19 infection and fearful of its likely severe consequences tend to perceive greater risk concerning the disease. In comparison, those angry at the disease's

outbreak and/or how it is being managed tend to perceive a lesser risk on average. The findings affirm previous research like the risk-as-feeling hypothesis, indicating that emotions may significantly predict risk perception (Loewenstein et al., 2001). Generally, social media's loosely regulated nature makes it possible for users to wrap public health discussions in negative sensations, like fear and anger, which have some influence on risk perception towards such issue (Do et al., 2016; Han & Liu, 2018; Guidry et al., 2020). Previous research testing the ATF suggests that fear and anger relate in discrete ways to risk perception. Fearful people tend to see risky situations as unclear and uncontrollable; hence, their diminished tendency to act rationally when faced with virulent disease outbreaks. Conversely, angry people tend to exhibit reduced uncertainty, increased sense of efficacy, and volitional control, leading them to believe in their capacity to manage perceived risks (Keltner, 2000; Broche-Pérez et al., 2020; Harper et al., 2020; Khosravi, 2020; Oh et al., 2020).

The role played by online media information sources on risk perception has remained relatively unknown. By incorporating this variable, this study further extends the frontiers of empirical knowledge on the determinants of public risk during the occurrence of contagious infections. Our study indicates that the variation in the sources of COVID-19 information available through social media does not significantly influence risk perception or public affective responses towards the disease, contrary to earlier assumptions that personal ties with sources of risk information on social media may influence substantially how online media users perceive and respond to public health risk (Oh et al., 2020). Our findings showed that receiving information shared by family members, online friends, government sources, or online news sources did not significantly predict fear, anger, or perceived risk towards COVID-19. Arguably, the concept of social ties in the virtual space is fluid and constantly changing, given that some online friends tend to share many values and, therefore, become more attracted to one another than the people they know in the real world.

It is essential to have a nuanced understanding of the distinctive role of gender to aid proper public health policy formulation and the implementation of health strategies during risky situations. Previous sociological studies argue that risks are socially and culturally constructed; hence, people's responses to a pandemic tend to be significantly impacted by their gender (Yiwei, 2018; Khosravi, 2020). In agreement with earlier studies (Finucane et al., 2000; Loewenstein et al., 2001; Choi et al., 2017; Broche-Pérez et al., 2020), our results showed that female respondents who get exposed to COVID-19 risk information via social media tend to perceive a more significant measure of risk towards the pandemic than males. Similarly, females seem to be more fearful of contracting COVID-19 with its debilitating consequences than males. However, the male respondents had a more significant measure of anger towards the outbreak of COVID-19 than their female counterparts. This suggests that because the female respondents are more afraid of their perceived susceptibility to COVID-19 and the severity of its consequences, they are likely to lack volitional control and exhibit panic over the spread of the pandemic. Conversely, in agreement with the ATF's assumptions (Lerner & Keltner, 2000), the male respondents will perceive greater self-efficacy towards COVID-19 prevention and control given their significantly higher level of anger towards the disease than their female counterparts. Generally, anger tends to provide a bulwark against emotional distress, shrink the feeling of vulnerability and foster positive outcomes through volitional control.

Conclusion

Social media are critical to information gathering and dissemination processes, especially during public health crises. This study, thus, shows that using social media extensively for

COVID-19 risk information can significantly influence risk perception towards the disease. Also, the study concludes that utilising social media technology for COVID-19 related risk information can significantly increase public fear and decrease public anger towards the disease. Similarly, our study concludes that the diversity in social media information sources does not considerably influence perceived risk and affective responses towards COVID-19. This finding, which was relatively unknown in previous research, indicates that social media consumers do not express a more vivid sympathy for the emotions shown by people with whom they have close physical ties (such as family members and friends) than distant acquaintances (like government and popular news media sources). Finally, our study also concludes that gender can significantly predict public risk perception and affective responses towards COVID-19, given that females tend to exhibit a significantly greater measure of fear and risk perception towards the pandemic than males.

Given people's proclivity to emphasise the negative aspects of an infectious disease outbreak while using online media, the study recommends that public health communicators and other professionals in health crises management must make deliberate efforts to ensure the unfettered availability of correct health information to reduce panic and increase the feeling of volitional control in public during risky situations. Notably, public health agencies should monitor social media discussions to be in tune with public fear and anger to provide appropriate responses that will allay such uncertainties. It would suffice to note that public health experts and policymakers should consider gender differences when devising strategies to manage public health crises, like the ravaging COVID-19 pandemic.

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