Research Article

Impact of Social Media Exposure on Risk Perceptions, Mental Health Outcomes, and Preventive Behaviors during the COVID-19 Pandemic in Saudi Arabia

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Abstract

Introduction: Social media has played a key role in mediating the communication of information during the COVID-19 pandemic. The way information is shared through social media shapes people's risk perceptions, which in turn affects their mental health and behaviors. This study aimed to assess social media's impact on the public's risk perceptions, mental health, and preventive behaviors during the peak of the COVID-19 pandemic. *Methods:* A Web-based survey was developed to assess social media exposure, risk perceptions, mental health, and COVID-19-related preventive behaviors among adults in Saudi Arabia. Multivariate logistic regression analysis was used to identify the association between social media exposure and key measurements. *Results:* A total of 1,500 individuals participated in the study; of those, 93.2% of participants reported using social media for COVID-19-related information. Twitter (68.3%) followed by Snapchat (25.1%) were the most used platforms. About 44.4% of participants were highly exposed to social media. High social media exposure was significantly associated with higher risks of anxiety (OR = 1.56, 95% CI: 1.19–2.05) and depression (OR = 1.47, 95% CI: 1.01–2.81) and higher levels of COVID-19 risk perception (OR = 1.43, 95% CI: 1.08–1.89). However, social media has no significant impact on the adoption of preventive behaviors. *Discussion/Conclusion:* Our results were consistent with the other international studies that were conducted during the COVID-19 pandemic. The anticipated future increase in social media use urges the need for longitudinal studies to investigate the psychological and behavioral effects of social media during emerging pandemics.

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Introduction

Nowadays, there are many sources of information related to health. The importance of these sources increases during the presence of global health crises [1–5]. In Saudi Arabia, there are 25 million active social media users, which accounts for 72.38% of the general population [6]. It was reported that social media was one of the trusted information sources during the H1N1 and MERS-CoV outbreaks [7, 8]. The Ministry of Health in the Kingdom of Saudi Arabia acted as the main and official source responsible for communicating health information during

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the COVID-19 pandemic. High-quality digital media materials were produced and disseminated through various social media platforms to raise awareness and advise people to stay in their home [9, 10].

During the COVID-19 pandemic, social media and COVID-19-related infodemic have a direct role in providing health information and promoting preventive behaviors; however, these methods may increase the possibility of negative social and economic impacts [8, 11, 12]. In Saudi Arabia, COVID-19-related information were also contributed to people's awareness of the severity of COVID-19 as well as to their attitudes, perceptions, and practices during the pandemic [10, 13]. Furthermore, a significant association was found between social media exposure (SME) and mental distress at the beginning of the COVID-19 pandemic in China [14]. Other few studies conducted during the COVID-19 pandemic indicated that frequent exposure to social media increased the rates of anxiety, depression, and panic disorders [15, 16].

Studies that target the impact of SME in Saudi Arabia during the early peak of COVID-19 pandemic are limited. The psychological and behavioral impacts of SME among the public in Saudi Arabia during COVID-19 pandemic has not been fully investigated yet. Therefore, we aimed in this study to assess the impact of SME on risk perceptions, mental health outcomes, and preventive behaviors among adults in Saudi Arabia during the COVID-19 pandemic. Also, the amount of SME among the public during the early peak of the COVID-19 pandemic will be investigated.

Materials and Methods

Study Design and Population
A cross-sectional study among the public in Saudi Arabia using Web-based survey was conducted in June 2020. During that period, the total confirmed cases of COVID-19 in Saudi Arabia exceeded 100,000. A total of 15,000 individuals' phone numbers were extracted from the Saudi Food & Drug Authority database via quota sampling based on regions. Study participants were invited to participate in the study by the short message service, and a message that included a short description of the study with the survey link was sent to all the extracted phone numbers. As the data were obtained electronically, no user could submit responses that were missing vital information.

Study Measurements
Social Media Exposure
SME was assessed by asking three questions using a 5-point Likert scale (1 = not at all to 5 = to a great extent). The three questions were as follows: "(1) How much have you seen information about COVID-19 on social media these days? (2) How much do you depend on social media for COVID-19 information? (3) How much do you trust the information you get from social media about COVID-19?" The three responses were averaged to create an index of SME, and higher scores indicated higher social media influence (mean = 9.68, SD = 2.6, range = [4–18], Cronbach's α = 0.86). In addition, types of social media platforms and accounts used to get information about COVID-19 and the number of hours spent per day in social media reading about COVID-19 have been assessed.

Personal Risk Perception
The personal risk perception (PRP) level was measured by asking four questions using a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The four questions were as follows: "(1) The problem of COVID-19 is serious to me; (2) I am worried that I would be affected by COVID-19; (3) I would likely be affected by COVID-19; (4) I have felt that COVID-19 is dangerous." [11]. The four responses were averaged to create an index of PRP, and higher scores indicated higher PRP level (mean = 13.8, SD = 3.5, range = [4–20], Cronbach's α = 0.76) [8, 11].

Mental Health Outcomes
Mental health outcomes, including depression and anxiety, were measured using Arabic validated versions of the Patient Health Questionnaire (PHQ) 2-item score (range, 0–6) and the Generalized Anxiety Disorder (GAD-7) scale (range, 0–21) [17]. A cutoff point of 2 or higher for depression risk and a cutoff point of 10 or higher for anxiety risk were chosen based on the latest evidence suggesting a better reliability and diagnosis accuracy [17, 18].

Personal Preventive Behaviors
Several personal preventive behaviors related to COVID-19 were assessed using a 5-point scale ranging questions from 1 (never) to 5 (always). The list of preventive behaviors was as follows: (1) handwashing with soap, (2) use of alcoholic hand rub, (3) avoid handshaking, (4) covering mouth and nose while coughing or sneezing, (5) avoidance of close contact with the person who has flu symptoms, (6) avoid attending family/friends gatherings, (7) avoid going out to public spaces such as malls and restaurants, (8) keep a 2-meter distance away from the other person in work and public spaces, (9) avoid going out for unnecessary matters. The nine items were averaged to create an index of personal preventive behaviors, and higher scores indicated higher compliance to preventive behaviors (mean = 40, SD = 5.2, range = [12–45], Cronbach's α = 0.83).

Statistical Analysis
Descriptive and bivariate correlation analyses of demographical characteristics and key measurements were conducted. Multivariate logistic regression analysis was used to identify the association between SME and key measurements. Regression coefficients, odds ratios (ORs), 95% confidence intervals (CIs), and p values to quantify the associations between variables and study outcomes were reported. The statistical significance level was set at $p < 0.05$ (two-sided). Data analyses were conducted using SPSS version 26.0 software.

Table 1. Sociodemographic characteristics and SME of study participants (*N* = 1,500)

	Overall	SME			*p* value
		low	moderate	high	
Overall	1,500 (100)	279 (18.6)	555 (37)	666 (44.4)	
Age					
18 to ≤29	411 (27.4)	50 (18)	185 (33.3)	178 (26.8)	
30 to ≤44	731 (48.7)	128 (46)	286 (51.5)	321 (48.1)	<0.001
≥45	358 (23.9)	101 (36)	84 (15.2)	167 (25.1)	
Gender					
Male	917 (61.1)	186 (66.5)	296 (53.3)	438 (65.8)	<0.001
Female	583 (38.9)	93 (33.5)	259 (46.7)	228 (34.2)	
Marital status					
Single	426 (28.4)	56 (20.1)	197 (35.4)	183 (27.5)	
Married	1,014 (67.6)	216 (77.4)	329 (59.4)	460 (69.1)	<0.001
Divorced/widowed	60 (4)	7 (2.5)	29 (5.3)	23 (3.4)	
Education					
High school or less	243 (16.2)	52 (18.4)	77 (13.9)	102 (15.3)	
Bachelor/Diploma	1,023 (68.2)	182 (65.3)	386 (69.5)	455 (68.4)	0.63
Master/PhD	234 (15.6)	45 (16.3)	92 (16.6)	109 (16.3)	
Occupation					
Student	145 (9.7)	14 (5.0)	76 (13.7)	56 (8.4)	
Healthcare employee	199 (13.3)	27 (9.6)	76 (13.7)	101 (15.1)	
Governmental/private employee	746 (49.7)	152 (54.4)	276 (49.7)	321 (48.2)	<0.001
Unemployed/retired	410 (27.3)	86 (31.0)	127 (22.9)	188 (28.2)	
Region					
Al-Riyadh, Qassim	673 (44.9)	119 (42.7)	255 (45.9)	310 (46.5)	
Makkah and Medina	347 (23.1)	80 (28.5)	126 (22.7)	145 (21.8)	
Eastern Region	235 (15.7)	33 (11.7)	88 (15.8)	109 (16.3)	0.48
Asir, Jazan, and Najran	159 (10.6)	28 (10.0)	57 (10.3)	68 (10.2)	
Al Bahah, Northen borders, Hail, Al-Jawf, and Tabuk	86 (5.7)	19 (7.1)	29 (5.3)	6 (5.3)	
Monthly income					
Less than 5,000 SR	310 (20.7)	50 (18.0)	124 (24.4)	118 (17.7)	
5,000–10,000 SR	287 (19.1)	62 (22.2)	91 (16.4)	136 (20.4)	
10,000–15,000 SR	290 (19.3)	62 (22.2)	98 (17.7)	124 (18.6)	0.09
15,000 SR or more	322 (21.5)	61 (21.8)	122 (21.9)	159 (23.9)	
I prefer not to say	291 (19.4)	44 (15.9)	120 (19.6)	129 (19.5)	

Results

Sociodemographic Characteristics and SME

A total of 1,500 participants completed the survey with a mean age of 37.9 years (SD ±11.61). The majority of participants were male (*n* = 917 [61.1%]), married (*n* = 1,014 [67.7%]), and governmental/private employees (*n* = 746 [49.7%]). High SME was found in 44.4% (*n* = 666) of participants, whereas medium and low levels of exposure were found in 73% (*n* = 555) and 18.8% participants (*n* = 279), respectively. Other basic characteristics are represented in Table 1.

Our results showed that the proportion of high SME was higher among men (65.8% vs. 34.2%, *p* < 0.001) and those who aged 30–44 years (48.1% vs. 26.8% and 25.1%,

p < 0.001). In addition, high SME was higher among those who were married (69.1% vs. 27.5% and 3.4%, *p* < 0.001) and among governmental/private sectors employees (48.2% vs. 15.1%, 8.4%, and 28.2%, *p* < 0.001). The proportion of SME was not different between participants from different regions and monthly income (Table 1).

SME during the COVID-19 Pandemic

The majority of the participants (*n* = 1,398 [93.2%]) reported using social media for COVID-19-related information. Twitter (*n* = 952 [68.3%]) followed by Snapchat (*n* = 350 [25.1%]) were the most used platforms. Most of the participants reported preferring governmental accounts (*n* = 989 [70.7%]), whereas general news accounts were the least preferred social media account type (*n* =

Table 2. SME of study participants (N = 1,500)

	Participants, n (%)
SME	
Low	279 (18.6)
Moderate	555 (37)
High	666 (44.4)
Use social media for COVID-19 information	
Yes	1,398 (93.2)
No	102 (6.8)
Social media platforms used for COVID-19 information	
Twitter	952 (68.3)
Snapchat	350 (25.1)
Instagram	36 (2.6)
Facebook	60 (4)
Most preferred social media accounts for COVID-19 information	
Governmental accounts	989 (70.7)
News accounts	130 (9.3)
Doctors and specialists	183 (13.1)
Public and personal accounts	96 (6.9)
Daily hours spent in social media reading about COVID-19	
An hour or less	160 (11.4)
2–3 h	525 (37.6)
4–5 h	384 (27.5)
Six hours or more	329 (23.5)

Table 3. PRP and mental health outcomes of study participants (N = 1,500)

	N (%)
The problem of COVID is serious to me	
Low-risk perception	526 (35.1)
High-risk perception	974 (64.9)
I have felt that COVID is dangerous	
Low-risk perception	666 (44.4)
High-risk perception	834 (55.6)
I am worried that I would be affected by COVID	
Low-risk perception	882 (58.8)
High-risk perception	618 (41.2)
It is likely that I would be affected by COVID	
Low-risk perception	979 (65.3)
High-risk perception	521 (34.7)
Depression	
Not at risk	637 (42.5)
At risk	863 (57.5)
Anxiety	
Not at risk	1,264 (84.3)
At risk	236 (15.7)

130 [9.3%]). Four hours or more were the most reported amount of time spent in social media reading about the pandemic (n = 713 [51%]) (Table 2).

PRP and Mental Health Outcomes during the COVID-19 Pandemic

About 64.9% (n = 974) of participants perceived the COVID-19 pandemic as a serious issue, while 55.6% of participants (n = 843) had felt that COVID-19 is a dangerous infection. Moreover, 41.2% of participants (n = 618) were worried about being infected by COVID-19, and 34.7% (n = 521) thought that they would be affected by COVID-19. Regarding mental health outcomes, more than half of the participants (n = 618 [57.72%]) were at risk of depression, whereas 15.7% were at risk of anxiety (Table 3).

Preventive Behaviors during the COVID-19 Pandemic

The majority of participants were found to have good compliance to preventive behaviors, including hand wash with soap (n = 1,033 [68.7%]), avoiding handshake (n = 1,168 [77.8%]), covering mouth when sneezing (n = 1,180 [78.7%]), and avoiding people with flu symptoms (n = 1,186 [79%]). In addition, most participants were compliant to avoiding family gatherings (n = 907 [60.4%]),

avoiding public places (n = 1,027 [68.4%]), keeping 2 m distance (n = 958 [63.9%]), and avoiding going out for unurgent reasons (n = 988 [65.9%]). However, good compliance in using hand sanitizer was found among 46.2% (n = 694) of participants (Table 4).

Impact of SME on Key Measurements

Multivariate logistic regression analysis was conducted to assess the impact of SME on study key measurements. It showed that high SME was significantly associated with a higher level of PRP (OR = 1.43, 95% CI: 1.08–1.89) and higher risks of anxiety (OR = 1.56, 95% CI: 1.19–2.05) and depression (OR = 1.47, 95% CI: 1.01–2.81). However, the exposure to social media has no significant impact on the compliance with COVID-19 preventive behaviors during the pandemic (OR = 0.95, 95% CI: 0.72–1.24). Results are represented in Table 5.

Discussion/Conclusion

In the current study, participants had a significant exposure to social media during the COVID-19 pandemic. The level of exposure to social media during the pandemic is highly anticipated with the surge of social media us-

Table 4. Preventive behaviors of study participants (N = 1,500)

	N (%)
Hand wash with soap	
Poor compliance	31 (2.2)
Fair compliance	436 (29.1)
Good compliance	1,033 (68.7)
Hand sanitizer	
Poor compliance	193 (12.9)
Fair compliance	613 (40.9)
Good compliance	694 (46.2)
Avoid handshake	
Poor compliance	79 (5.3)
Fair compliance	253 (16.9)
Good compliance	1,168 (77.8)
Cover mouth when sneezing	
Poor compliance	43 (2.9)
Fair compliance	274 (18.3)
Good compliance	1,180 (78.7)
Avoid people with flu symptoms	
Poor compliance	67 (4.5)
Fair compliance	247 (16.5)
Good compliance	1,186 (79)
Avoid family gatherings	
Poor compliance	79 (5.3)
Fair compliance	514 (34.3)
Good compliance	907 (60.4)
Avoid public places	
Poor compliance	91 (6.1)
Fair compliance	382 (25.5)
Good compliance	1,027 (68.4)
Keep 2 m distance	
Poor compliance	67 (4.5)
Fair compliance	475 (31.7)
Good compliance	958 (63.9)
Avoid going out for unurgent reasons	
Poor compliance	114 (7.6)
Fair compliance	398 (26.5)
Good compliance	988 (65.9)

Table 5. Multivariate analysis of social media influence on key measurements

Key measurements	OR (95% CI)	p value
Anxiety		
Not at risk	Reference[a]	0.04
At risk	1.47 (1.01–2.81)	
Depression		
Not at risk	Reference[a]	<0.01
At risk	1.56 (1.19–2.05)	
PRP		
Low-risk perception	Reference[a]	0.01
High-risk perception	1.43 (1.08–1.89)	
Preventive behaviors		
Low compliance	Reference[a]	
Moderate compliance	0.95 (0.72–1.24)	0.71
High compliance	1.33 (0.99–1.80)	

[a] Low level of SME (reference).

ers worldwide [19]. The level of SME was consistent with other studies conducted in other countries [9, 15, 16]. Our results also indicate that higher PRP was found among participants with high SME. High levels of PRPs were reported in one study conducted in Saudi Arabia at the same period [15]. Furthermore, social media was related to shaping and forming risk perceptions among the public during the MERS-CoV outbreak in 2015 in South Korea [8]. That social media can have significant effects on the perception of public risks and mental health [8, 12, 15].

Our findings also indicate that higher exposure to social media during the COVID-19 pandemic was significantly associated with higher risks of depression and anx-

iety. Our results were consistent with the recent study conducted in China. They found that frequent exposure to social media was positively associated with a higher risk of anxiety and a combination of depression and anxiety [15]. Furthermore, frequent exposure to social media during the COVID-19 pandemic increased the rates of anxiety, depression, and panic disorders among public in Iraq [15, 16].

Although the positive impact of social media on preventive behaviors was proven in one study conducted during the MERS-CoV pandemic in South Korea, we did not find a significant relationship between SME and preventive behaviors compliance among the public in Saudi Arabia [11]. The insignificant association can be justified by the higher public risk perception to COVID-19 than MERS-CoV, which may result in high preventive behaviors compliance regardless of the level of SME.

This study was conducted during the early peak of the COVID-19 pandemic. Additionally, unlike other international similar studies which used one measurement to study SME, this study investigated three different measurements included SME, dependency, and trust among participants [11, 15, 16]. The recruitment of study participants was conducted based on phone numbers to ensure the inclusion of those with minimal exposure to social media. Despite this, our study has some limitations. The study's cross-sectional nature limits our ability to make a strong causality inference of our major key measurements. The authors did not have baseline measurements prior to the onset of the COVID-19 pandemic and

were unable to make any comparisons. Also, the reported impact of isolation and other restrictive measures on depressive/anxiety symptoms was not adequately accounted for in the analysis. As the majority of study participants reported using Twitter and governmental accounts we were not able to study the impact of different social media platforms and accounts on the key measurements.

We believe that governmental and healthcare agencies are highly recommended to apply and adopt effective pandemic-related communication and education programs to avoid the psychological consequences on the public. In addition, it is highly recommended to develop strategies to improve the way personal and educational messages are shared during these critical times. The expected additional increase in social media users highlights the need for further research to assess other mental consequences.

Conclusion

Social media offers an opportunity for a quick share of information about emerging disease pandemics; however, its negative consequences need to be addressed with the predicted increase of social media use. Future longitudinal studies to further assess SME's behavioral and psychological impacts during infectious disease pandemics are highly needed.

Statement of Ethics

This study protocol was reviewed and approved by the Human Research Ethics Committees of the Saudi Ministry of Health and the Food & Drug Authority, approval number [2020_004]. A consent letter in the first section of the survey was given to all participants before their participation in the study.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Meshael Alrasheed: conceptualization, methodology, analysis, writing – original draft, and visualization; Salman Alrasheed: data curation, writing – review, and editing; Amani Salem Alqahtani: conceptualization, methodology, and writing – review and editing. All the authors approved the final manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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