THE ASSOCIATION BETWEEN SOCIAL MEDIA USE AND DEPRESSIVESYMPTOMS AMONG ADULTS IN RIYADH, SAUDI ARABIA

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Background: Excessive use of social media sites and applications was reported to be associated with depressive symptoms. We determined the association between social media use and depressive symptoms among adults in Riyadh and correlated the results with other studies. **Methods:** A cross-sectional study was performed using a self-administered survey questionnaire distributed to participants aged 13 years old and above. The Patient Health Questionnaire 9 (PHQ-9) was used as a screening tool to measure depression. Positive and negative affective experiences were also assessed. **Results:** A total of 467 participants with a mean age of 27.0 ± 10.9 years were surveyed; 269 (57.6%) were males, and 198 (42.4%) were females. The mean of the total PHQ-9 score was

8.7 ± 5.8. There were 17 patients (3.6%) with no depression, 103 (22.1%) with minimal depression, 160 (34.3%) with mild depression, 113 (24.2%) with moderate depression, 47 (10.1%) with moderately severe depression, and 27 (5.8%) with severe depression. Females significantly had experienced moderate to severe depression compared to males (P = 0.040, OR = 1.48). One hundred eighty-seven respondents (40.0%) had moderate to severe depression on the three dimensions of social networking sites (SNSs) usage. The PHQ-9 score was positively significantly correlated with all three dimensions of the use of SNSs. The negative affective experiences ranked high among other affective experiences with depression, the highest mean of all the scales (5.8 ± 1.4). The positive affective experiences scored low, with contentment scoring the lowest (3.7 ± 1.9). **Conclusion:** A high percentage of moderate to severe depression and negative affective experiences, including anger and happiness, exists among individuals who excessively use and spend a lot more time using SNSs. A greater tendency toward depression occurs among females. Although the data from this study are self-reported, there is a need for health practitioners and family physicians to identify early signs of depression that warrants early intervention to address to mitigate and prevent the potentially harmful consequences that might happen in the future.

Keywords: Anxiety, depression, Saudi Arabia, social media

Introduction

Depression has been estimated to be the second cause of disability worldwide by the year 2020.[1] It is a mental illness characterized by mood disturbance (mainly having a low mood, feeling of guilt or low self-worth, and marked loss of interest and pleasure) and physical symptoms such as disturbed sleep, increased or decreased appetite, low energy, and poor concentration.[2,3] Individuals who suffer from depression have an increased lifetime risk of committing suicide. Its prevalence has been growing globally, reaching up to 44% in developing countries and up to 41% in Saudi Arabia. Several risk factors are associated with developing depression: (1) Demographic risk factors such as being a female, young age, being unemployed, being single, divorced, or widowed; (2) Social risk factors such as substance abuse, low self-esteem, and lack of social support; and (3) Other medical risk factors such as having a chronic medical condition.[3] In Saudi Arabia, risk factors for depression are on the rise; other than the increased prevalence of chronic illness, there is a marked development of

stress due to the shift to modern lifestyles and the development of social isolation.[3,4]

The number of Internet users, social media users in particular, in Saudi Arabia has increased exponentially over the past few years.[5] In 2021, Saudi Arabia had an estimated 33.5 million Internet users, i.e. 95.5% of the population.[6] Further, 27.8 million people (79.3% of the population) were active social media users. More than 50% of the Saudis use social media platforms such as WhatsApp, YouTube, Facebook, Instagram, and Twitter.[7] Saudis spend an average of about 7 hours per day on the Internet and about 3 hours per day on social media applications.[6]

In 2010, Andreas Kaplan and Michael Haenlein defined social media as "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content."[8] Social media (i.e. social networking sites (SNSs)) allow users to have profiles to view, create, share content that expresses their thoughts, ideas, and emotions. In addition, it serves as a communication tool facilitating interaction between individuals.[8] It has become an essential part of our daily lives.[1] There is a wide range of platforms that have different purposes. Here are examples of the most commonly used platforms worldwide: Facebook, where people can share their life events; Twitter, for public discussions about global trends, issues, and expressing one's thoughts; YouTube, for sharing video content; Instagram, sharing pictures and live streams; LinkedIn, for professional and business use; Snapchat; where a person can send pictures/videos that disappear after viewing; Pinterest, for sharing ideas attached with pictures/videos; and Tumblr, a blogging platform to discuss multimedia content.[9]

Back in 2016, over 90 percent of adults (18–49 years) used at least one social media platform within the last 12 months.[10] It made people's lives more comfortable and more convenient. However, it came with a cost; different studies observed the negative effects of social media on physical and psychological well-being, specifically depression and anxiety.[1,8,10] Time spent on social media, the frequency of its use, and using more than one social media platform were found to be linked to poorer psychological well-being.[11,12] It has been found that social media induce depression by several factors. One study concluded that nighttime use of social media along with the emotional investment of social media increase sleep disturbance and depressive symptoms in adolescents.[13] Depressive symptoms were also associated with problematic use of social media, which is being driven to excessively use social media to the point of limiting other daily activities such as studying, social activities, and interpersonal relationships.[14] In another study, it has been observed that positive experience on social media by having emotional support, connecting to friends, and finding employment opportunities is associated with less depressive symptoms; however, depressive symptoms due to negative social media encounters were significantly higher than positive experiences.[12] Generally, in social media, people tend to capture and share events that give the impression of having a successful and happy life, which leads the observer (especially young adults) to compare themselves to the apparently happy life of others, and finally, the feeling of depression and submission.[12–16] Several studies have explored the negative mental health consequences of excessive social media use. There has been an overwhelming exploration of the negative consequences of social media use in literature as compared to the positive effects.[17] Systematic reviews on this topic have found that excessive media use in young adults was associated with poor sleep quality and poor mental health outcomes, directly and indirectly.[18–20] Although studies have found some correlation between social media use and mental health, it must be understood that the evidence comes mainly from cross-sectional and observational studies.[21] Further studies in the form of qualitative research and long-term cohorts are needed to establish the association with much more validity.[22]

There is a paucity of studies in Saudi Arabia on this topic. Hence, in this study, we aimed to determine the association between social media use and depressive symptoms among Saudi adults.

Methods

A cross-sectional study was conducted among adults aged 13 years old and above currently living in the capital city of Riyadh. The population size of Riyadh is 7,231,447. Participants were randomly sampled, and using a confidence interval of 5, confidence level of 95%, and 5% margin of error, the target sample size was 384. The data were collected using a self-administered questionnaire distributed both online and as hard copies to ensure it reached most of the desired sample. The questionnaire included basic demographic data (age, gender, educational level, current residence, employment status, and marital status). In addition, there were questions about the frequency of social media use, what types of social media were used, and a questionnaire for depression screening using the Patient Health Questionnaire 9 (PHQ-9) questionnaire.

The sum of the scores from the PHQ-9 questionnaire was added and categorized into: no depression (score of 0), minimal depression (1–4), mild depression (5–9), moderate depression (10–14), moderately severe depression (15–19), and severe depression (20–27). Questions on social media use were grouped into three factors: Factor 1 or basic usage factor (questions on the frequency of use, the average length of time of use, and the number of friends), Factor 2 or interaction usage factor (frequency of sending messages, updating status, sharing or resending profiles, visiting a friend's homepage, and

commenting on others' photos and comments), and Factor 3 or display usage factor (composition of friends, writing notes/blogs, updating profile image, and posting photos).

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0 (SPSS Inc., IBM, Armonk, New York, USA). Results are indicated as numbers and percentages for categorical variables and as mean and standard

deviation for continuous variables. Correlation between PHQ-0 scores and factor usage was done using the Spearman rho correlation. Significance in the mean PHQ-9 scores across different factor usages was done using the analysis of variance. A *P* value of < 0.05 was considered statistically significant.

Approval by the institute of review board in King Fahad Medical City, Riyadh, Saudi Arabia, was secured prior to conducting the study. Participation in the study was anonymous, and the agreement of participants was obtained.

Results

A total of 467 participants were surveyed with a mean age of 27.0 ± 10.9 years (range: 13–68 years); 269 (57.6%) were males, and 198 (42.4%) were females. WhatsApp was the most commonly used application with 373 (79.9%) users, followed by Snapchat with 358 (76.7%) users and Twitter with 301 (64.5%) users. Table 1 shows the detailed demographic profile of the participants.

Table 2 shows the respondents' responses to the PHQ-9 questions. Most of the respondents have little interest or pleasure in doing things for several days (n = 202, 43.3%), feeling down, depressed or hopeless for several days (n = 236, 50.5%), trouble falling or staying asleep, or too much sleep for several days (n = 170, 36.4%), and feeling tired or having little energy for several days (n = 212, 45.4%). There were more respondents who "not at all" experienced poor appetite or overeating (n = 158, 33.8%), feeling bad about oneself (n = 187, 40.0%), trouble concentrating (n = 205, 43.9%), moving or speaking slowly (n = 313, 67.0%), and thoughts that would be better off dead (n = 400, 85.7%). Less than a third of the respondents had experienced all the items in the PHQ-9 questionnaire more than half the days or nearly every day.

The mean total PHQ-9 score was 8.7 ± 5.8 (range: 0–27). Based on the total PHQ-9 score, there were 17 patients (3.6%) with no depression, 103 (22.1%) with minimal depression, 160 (34.3%) with mild depression, 113 (24.2%) with moderate depression, 47 (10.1%) with moderately severe depression and 27 (5.8%) with severe depression [Figure 1]. More females had significantly experienced moderate to severe depression compared to males (n = 90/198 or 45.5% versus 97/269 or 36.1%, *P* = 0.040, OR = 1.48).

Table 3 shows the responses to questions on basic usage, interaction, and display usage factors. There were 288 (61.7%) of respondents who used SNS multiple times a day, and half of them (n = 234, 50.1%) spend at least 3 hours a day using SNSs. A larger percentage of respondents frequently send messages daily multiple times a day (n = 204, 43.7%). Furthermore, more than half of the respondents seldom (monthly to never) write notes, update their profile images, or post photos.

Table 1: Demographic characteristics of 467 respondents	
Variables	***n* (%)**
Gender	
Male	269 (57.6%)
Female	198 (42.4%)
Education	
High school or less	129 (27.6%)
College	279 (59.7%)
Higher Education	59 (12.6%)
Marital status	
Single	327 (70.0%)
Married	133 (28.5%)
Others	7 (1.5%)
Employment	
Employed	173 (28.5%)
Unemployed	294 (63.0%)
Monthly income	
<10,000 SR	303 (64.9%)
10,000-15,000 SR	43 (9.2%)
15,000-20,000 SR	77 (16.5%)
20,000-25,000 SR	26 (5.6%)
More than 25,000 SR	18 (3.9%)
Social media/apps used	
WhatsApp	373 (79.9%)
Snapchat	358 (76.7%)
Twitter	301 (64.5%)
Instagram	264 (56.5%)
You Tube	252 (54.0%)
Pinterest	18 (3.9%)
LinkedIn	17 (3.6%)
Tumblr	16 (3.4%)
Facebook	9 (1.9%)
Line	6 (1.3%)

Table 4 shows the association between the three different factors and categories of depression. There were significant associations between factor 1 (basic usage) and depression (*P* < 0.001), factor 2 (interaction usage) and depression (*P* = 0.027), and factor 3 (display usage) and depression (*P* = 0.011). There were 187 respondents (40.0%) who had moderate to severe depression in the three dimensions of SNS usage. The PHQ-9 score was positively significantly correlated with basic usage (spearman = 0.211, *P* < 0.001), interaction usage (spearman = 0.100, *P* = 0.031) and display usage (spearman = 0.161, *P* < 0.001). Male respondents had a mean (SD) PHQ-9 score of 23.9 ± 10.6, while female respondents had a mean (SD) PHQ-9 score of 23.4 ± 11.5 (*P* = 0.602). PHQ-9 score was significantly correlated to basic usage factor (r = −0.105, *P* = 0.023) and display usage factor (r = −0.110, *P* = 0.017) but not with interaction usage factor (r = −0.054, *P* = 0.246).

Figure 2 shows the frequency of positive and negative affective experiences of the survey respondents. Depression had the highest mean of all the scales (5.8 ± 1.4), followed by unhappiness (5.6 ± 1.4) and anger (5.5 ± 1.5). The positive

affective experiences scored low, with contentment scoring the lowest (3.7 ± 1.9), followed by joy (4.0 ± 1.7) and cheer (4.0 ± 1.8).

The mean score for the total positive and negative affective experience scales was 38.3 ± 8.12 (median: 37.0, range: 17.0–56.0).The mean positive score was 15.9 ± 6.1 (median: 16.0, range:

| Table 2: PHQ9 questionnaire responses of 467 survey respondents				
	Not at all	**Several days**	**More than half the days**	**Nearly everyday**
Little interest or pleasure in doing things	125 (26.8%)	202 (43.3%)	88 (18.8%)	52 (11.1%)
Feeling down, depressed, or hopeless	111 (23.8%)	236 (50.5%)	71 (15.2%)	49 (10.5%)
Trouble falling or staying asleep, or sleeping too much	141 (30.2%)	170 (36.4%)	76 (16.3%)	80 (17.1%)
Feeling tired or having little energy	79 (16.9%)	212 (45.4%)	107 (22.9%)	69 (14.8%)
Poor appetite or overeating	158 (33.8%)	151 (32.3%)	86 (18.4%)	72 (15.4%)
Feeling bad about yourself or that you are a failure or have let yourself or your family down	187 (40.0%)	143 (30.6%)	78 (16.7%)	59 (12.6%)
Trouble concentrating on things, such as reading the newspaper or watching television	205 (43.9%)	144 (30.8%)	59 (12.6%)	59 (12.6%)
Moving or speaking so slowly that other people could have noticed. Or the opposite-being so fidgety or restless that you have been moving around a lot more than usual	313 (67.0%)	85 (18.2%)	44 (9.4%)	25 (5.4%)
Thoughts that you would be better off dead, or of hurting yourself	400 (85.7%)	35 (7.5%)	17 (3.6%)	15 (3.2%)
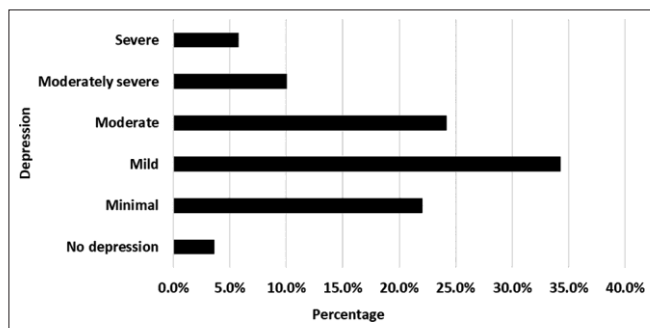
Figure 1: Frequency of depression categories among 467 survey participants

Figure 2: Positive and negative affective scales

4.0–28.0), and the mean negative score was 22.3 ± 4.6 (median: 23.0, range: 7.0–28.0). PHQ-9 score was significantly negatively correlated with the total positive or negative affective experience (spearman = −0.415, $P < 0.001$), negative affective experience (spearman = −0.493, $P < 0.001$), and positive affective experience (spearman = −0.199, $P < 0.001$).

Discussion

This study was done to determine the association between social media use and depressive symptoms among Saudi adults. In this study, we focused on the prevalence of depressive symptoms and their relationship to the use of social media applications.

This study's prime finding is that 40% of our respondents exhibited moderate to severe depression based on the PHQ-9 score, with 5.8% of them having severe depression. This rate is relatively higher than that reported in a similar study conducted among female teenagers in Al Qasim, Saudi Arabia, which showed an overall 35% depression rate.[8] In contrast to their research, their study population was significantly younger (aged 13–19) and focused on the female gender. Despite the high depression
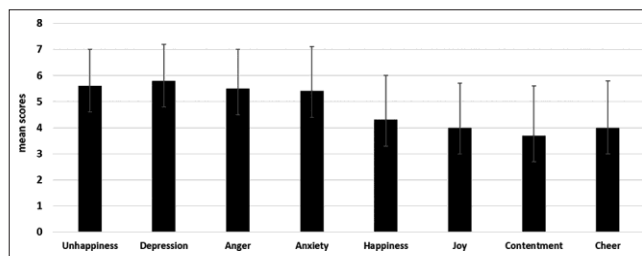
rate, they concluded that only 20% of those who spent a lot of time using social media have depression.[8] Furthermore, 61.7% of our respondents use SNS multiple times a day, spending at least 3 hours online. This is concordant with the study conducted by Lin *et al*.[23] in 2016 that depression has a strong, linear,

dose-response trend. This means that the more time the users spend on SNS, the higher the odds of depression (by as much as 1.6 times). One study showed that behavioral cues through prolonged use of social media were suggested as a useful signal for the onset of depression, particularly among those who exhibit social disengagement and decrease social activity.[24] Another study showed that excessive social media use affected university students' academic performance and correlated significantly with depressive symptoms.[25] In contrast, however, a large study conducted by Block *et al*.[26] in 2014 showed that the increased use of social media might not be the main cause for depressive symptoms or even depression; instead, these people may have experienced major setbacks or problems.

Another highlight of this study is the significant association between social media usage, interaction, and display with depression. Forty percent of our respondents (n = 187) had moderate to severe depression, in direct contrast to the study by Ali *et al*.[8] However, studies have shown that self-reported depression and excessive use of social media (specifically,

WhatsApp, Instagram, Facebook, and Twitter) were associated with depression among teenagers.[27–29] In fact, the association between frequent use of social media platforms and depression remained significant regardless of the time spent online.[29]

Our study showed that the frequency of moderate to severe depression was high and that the PHQ-9 score was positivelycorrelated with all the dimensions of SNS (basic usage, interaction, and display usage). Although the PHQ-9 has a high sensitivity, some reports suggested that it has poor specificity in detecting

Table 3: Responses to questions on basic usage factor, interaction usage factor, and display usage factor for social media use

Frequency of using SNS	Never 2 (0.4%)	Yearly 2 (0.4%)	Monthly 3 (0.6%)	Weekly 1 (0.2%)	Multiple times/week 4 (0.9%)	Daily 167 (35.8%)	Multiple times/day 288 (61.7%)	Mean (SD)	Range
Factor 1 (Basic usage factor)								13.9 (2.9)	3.0-21.0
Length of time	≤15 min	15-30 min	½-1 h	1-2 h	2-3 h	3-4 h	>4 h		
	23 (4.9%)	27 (5.8%)	42 (9.0%)	76 (16.3%)	65 (13.9%)	79 (16.9%)	155 (33.2%)		
Number of friends	1-50	50-100	100-200	200-300	300-400	400-500	>500		
	193 (41.3%)	(141 (30.2%)	61 (13.1%)	22 (4.7%)	(13 (2.8%)	8 (1.7%)	29 (6.2%)		
Factor 2 (Interaction usage)									
Freq sending message	33 (7.1%)	18 (3.9%)	51 (10.9%)	91 (19.5%)	70 (15.0%)	100 (21.4%)	104 (22.3%)		
Updating status	232 (49.7%)	114 (24.4%)	70 (15.0%)	28 (6.0%)	7 (1.5%)	10 (2.1%)	6 (1.3%)	21.5 (7.7)	6.0-42.0
sharing	91 (19.5%)	70 (15.0%)	88 (18.8%)	83 (17.8%)	59 (12.6%)	37 (7.9%)	39 (8.4%)		
Visiting profiles	71 (15.2%)	52 (11.1%)	93 (19.9%)	99 (21.2%)	57 (12.2%)	61 (13.1%)	34 (7.3%)		
Comments on photos	111 (23.8%)	61 (13.1%)	91 (19.5%)	66 (14.1%)	61 (13.1%)	42 (9.0%)	35 (7.5%)		
Comments on comments	76 (16.3%)	47 (10.1%)	61 (13.1%)	75 (16.1%)	48 (10.3%)	74 (15.8%)	86 (18.4%)		
Factor 3 (Display usage factor)									
Composition of friends	All acquaintances	2	3	4	5 39	6	All strangers	11.0 (4.0)	3.0-27.0
	98 (21.0%)	74 (15.8)	87 (18.6%)	(108 (23.1%)	(8.4%)	36 (7.7%)	20 (4.3%)		
Writing notes	127 (27.2%)	67 (14.3%)	96 (20.6%)	66 (14.1%)	47 (10.1%)	31 (6.6%)	33 (7.1%)		
Update profile image	173 (37.0%)	160 (34.4%)	100 (21.4%)	22 (4.7%)	7 (1.5%)	4 (0.9%)	1 (0.9%)		
Posting photos	147 (31.5%)	86 (18.4%)	110 (23.6%)	68 (14.6%)	28 (6.0%)	18 (3.9%)	10 (2.1%)		

Table 4: Three dimensions of SNS usage and levels of depression

SNS dimensions	Depression levels	n	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		P
						Lower Bound	Upper Bound	
Factor 1 Basic_usage	No depression	17	11.41	3.355	0.814	9.69	13.14	
	Minimal	103	13.65	2.476	0.244	13.17	14.13	<0.001
	Mild	160	13.53	2.883	0.228	13.07	13.98	
	Moderate	113	14.65	2.818	0.265	14.13	15.18	
	Moderately severe	47	14.36	2.427	0.354	13.65	15.07	
	Severe	27	15.37	2.989	0.575	14.19	16.55	
	Total	467	13.94	2.850	0.132	13.68	14.20	
Factor2 interact_usage	No depression	17	17.18	7.055	1.711	13.55	20.80	
	Minimal	103	20.86	7.447	0.734	19.41	22.32	0.027
	Mild	160	20.96	7.452	0.589	19.79	22.12	
	Moderate	113	23.17	7.769	0.731	21.72	24.62	
	Moderately severe	47	22.02	7.908	1.154	19.70	24.34	
	Severe	27	22.33	9.249	1.780	18.67	25.99	
	Total	467	21.52	7.737	0.358	20.82	22.22	
Factor3 display_usage	No depression	17	9.35	3.517	0.853	7.54	11.16	
	Minimal	103	10.22	3.681	0.363	9.50	10.94	0.011
	Mild	160	10.77	3.807	0.301	10.17	11.36	
	Moderate	113	11.76	4.135	0.389	10.99	12.53	
	Moderately severe	47	11.68	4.487	0.655	10.36	13.00	
	Severe	27	12.15	4.951	0.953	10.19	14.11	
	Total	467	11.01	4.039	0.187	10.64	11.38	

major depression.[30–32] However, we intended only to determine the association between social media use and the presence or prevalence of depression and not make a criteria-based diagnosis of any major depressive disorders. In this regard, there is a compelling need for further investigation among our respondents who had a PHQ-9 score of >10 to correctly identify any major depression and institute the necessary early intervention.[30]

The negative affective experience scores, particularly depression, unhappiness, and anger, ranked highest among the rest. There have been reports linking emotional distress with social media addiction, particularly among the young population.[33] The association was thought to be a result of higher sensitivity to stress that can be triggered by neglect and negative reactions from peers, thus causing emotional disturbance among youth.[33]

This may hold true with our study population as we have a young surveyed population. Furthermore, the "fear of missing out" among people engages a person on alliances that were created through social media that allows one to develop personal and professional identities and a personal network of friends. People who are secretly in distress or distracted are more able to communicate their feelings, emotions, and perspectives through social media means than verbally disclosing their problems upfront with their family.[34] A study showed that Facebook addiction was related to reward and gratification mechanisms as well as some personality traits.[35] This addiction may leadto negative physical and psychological consequences, which include sleep deprivation, loneliness, depression, and even anger or hostility.[36]

PHQ-9 scores were not significantly different across gender; however, there was a 1.5× greater tendency for female patients to experience moderate to severe depression (45.5% versus 36.1%). Similar findings on the strong association of the female gender with depressive symptoms who excessively use SNS. Possible reasons suggested included social comparison, feedback-seeking, popularity, rejection, reassurance-seeking, and appearance sensitivities among females.[37,38] First-onset depression, recurrence of depression, and chronic depression occur much earlier among females than males due to a variety of factors that include the familial environment, adverse experiences in childhood, social and cultural norms, social roles and employment among married females, inconsistent support, and the higher vulnerability of females secondary to lowering of mood, rumination, and inactiveness compared to males who tend to distract themselves by engaging in physical or recreational activities when feeling anxious or depressed.[39]

The findings of this study imply that a high percentage of depression and negative affective experiences are existent among individuals who frequently use social media and SNSs. The attitude toward social media use may be brought about by impulsivity although individuals display negative behaviors toward social media content. Inconsistency exists between attitudes toward social media and their actual behavior, and this inconsistency can harm their mental state and self-esteem.[28,40,41]

One limitation of this study is its self-reported survey design. Respondents may underreport or exaggerate the extent of their responses and may not accurately answer the questions. The information taken from self-reported surveys can be unreliable and biased. However, we believe that our findings may be useful to develop strategies to identify the onset of depression and other negative affective responses, including unhappiness and anger. Strategies that will not only identify but will also enable excessive social media users to understand the negative consequences and become more aware of their mental health. On the contrary, it may only be coincidental that the high prevalence of depression is seen among people who frequently use these social media applications and may not reflect causation, but there is a need to investigate this matter.

Conclusion

A high percentage of moderate to severe depression and negative affective experiences, including anger and happiness, exists among individuals studied. There is a significant association between those who excessively use and spend a lot more time using SNS and depression. A greater tendency toward depression occurs among females. The novel finding in this study was the high prevalence of depression found in the study population and a clear association with the degree of social media usage. The findings of this study would enable primary care physicians to caution patients whom they suspect of excessive social media use and warn them against the negative consequences of mental health, such as depression and anxiety.[42] During routine clinic visits, the primary care physician can incorporate screening questions on social media use to detect patients who may be in need of early intervention to reduce such addictive behaviors.

Conflicts of interest
There are no conflicts of interest.

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