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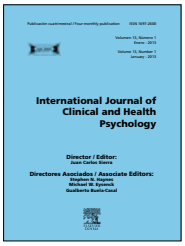

BRIEF REPORT

Using online social media, Facebook, in screening for major depressive disorder among college students

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KEYWORDS
Screening for Major Depressive Disorder;
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Abstract This study explored the feasibility of using Internet social networking media in an online program for Major Depressive Disorder (MDD) screening and psychoeducation targeting college students. A Facebook advertisement targeted students at five colleges in the United States to complete a mental health research survey that screened for MDD using the Patient Health Questionnaire-9 (PHQ-9). Students who screened positive for MDD were offered an eight-week follow-up survey. Of the 259 students who consented to participate in the study, 26.7% screened positive for MDD, while only 14.2% were receiving treatment. The use of Facebook to advertise for online screening for MDD required very little start-up time, and the average cost was $11.45 per subject recruited. It is feasible to use online, commercially available social networking media such as Facebook for online screening for MDD among college students. However, conducting online screening and offering treatment resources alone did not increase treatment rate in this population.

PALABRAS CLAVE
Detección de trastorno depresivo mayor;
Medios de comunicación social;
Estudiantes universitarios;

Resumen Este estudio exploró la viabilidad del uso de redes sociales en Internet para llevar a cabo un programa de detección del Trastorno Depresivo Mayor (TDM) y proporcionar psicoeducación a estudiantes universitarios. Se publicó un anuncio en Facebook dirigido a estudiantes en cinco universidades en los Estados Unidos para que completaran una encuesta de salud mental para la detección de TDM usando el *Patient Health Questionnaire-9* (PHQ-9). A los estudiantes que dieron positivo para el TDM se les ofreció otra encuesta de seguimiento ocho semanas después. De los 259 estudiantes quienes accedieron a participar en este estudio, 26,7% dieron positivo para el TDM, pero solo 14,2% estaban recibiendo tratamiento. El uso de Facebook para

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Internet;
Estudio descriptivo mediante encuesta

anunciar la encuesta para la detección de TDM requirió poco tiempo de inicio y el coste promedio fue de $11,45 por sujeto. Es factible utilizar redes sociales comercialmente disponibles en Internet como Facebook para detectar el TDM en estudiantes universitarios. Sin embargo, la realización de la encuesta en Internet y provisión de recursos de tratamiento no fueron suficientes para aumentar las tasas de tratamiento en este grupo.

Major depressive disorder (MDD) is a common and sometimes fatal illness that affects young adults and adolescents. Studies have shown that the prevalence of MDD is between 15% (Eisenberg, Gollust, Golberstein, & Hefner, 2007) and 20% (Adams, Wharton, Quilter, & Hirsch, 2008) in this population. Among college students, MDD is associated with increased suicidal ideation, feelings, and attempts (Garlow et al., 2008; Konick & Gutierrez, 2005; Miller & Chung, 2009). Kisch, Leino, & Silverman (2005) conducted a study that showed that 9.5% of college students had experienced serious suicidal ideation and that 1.5% of the students had attempted suicide. Sonawalla et al., (2001) found that 16.4% of students at a given college had experienced suicidal ideation. MDD has also been found to decrease academic performance (Fazio & Palm, 1998; Heiligenstein, Guenther, Hsu, & Herman, 1996), have negative effects on physical health (Rawson, Bloomer, & Kendall, 1994), increase alcohol intake (Grant, Stewart, & Mohr, 2009), and increase college students' risk for maladaptive eating behaviors (Hawkins, McDermott, Seeley, & Hawkins, 1992).

One strategy to address this prevalent disorder among college students is to actively screen for MDD to increase recognition (Houstonet al., 2001) and foster treatment-seeking behavior in this population. However, cost considerations have limited the adoption of screening for MDD in college campuses. To reduce costs, recent studies have used Internet-based technologies (Farmer, Bruckner Holt, Cook, & Hearing, 2009; Sun, Unger, Palmer, Gallaher, Chou, Baezconde-Garbanati, Sussman, & Johnson, 2005) to conduct screening for MDD and deliver public health interventions (Bennett & Glasgow, 2009; Griffiths, Lindenmeyer, Powell, Lowe, & Thorogood, 2006; Webb, Joseph, Yardley, & Michie, 2010). A recent study conducted showed that e-mail is an effective and inexpensive method of screening college students for MDD (Shyu, Youn, Fava, Kvedar, & Yeung, 2011). Haas et al., (2008) also found e-mail to be an effective tool for disseminating online screening questionnaires.

Another Internet-based technology that holds promise for screening in this important population is social networking. More than 80% of adults aged 18 to 29 visit social networking sites such as Facebook (Madden, 2011), and the use of these sites as possible sources of health information is rapidly growing (Vance, Howe, & Dellavalle, 2009). Patients utilize these networks to share their experiences with disease management and research (Farmer et al., 2009), and young adults in particular are increasingly turning to social networking sites such as Facebook to seek health information (Muise, Chistofides, & Desmarais, 2009; Raacke & Bonds-Raacke, 2008; Vance et al., 2009; Wilson, Fornasier, & White, 2010).

Utilizing social networking media sites offers numerous potential advantages over other intervention formats, such as reducing the staff needed to deliver health care interventions (Griffiths et al., 2006). It also allows for increased customization of the interventions delivered through these technologies, making the interventions more relevant to the target population. Furthermore, social media sites aid in the research process by providing: a) ease in data capture, as researchers are not restricted to specific geographic, time and/or mobility constraints when recruiting subjects (Griffiths et al., 2006); as well as b) ease in data output, as there is no need for additional data entry. Through enhanced confidentiality protocols and anonymity features, the use of social media sites in health care survey recruitment may even help reduce the stigma that might be associated with completing such questionnaires (Griffiths et al., 2006).

This study investigates the feasibility and cost of using the social networking site Facebook to screen and educate the large and underserved population of college students with MDD. In addition, this study evaluates whether screening for MDD and providing psychoeducation through a toolkit will increase the rate of treatment seeking behavior among college students. Third, it estimates the cost of using Facebook in such a program.

Method

Participants

Between May and October 2009, 259 students from five U.S. colleges consented to participate in the study (Table 1). Of those, the majority were female (77.4%) and Caucasian (62.7%). Asians comprised 24.9% of the participants, Blacks 5.3%, and American Indian or Alaska Natives .9%; 6.2% did not wish to provide an answer. Regarding ethnicity, the majority described themselves as "Not Hispanic or Latino" (88%); 8.9% self-identified as Hispanic or Latino. More than a third of respondents were juniors (34.7%), followed by 27.6% sophomores, 15.1% freshmen, 8% seniors, 6.7% 5th year students, and 4.4% graduate students. More than a quarter of the sample (26.7%) of students screened positive for MDD, and 18.9% endorsed suicidal symptoms; 14.2% were receiving treatment for MDD, including medication (37%), therapy (22.2%), or a combination of both (40.7%) (Table 2).

Instruments

Patient Health Questionnaire-9 (PHQ-9) is a patient self-administered questionnaire that is part of the longer Patient

Table 1 Demographics of study participants.

	N (% of N for each category)
Consented	259
Female (N = 225)	*171 (76)*
Ethnicity (N = 225)	
Not Hispanic or Latino	198 (88)
Hispanic or Latino	20 (8.90)
I do not wish to provide an answer	4 (1.80)
Not known	3 (1.30)
Race (N = 225)	
Caucasian	141 (62.70)
Asian	56 (24.90)
Black	12 (5.30)
American Indian or Alaska Native	2 (.90)
Do not wish to provide an answer	14 (6.20)
Year in college (N = 225)	
Freshman	34 (15.10)
Sophomore	62 (27.60)
Junior	78 (34.70)
Senior	18 (8)
5th year	15 (6.70)
Graduate student	10 (4.40)
I do not wish to provide an answer	8 (3.60)
Geographic location of college (N = 259)	
California	56 (21.60)
Massachusetts	142 (54.80)
Pennsylvania	61 (23.60)

Health Questionnaire (PHQ) measure, an instrument that was developed to be used as a diagnostic tool for mental disorders in primary care (Spitzer, Kroenke, & Williams, 1999). The PHQ-9 is the depression module of the PHQ, and includes 9 items that are based on the 9 criteria used in the DSM-IV to assess depressive disorders (Kroenke, Spitzer, & Williams, 2001). The PHQ-9 can be used to diagnose major depression (by endorsing 5 or more of the 9 depression symptoms for more than half the days in the past 2 weeks and 1 of the symptoms being either depressed mood or anhedonia as in the DSM-IV), as well as provide a severity assessment, ranging from 0 to 27, since each item is rated from 0 *(not at all)* to 3 *(nearly every day)*. The PHQ-9 has excellent internal validity, with a Cronbach's alpha of .89, excellent test-retest reliability, and it has been shown to have 88% sensitivity and 88% specificity for identifying MDD with a score of ≥ 10 (Kroenke et al., 2001).

Design and procedure

- Recruitment through Facebook: The current descriptive study used the social networking site Facebook to target undergraduate and graduate students at five colleges across the nation (one in California, three in Massachusetts, and one in Pennsylvania) through their Facebook networks. Founded in February 2004, Facebook now has over 800 million current active users. Facebook users interact with one another by sharing pictures, links, videos and information about themselves (http://www.facebook.com/press/info.php?factsheet). In order to become a user, one has to be at least 13 years of age and have a valid e-mail account; membership is free. Facebook users can

Table 2 Results of online depression screening.

Average PHQ-9 score (*N* = 217)	6.97 (SD = 5.57)
	N (% of *N* for each category)
Positive screen, PHQ-9 score ≥ 10 (N = 217)	58 (26.70)
PHQ-9 Item #9 ≥ 1 (Suicidal Ideation) (N = 217)	41 (18.90)
Previously received treatment for depression (N = 224)	
No	162 (72.30)
Yes	57 (25.40)
Don't know	4 (1.80)
I do not wish to provide an answer	1 (0.40)
If yes (N = 57)	
Medication	4 (11.80)
Therapy	11 (32.40)
Both	19 (55.90)
Currently receiving treatment for depression (N=224)	
No	188 (83.90)
Yes	34 (14.20)
I do not wish to provide an answer	2 (0.90)
If yes (N = 34)	
Medication	10 (37)
Therapy	6 (22.20)
Both	11 (40.70)

join different networks, such as geographic or school networks, that allow them to interact with other network members. It is easy to create Facebook advertisements targeted to specific populations. The advertisement is displayed in the "Ad Space," located on the right side of the webpage. Every time a user refreshes his or her page, new advertisements appear in this space.

To recruit the study population for this study, advertising campaigns were filtered to target students who listed any of the five university networks as part of their profiles, lived in the United States, and were aged 18 or older. The Facebook advertisement invited students to complete a research survey on mental health from the Massachusetts General Hospital for a chance to win a $200 gift card.

Interested students were able to click on the advertisement, which led them directly to the study's MDD screening survey. The study's Facebook advertisement was run four different times between May and October 2009. The first campaign lasted two weeks, the second and third each lasted one month, and the last, two weeks.

- Online screening for MDD: The online survey was created using SurveyMonkey, a commercial website for conducting web-based surveys (http://s3.amazonaws.com/SurveyMonkeyFiles/UserManual.pdf). SurveyMonkey allows a user to create custom-designed, web-based surveys, with a secure venue for storing online data behind a firewall (http://s3.amazonaws.com/SurveyMonkeyFiles/UserManual.pdf). Prior to starting the survey, potential participants were sent information about the nature of the study; after reading the study details, participants were asked to provide consent electronically to participate in the study by clicking on the "agree" button. Students had the option to provide their e-mail address on two occasions: the first would allow them to enter a raffle for a $200 Visa gift card; the second would be used only if students wanted to be re-contacted in order to complete a follow-up survey eight weeks later for a chance to win a second $200 Visa gift card. No other identifying information was collected at that point.

  In the survey, students were asked to provide demographic information regarding their race, ethnicity, age, gender, college affiliation, and year in college. Questions were also asked regarding their past and current history and treatment of MDD. The students filled out the Patient Health Questionnaire-9 (PHQ-9). Once participants completed the PHQ-9, they were immediately informed of their results.

  Students with a score of 10 or more on the PHQ-9 were considered to have screened positive for MDD and were offered psychoeducation through the toolkit described below. Students who had scored one or more on the suicide question of the PHQ-9 (question #9 regarding "thinking that you would be better off dead or that you want to hurt yourself in some way") were also directed to a separate web page that recommended they go to their local emergency room if they were at risk for suicide.

  Those students who screened positive for MDD and also consented to take part in the follow-up survey were re-contacted eight weeks later. The follow-up survey incorporated the same questions as the initial survey and added questions about the students' use and evaluation of the online information on MDD and initiation of treatment for MDD in the previous two months.

  Students who scored less than 10 on the PHQ-9 were considered to have screened negative for MDD. They were informed that they probably did not have a diagnosis of depression. They were offered the same MDD toolkit described below, but without school-specific treatment resources.

  All surveys, advertisements, and instruments were approved by the Massachusetts General Hospital's Institutional Review Board (IRB). Given that study recruitment was conducted via Facebook, a commercially available website not administered by colleges, the researchers did not obtain separate approval from the specific schools' IRBs.

Online psychoeducation: Major Depressive Disorder Toolkit

Students with a score of 10 or more in the PHQ-9 were presented with a MDD toolkit, which included Internet links to two MDD psychoeducation websites and information on local treatment resources. The two websites were the National Institutes of Mental Health (NIMH) site and the British Columbia Partners for Mental Health and Addictions Information site. Both websites offered information on the definition of MDD, its effects on different groups of people, available treatment options, and self-management skills to cope with the illness (http://www.nimh.nih.gov/health/publications/depression/complete-index.shtml; http://www.heretohelp.bc.ca/skills/managing-depression). Students were also offered information on local treatment resources, including at least one campus-based peer counseling student group for each college. The survey's website provided the contact information and hours of operation of the peer counseling groups. One school's peer counseling group also provided the contact information for the school counseling center and suicide hotlines in its region. Students were encouraged to visit these websites and gain more knowledge about MDD and treatment options as well as to make use of local resources.

Analyses

Descriptive statistics were used to characterize the survey population's demographics, psychiatric and treatment history, and PHQ-9 scores (please refer to Table 1 and 2). The McNemar test was conducted to assess differences in the rates of MDD treatment at eight-week follow-up among students who received psychoeducation (McNemar, 1947). A paired-samples t-test was conducted to assess whether the PHQ-9 severity scores differed between pre- and post-psychoeducation. Analyses of the costs involved were performed using descriptive statistics. SPSS version 17 was used for all analyses (SPSS, 2008).

Results

Of the 58 students who screened positive for MDD, 21 (36.2%) consented to take the follow up survey, of the 58 students who screened positive for MDD, 21 (36.20%) consented to take the follow up survey, but only 20 actually

completed it by providing responses to the questions (Table 3).

The MDD toolkit attracted little attention from the students, as only two students reported having visited the resources provided in the initial survey, and only one of these students actually made use of the resources. Among the follow-up survey completers, 20 provided the information and rationale for their help-seeking patterns for MDD. MDD screening and psychoeducation through the toolkit did not result in a significant increase in self-reported help-seeking behavior. The results showed that the rate of students receiving treatment for MDD remained constant at 40% at eight-week follow-up (McNemar test, $p > .05$). The most common reason reported for not seeking treatment was that students felt they were too busy and/or had forgotten (35%). Other frequent obstacles included feeling that the depressive symptoms did not bother them enough to make them seek treatment (25%), believing that the treatment would not be helpful (20%) and not thinking that they were depressed (20%).

The results indicate that there was a significant decrease in PHQ-9 severity when comparing pre-education PHQ-9 scores ($M = 14.35$, $SD = 4.27$) and post-education PHQ-9 scores ($M = 11.20$, $SD = 6.08$), $t_{(19)} = 3.42$, $p < .05$.

The average amount spent per subject recruited to the study was calculated to be $11.45.

Discussion

In this study, utilizing social networking media was a feasible method of recruitment for depressed college students for an online MDD screening and psychoeducation program. Using Facebook, an adequate sample of college students was recruited ($N = 259$); 26.70% screened positive for MDD in the initial survey, and 18.90% reported suicidal ideation in the past two weeks. These rates are consistent with previous results demonstrating that MDD is prevalent among college students (Adams et al., 2008; Eisenberg et al., 2007).

Similar to an earlier study, we found that simply offering psychoeducation to students with MDD had little impact on their treatment rates (Shyu et al, 2011). In fact, very few subjects actually accessed the online psychoeducation despite its easy availability. Many did not consider treating MDD a high priority (Table 3), and most (83.90%) of the depressed students remained untreated. Thus, even though there was a decrease in PHQ-9 symptoms pre- and post-education, it is difficult to attribute such decline to the use of the psychoeducational materials. Screening may help to identify MDD in this population, but a more active approach to engage students may be necessary to improve rates of MDD treatment.

These findings suggest that using websites such as Facebook is an efficient way to recruit students from a

Table 3 Results of eight-week follow-up survey.

	n (% of *N* in each category)
Accessed online information or peer counseling group (N = 20)	2 (10)
Online information	1 (5)
Peer counseling	0 (0)
Since completing the initial survey, sought treatment of any kind for depression (N = 20)	7 (35)
Medication	2 (10)
Therapy	0 (0)
Both	2 (10)
N/A (data not available)	3 (15)
Reasons for not seeking treatment[a] *(N = 20)*	
I was too busy/I forgot	7 (35)
I did not think it would be helpful	4 (20)
I do not know how to find a provider	3 (15)
The symptoms do not bother me that much	5 (25)
I did not believe I was depressed	4 (20)
I do not wish to provide a response	1 (5)
Obstacles encountered when seeking assessment and treatment for depression (N =19)	
Did not encounter any obstacles	4 (21.10)
Did not know where to start looking for information on how to find a local provider	2 (10.50)
Do not have health insurance	1 (5.30)
Do not want to pay health insurance co-pay	1 (5.30)
I was put on a waitlist to see a provider	1 (5.30)
I do not wish to provide an answer	2 (10.50)
PHQ-9 score ≥ 10 (N = 20)	14 (70)
PHQ-9 Item #9 ≥ 1 (Suicidal Ideation) (N = 20)	6 (30)
Average PHQ-9 score at eight-week follow-up (N = 20)	11.20 (*SD* = 6.08)

N/A, not available; PHQ-9, Patient Health Questionnaire-9; *SD*, standard deviation.
[a]Multiple answers are allowed.

broad spectrum of colleges. There was almost no start-up time needed before the advertisements were made available to students. It only took 24 hours to set up a user account, design the advertisement, designate the type of campaign, budget and target group, and have the website administration approve the advertisement before publishing. In the earlier study using e-mail and student volunteers from the participating universities, the cost was lower ($4.04 per recruited subject) (Shyu et al., 2011). The cost spent per subject for using Facebook was $11.45 per subject, almost three times as high as (or $7.41 more than) the cost spent per subject using e-mails, but it did not require the lengthy preparation time and significant effort required to organize student volunteers (Shyu et al., 2011). Thus commercial websites may be the preferred option for studies with time constraints, or for those targeting a broader population. Using an online interface eliminates the need for researchers or subjects to travel to study sites, and subjects can respond to surveys at their convenience. In addition, direct electronic data collection eliminates potential mistakes associated with data entry.

There are several limitations to this study. The findings from this study may represent the prevalence of MDD and treatment behaviors specifically of Facebook users who responded to the Facebook advertisement at selected colleges, which may or may not be generalizable to students at other colleges or to the non-advertisement responders within the targeted colleges. The recruitment strategy of this study neglected Facebook non-users and may have included non-students who listed one of the colleges in their networks. Furthermore, the subject sample included more female than male respondents, which may also limit the generalizability of the results. Although the study sample may not be representative of the college population as a whole, the study does demonstrate that this online screening method is feasible for certain college populations.

MDD diagnoses were based on the PHQ-9 and were not subsequently confirmed with in-person structured interviews. Thus, some of those who screened positive may not have met strict criteria for MDD. Also, students' emotional symptoms have been found to change throughout the course of a semester (Kelly, Roberts, & Bottonari, 2007), and thus it is unclear if students were reporting transient stress symptoms or if they were truly experiencing depressive symptoms. The present study attempted to control for this variation by recruiting students at various points in time across a four-month period. These factors may have accounted for the findings that 25% of subjects felt their symptoms were not bothersome and that 20% reported that they did not believe they were depressed, and they may have led to the low treatment-seeking behavior in the sample. Future research will need to take these factors in account when conducting online MDD screening interventions for college students.

Conclusion

It is feasible and efficient to use online, commercially available social networking media such as Facebook in programs screening for MDD in college students at a reasonable cost. However, providing psychoeducation alone may not be enough to increase treatment of MDD in this population. Future interventions incorporating Internet-based technologies may improve the ability to screen for MDD in college populations.

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