Research Article

FEELING BAD ON FACEBOOK: DEPRESSION DISCLOSURES BY COLLEGE STUDENTS ON A SOCIAL NETWORKING SITE

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Background: *Depression is common and frequently undiagnosed among college students. Social networking sites are popular among college students and can include displayed depression references. The purpose of this study was to evaluate college students' Facebook disclosures that met DSM criteria for a depression symptom or a major depressive episode (MDE).* **Methods:** *We selected public Facebook profiles from sophomore and junior undergraduates and evaluated personally written text: "status updates." We applied DSM criteria to 1-year status updates from each profile to determine prevalence of displayed depression symptoms and MDE criteria. Negative binomial regression analysis was used to model the association between depression disclosures and demographics or Facebook use characteristics.* **Results:** *Two hundred profiles were evaluated, and profile owners were 43.5% female with a mean age of 20 years. Overall, 25% of profiles displayed depressive symptoms and 2.5% met criteria for MDE. Profile owners were more likely to reference depression, if they averaged at least one online response from their friends to a status update disclosing depressive symptoms (exp(B) = 2.1, P<.001), or if they used Facebook more frequently (P<.001).* **Conclusion:** *College students commonly display symptoms consistent with depression on Facebook. Our findings suggest that those who receive online reinforcement from their friends are more likely to discuss their depressive symptoms publicly on Facebook. Given the frequency of depression symptom displays on public profiles, social networking sites could be an innovative avenue for combating stigma surrounding mental health conditions or for identifying students at risk for depression. Depression and Anxiety 28:447–455, 2011.*

Key words: *internet; mental health; adolescent medicine; self disclosure; social networks*

INTRODUCTION

Depression is one of the most common health issues impacting the college student population; rates of college students reporting depression have increased 56% in the last 6 years.[1–3] Given that approximately half the young adults attend postsecondary education, universities are an important setting in which depression can be addressed.[4] Depression often has an onset during the adolescent and young adult years and is associated with negative health and social outcomes.[5]

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The authors disclose the following financial relationships within the past 3 years: Contract grant sponsor: NICHD; Contract grant number: K12HD055894.

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Received for publication 12 November 2010; Revised 23 January 2011; Accepted 2 February 2011

DOI 10.1002/da.20805
Published online 11 March 2011 in Wiley Online Library (wileyonlinelibrary.com).

Adverse outcomes include poor academic achievement, increased rates of substance use, co-morbid psychiatric conditions, and suicide.[6–10]

Depression is typically diagnosed during a clinical encounter using the Diagnostic and Statistical Manual volume IV (DSM-IV) criteria. Symptoms include depressed mood, hopelessness,[11] and sleep difficulties, including both hypersomnia and insomnia.[12–14] For a major depressive episode (MDE), the most common form of depression among adolescents and young adults, symptoms must be present "most every day" during a 2-week time period.[11,15] Although the DSM-IV criteria are useful in defining depression, diagnosis requires a patient to initiate a clinic visit and report symptoms that trigger the provider's recognition that a mental health assessment is needed.

Despite the prevalence of depression in this population, college students struggling with depression are frequently undiagnosed, as many do not perceive a need for help and do not seek clinical services.[16,17] Although 30% of college students report that in the last 12 months they have felt so depressed that it was difficult to function, only 10% of college students report having sought care and been diagnosed with depression.[3] Concerns about the stigma related to mental illness are also associated with less perceived need for help and decreased treatment-seeking behavior within this population.[18] Other barriers to help seeking include lack of knowledge about available services and privacy concerns.[1]

Given the prevalence, consequences, and missed opportunities for recognition and treatment of this common mental health problem, new ways of identifying college students at risk and referring them to appropriate services are warranted. Social networking web sites (SNSs) may present innovative opportunities to identify college students at risk. More than 90% of college students use SNS; Facebook.com is the most popular SNS in this population.[19–21] SNSs are commonly used for social dialogue among peers, and previous work has illustrated that references to personal information or health risk behaviors are common.[22–24] One popular feature of Facebook is the "status update," in which personally written text describing the profile owner's current experience or emotion are displayed along with the date and time of disclosure.[25] Anecdotal reports suggest some college students discuss mental health concerns on status updates; examples include "Mary is feeling really sad this week" or "Dan is too depressed to sit in class." The prevalence of such disclosures is unknown. As the majority of college students' profiles are public, these status updates are available to students' peers as well as others within that university Facebook network, such as college health providers.[21]

If college students use Facebook profiles to disclose symptoms of depression, these disclosures could be viewed by peers as well as a larger online audience who may be able to facilitate identification or referral for mental health concerns. Before such outreach or potential interventions can be considered, the prevalence and content of such disclosures must be assessed. The purpose of this study was to evaluate college students' disclosures of depression symptoms on Facebook with three specific goals. Our first goal was to describe displayed depression symptoms on Facebook profiles, including prevalence estimates. We hypothesized that concerns about stigma related to reporting depression symptoms in a public online format would lead to low prevalence of depression symptoms.[18] Our second goal was to assess the prevalence of profiles whose display of symptoms met criteria for an MDE by applying standard DSM diagnostic criteria to 1 year of Facebook status updates. Our third goal was to determine associations between displayed depression symptoms on Facebook and other demographic or Facebook use characteristics.

METHODS

This study was conducted between July 1, 2009, and October 1, 2010, and received an IRB exemption from the University of Wisconsin.

SETTING AND SUBJECTS

This study was conducted using the SNS Facebook (www.Facebook.com), as it is the most popular SNS among our target population.[25] Profiles were included in this study if they were publicly available within our university Facebook network, self-reported their age as more than 18 years, and provided evidence of profile activity in the last 30 days. In order to evaluate current college students, we selected publicly available profiles from college students who had completed their sophomore and junior years of college (rising juniors and seniors) (Fig. 1).

DATA COLLECTION

We used the Facebook search engine to identify profiles within our university network that displayed a college graduation year of 2010 or 2011 and high school graduation year of 2006 or 2007. Similar to other online search engines, at the time of this study, Facebook presented search results in nonalphabetical, nonage-based, nonnumerical order in lists of up to 500 profiles. Profiles were thus assessed sequentially for eligibility. Our goal for this evaluation was to assess 200 profiles from students who were currently in a university setting; thus, we focused on students who had completed their sophomore and junior year.

The coders first viewed the "information section" of the profile to obtain demographic information and information describing Facebook use. Second, to evaluate depression symptom disclosures, coders reviewed each profile's history of status updates from the date of evaluation through the same date from 1 year prior. For each status update that included a depression symptom, coders recorded verbatim text and the date of disclosure. Status updates that referenced a person other than the profile owner (i.e. "Matt is sitting next to me in class and he looks bummed") were not considered personal references and were excluded. Third, for profiles in which a status update disclosed a depression symptom, investigators evaluated whether other Facebook users responded to that depression symptom in "comments" for that status update. Facebook users can provide comments as public feedback to status updates and pictures. For

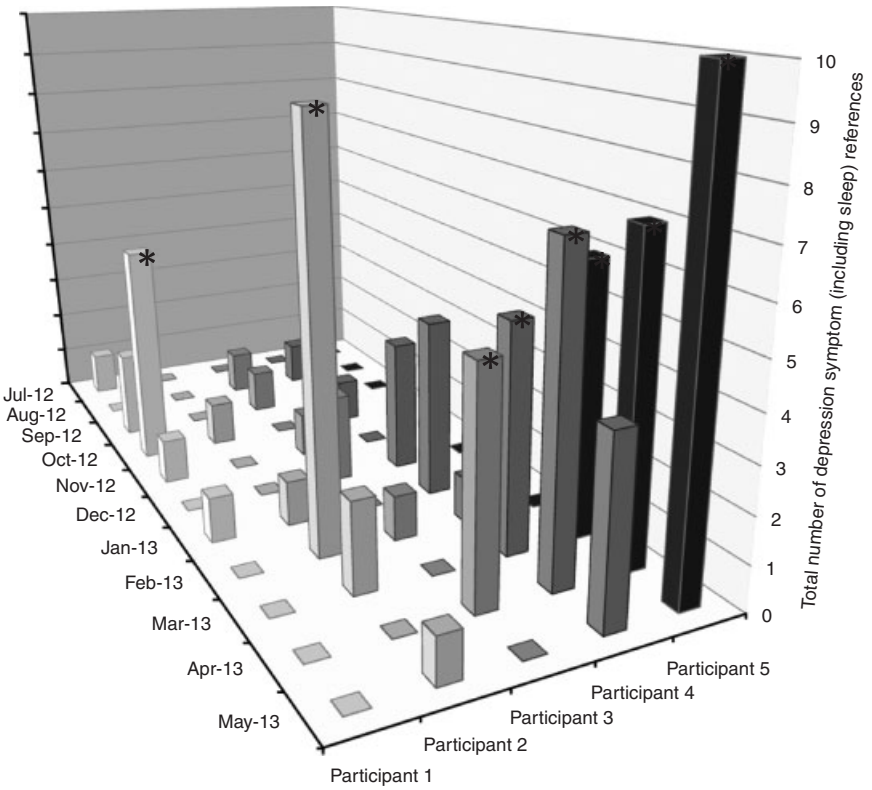

Figure 1. Number of status updates per month containing references to sleep or depression symptoms for participants meeting proxy criteria for a major depressive episode (MDE) ($n = 5$). *Month where proxy criteria for a MDE was met.

example, if a profile owner displays a status update: "I am really feeling down this week," then responses to that status update may include comments, such as "I hope you feel better" or "I'm having a bad week too!" If comments were present, they were counted and recorded verbatim.

CODER TRAINING

Two investigators participated in training and conducted all profile evaluations for this study. Training included review and practice with codebooks used in previous work with Facebook.[23] Coders then reviewed DSM-IV criteria for MDE and participated in developing the codebook with keywords and synonyms.[11] A final training exercise involved a pilot evaluation of profiles using these DSM-IV keywords and synonyms before collecting data used in this study.

VARIABLES

Depression symptoms. References to depression symptoms were defined using the symptoms outlined in the DSM criteria for a MDE.[11] We chose established clinical criteria as the basis of our research codebook to provide the most clinically relevant and objective framework for profile evaluation. The criteria for MDE include depressed mood, loss of interest/pleasure in activities, appetite changes, sleep problems, psychomotor agitation or retardation, energy loss, feeling worthless or guilty, decreased concentration, or suicidal ideation. Status updates were considered as a depression reference if they fit one of the described depression criteria by keyword or a synonym. For example, one symptom keyword of major depression is "hopeless"; therefore, a status update stating "I feel hopeless" would be coded as a reference to depression. The term "giving up" is a synonym of "hopeless"; therefore, a status update disclosing "I feel like giving up" would be coded as a reference to depression. Comments that referenced the common experience of having a bad day, such as "having a lousy day" or "wish this day would be done," did not meet criteria as a depression symptom.

References made in status updates to sleep difficulties were also coded. Sleep difficulties are associated with MDE and often described as sleep problems: "too much sleep or difficulty getting to sleep." Our pilot evaluations revealed that references to sleep difficulties often included disclosures regarding "feeling tired," without further discussion of whether the profile owner was sleeping too much, sleeping too little, or had other extraneous circumstances impacting sleep, such as studying. Furthermore, our pilot evaluations also revealed that prevalence of displayed comments related to sleep surpassed the prevalence of displayed comments related to other depression symptoms, which is not surprising given that 80% of college students reported feeling exhausted at least once in the past year.[3] To avoid overestimating the prevalence of depression symptoms by counting profiles that only disclosed sleep difficulties, we coded sleep-related disclosures separately.

Depression diagnostic criteria. A diagnosis of an MDE is made based on both symptoms and timing of symptoms, and Facebook status updates include a date and time stamp. Thus, we examined all status updates that met criteria for depression symptoms by date. We used DSM criteria for an MDE: five or more depression symptoms must be present during the same 2-week period, and at least one of the symptoms is depressed mood or loss of

interest/pleasure.[11] Given that we could not estimate how long the displayed depression symptom had been present based on the status update, we modified this criteria in applying it to Facebook. In keeping with DSM criteria, within the same 2-week period, we required five or more status updates that met DSM criteria as a symptom for depression, and at least one of the updates was depressed mood or loss of interest/pleasure.

Demographics and Facebook use. From each profile that met inclusion criteria, we recorded demographics, including age, gender, graduation year, and self-reported "relationship status" of whether the profile owner was single or in a romantic relationship. This information is presented in a standard format on Facebook profiles and displayed at the profile owner's discretion.

We also gathered data on the profile owner's Facebook use patterns. First, we recorded the number of Facebook "friends" displayed by the profile owner; Facebook allows users to link their profile to others' via "friending." Second, we recorded the number of days since last Facebook activity as a measure of recent Facebook use. Fewer days since last activity suggest more frequent logging in to Facebook.

A 10% random subsample of profiles were evaluated by two coders and Cohen's was used to evaluate the extent to which there was intercoder reliability in the presence or absence of depression symptoms.[26] The for displayed depression symptoms on Facebook was 0.79, indicating substantial agreement.

SPECIAL CONCERNS

Because of the potential for a profile owner to disclose suicidal ideation on a status update, we developed a protocol to respond to any imminent threats immediately and alert appropriate referral agencies. This protocol was developed in partnership with our University Health Services.

ANALYSES

All statistical analyses were conducted using STATA version 9.0 (Statacorp, College Station, TX). Bivariate analyses were conducted to examine the relationship of the presence or absence of depression disclosures on Facebook with both demographics and Facebook use characteristics. Pearson χ^2 tests were used for categorical comparisons and bivariate regression models were used for continuous measures. As the number of Facebook friends was not normally distributed, we used the square root of the number of friends. The number of days since last Facebook update and the number of references to sleep difficulties were treated as counts and analyzed using negative binomial regression models.

We then examined the relationship of the number of depression references with demographics and Facebook use variables using negative binomial regression models. Analyses were conducted using forward stepwise regression and confirmed using backward stepwise regression.

RESULTS

SAMPLE POPULATION

We evaluated 342 profiles to reach our goal of 200. Most profile exclusions were due to no age listed on the profile ($n = 95$) or profile security set to "private" ($n = 66$). Of the 200 included profiles, 43.5% were female and the average age was 20 years. Approximately 72% of participants reported their relationship status and nearly 41% described themselves in a relationship. The average number of friends displayed on each profile was 449.5 (SD 237.2), and the range was 66–1,405. The average date of last activity on Facebook was 5.98 (SD 6.9) days (Table 1).

TABLE 1. Demographics and Facebook use characteristics from included profiles ($n = 200$)

	Number of profiles	% of profiles	Mean (SD)
Age (years)			
19	26	13.0	
20	85	52.7	
21 and over	90	44.3	
Gender			
Male	113	56.5	
Female	87	43.5	
Relationship status			
Single	81	20.5	
Relationship	62	31.0	
Not Reported	57	28.5	
Facebook activity			
Number of friends	187		449.5 (237.2)
Last activity (days)	200		6.0 (7.0)
Mental health references			
Displayed depression symptoms	50	25	2.7 (3.3)
"Comments": Responses to depression references by others	50		0.8 (1.2)
Displayed sleep difficulties	83	41.5	3.2 (2.8)

PREVALENCE OF DEPRESSION REFERENCES ON FACEBOOK

Overall, 25% of profiles disclosed one or more depressive symptoms on status updates. Overall, the most common type of depression symptom reference was to depressed mood, and 50 references fit this category. Feelings of guilt or worthlessness were present on 15 references. Indecisiveness was present in six references and loss of energy in five references. The symptoms of decreased interest or pleasure in activities, change in appetite, and psychomotor agitation were present in only one reference each. No references to suicidal ideation were present in our data. Table 2 shows the categories of depression references and examples text from these references. Using DSM criteria for a MDE, we found that five profiles (2.5%) met these criteria (Fig. 1).

ASSOCIATIONS WITH PRESENCE OR ABSENCE OF DEPRESSION REFERENCES

Table 3 includes bivariate comparisons of the presence or absence of displayed depression symptoms by the participants' demographic and Facebook activity characteristics. College juniors were more likely to display depression symptoms (36%) compared to sophomores (14%) ($P < .001$) (Table 4).

Participants who displayed depression symptoms were more likely to have updated their Facebook profile more

TABLE 2. DSM IV[a] criteria for major depressive episode and example references from data

DSM IV criteria by category	Example key words or phrases	Example references from data
Depressed mood: sad, empty, crying, tearful	Sad, empty, crying, tearful, sad face emoticon	"Tom is pretty sad. Time for some whiny music...thank god for that"; "Mary has tears in her eyes"; "Erika is really really really unhappy"; "John is sad that he doesn't have therapy to go to anymore"
Decreased interest or pleasure in activities	Not having fun, don't feel like doing anything	"Jane doesn't feel like getting up today, or doing anything"
Increase or decrease in appetite	No appetite, don't feel like eating, can't stop eating, eating everything in sight	"Amy has no appetite right now"
Sleep problems: sleeping too much	Sleeping too much, slept >10 hr, fatigue, tired, exhausted	"Ann needs to stop being lame and so tired so that she can go out and socialize more instead of having to sleep so much"
Psychomotor agitation or retardation (feeling restless or slowed down)	Feeling slow	"Jeff is moving bogged down"
Loss of energy	Can't get anything done, can't get motivated	"Joe has lost his motivation"; "Mia has no drive"
Feelings of guilt, worthlessness, negative self-appraisal	Feel guilty or worthless, "I am stupid," "I'm not cool"	"Matt feels absolutely useless. It'd be great if I could do just one thing right once in awhile..."; "Kate hates herself right now"
Indecisiveness	Can't decide on something, don't feel like deciding, can't make up your mind	"Jim is frustrated and indecisive....argh."; "Lisa is not sure about anything...can't make up my mind"
Recurrent thoughts of death or suicidal ideation	Thinking of ways to commit suicide, references to jumping	None in this dataset

*All references have been altered to protect confidentiality.
[a]American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. 2000, Washington, DC: American Psychiatric Association.

TABLE 3. Bivariate relationships of the presence of displayed depression symptoms with demographic and Facebook use characteristics

	No references to depression on profile			One or more references to depression on profile			
	N	%	Mean (SD)	*N*	%	Mean (SD)	*P*-value
Age (years)							.039[a]
19	21	14.0		5	10.0		
20	70	46.7		15	30.0		
21 and over	59	39.3		30	60.0		
Graduation year							<.001[a]
2011 (rising junior)	86	57.3		14	24.8		
2010 (rising senior)	64	42.7		36	72.0		
Gender							.459[a]
Male	87	58.0		26	52.0		
Female	63	42.0		24	48.0		
Relationship status							.703[a]
Single	60	40.0		21	42.0		
Relationship	45	30.0		17	34.0		
Not reported	45	30.0		12	24.0		
Facebook activity							
Number of friends	140		20.3 (5.5)	47		21.0 (5.6)	.445[b]
Last activity (days)	150		6.9 (7.6)	50		3.2 (3.7)	<.001[c]
Depression related references							
"Comments": responses to depression reference				50		0.8 (1.2)	
Sleep references	150		0.9 (1.8)	50		2.7 (3.3)	<.001[c]

[a]*P*-value from Pearson χ^2 test.
[b]*P*-value from bivariate linear regression analysis with square root of number of friends as dependent variable.
[c]*P*-value from bivariate negative binomial regression analysis.

TABLE 4. Examples of depression symptom displays and "comments": responses from online peers

Example 1: 18-year-old female
Status update
"Feeling so bad today, like nothing is going to get better!"
Responses from peers
"Hang in there baby!"
"It will get better, I promise"
"Want to get coffee tomorrow?"

Example 2: 19-year-old male
Status update
"Like a knife to my heart, like a bullet to the chest....can't stop crying"
Responses from peers
"I'm coming over and I'm bringing the X box"
"Are you ok?"

Example 2: 20-year-old female
Status update
"Feel like I can't do anything right these days, sad and frustrated, blech."
Responses from peers
"But we love you!"
"Yes, you are great!"
"I agree"
"Want us to take you out tonight?"

recently ($P<.001$). Those who displayed depression symptoms on average had updated their Facebook profile 3.2 days (SD 3.7) before the profile was evaluated, and those who did not display depression had last updated their profile 6.9 days ago (SD 7.6).

References to sleep concerns were common, with 41.5% profiles displaying these disclosures. There were 268 references to sleep in our dataset. Half of the participants who displayed depression symptoms also displayed references to sleep difficulties; among participants who did not display depression symptoms, only 30% displayed sleep difficulties ($P<.001$).

DEPRESSION SYMPTOM DISCLOSURE COUNTS: MULTIVARIATE MODEL

In adjusted negative binomial models, college juniors reported more than three times more depression references than sophomores ($\exp(B) = 3.1$, $P = .001$). Furthermore, receiving responses to a displayed depression reference was associated with increased numbers of depression references. For each additional response from a Facebook friend to a displayed depression reference, a student displayed twice as many depression references ($\exp(B) = 2.1$, $P<.00$). Last, each additional reference to sleep concerns was associated with an increase in the number of status updates that reference depression ($\exp(B) = 1.37$, $P<.00$).

CONCLUSION

Our results suggest that displayed comments that meet criteria as symptoms of depression are disclosed on Facebook by approximately 25% of college students. As more than 80% profiles evaluated for eligibility were publically available and data suggests more than 90% college students maintain a Facebook profile, our results are likely generalizable within this university setting. Furthermore, a small proportion of coded Facebook profiles displayed depression symptoms that meet our proxy DSM criteria for a MDE.

In creating a SNS profile, college students may give researchers and health-care providers insight into aspects of their behavior that are not always apparent in offline life. Adolescents report that they often disclose more about themselves on SNSs than they do in person.[27] Given that more than 90% of college students maintain a Facebook profile, and that Facebook is a socially shared and socially constructed document, it may seem obvious that profile owners cannot stray too far from reality in constructing their online identity. However, creating a profile allows profile owners to selectively choose what aspects of their identity they wish to display and which they wish to avoid putting into public focus. Despite the potential for stigma surrounding mental health symptoms or diagnoses, a quarter of profiles in this study publicly displayed depression references. Our study does not provide evidence of the face validity of displayed references that meet criteria for depression symptoms, but it does provide prevalence estimates and rich description of how these status updates are displayed.

Our findings suggest that 2.5% of profiles displayed depression symptoms consistent with our proxy defined DSM diagnosis of a MDE, including timing and symptom category. These prevalence rates for both depression and depressive symptoms are similar to previous work in which such disclosures were self-reported. A recent study of adolescents and young adults found that more than a quarter of participants reported at least one core DSM-IV symptom of major depressive disorder.[28] Another study among college students found that 33% reported symptoms of depression, but only 2% reported symptom duration consistent with DSM criteria for a diagnosis of MDE.[29] The point prevalence of MDE in older adolescents has been estimated to be approximately 3%.[15] As much of the art and science of mental health diagnoses involve assessing symptom patterns over time, Facebook may present a novel way to investigate patterns of depression disclosure either for diagnostic or treatment purposes. Although we would not argue that Facebook should be used to formally diagnose depression, displayed information may allow identification of an at-risk student and prompt a further clinical evaluation. Recent media stories highlight tragic suicides of adolescents and young adults that were displayed on SNSs before being carried out, illustrating the urgent need to better understand the validity of displayed references to mental health concerns on SNSs.[30,31]

Our findings suggest several associations between Facebook use characteristics and display of depression

symptoms. First, students who displayed more recent Facebook activity were more likely to display a reference to depression. It is possible that students experiencing depressive symptoms place greater investment in SNSs as a communication outlet, as it could be viewed as a safe and indirect outlet for emotions. Second, references to depression were more commonly displayed on Facebook profiles in which a response by another Facebook user was generated. This suggests that those who receive reinforcement to a depression disclosure from their online friends may be more likely to discuss their depressive symptoms publicly on Facebook. From another perspective, this also suggests that depression disclosures on Facebook often elicit responses from peers who view these references. This is supported by previous work, which suggests that students often report willingness to refer their peers for help and more than half of college students are interested in learning how to help a student in distress.[3,32,33] As the total number of Facebook friends was not associated with increased depression disclosures, this suggests that it is not the size of one's online social network, but their involvement which may prompt peers to display depressive symptoms. Students with a more involved online social network may feel more comfortable disclosing depressive symptoms on their profiles, and may perceive more opportunity to do so. This is supported by a recent study in which older adolescents who received positive feedback on their SNS profiles reported enhanced self-esteem and sense of well-being.[34] Alternatively, these students may have more limited offline social networks, and thus invest more heavily in their Facebook social network. A last consideration is that those who use Facebook more often may be more likely to display more information in general, and thus more likely to display depression references.

There are several potential limitations of our study. First, we evaluated Web profiles from only one SNS and one university. The extent to which findings could be generalized to other Web sites or other adolescent populations is not known. Second, because we focused on college students, generalizing results to other young adult populations may not be warranted. Because college students are a key population in which mental health problems are common, consequential, and often undiagnosed, this was our population of choice for this evaluation. Third, as our study focused on publicly available profiles, it is unclear whether increased privacy settings would increase or decrease the likelihood of disclosing depression symptoms. Our goal in assessing publicly available profiles was to examine profiles that could be accessed by any peer, parent, or college health provider. Fourth, the validity of these displayed status updates suggesting depression symptoms is unclear at this point. Without clinical context, including duration, severity, and frequency of the displayed symptoms, formal diagnosis cannot be made without further clinical evaluation. Future study should evaluate associations between displayed depression symptoms and self-reported depression symptoms using a clinical scale.

Despite these limitations, our study has important implications for improving mental health care for college students. First, given the prevalence of references to depression disclosed on Facebook, the popularity of this website among college students and the ability to track disclosures and symptoms over time, Facebook may present an innovative opportunity to identify students at risk for depression. The wide accessibility of SNSs could allow for involvement of family members, university representatives, or even peers as a means of helping to identify students who would benefit from further screening via a clinical encounter to assess depression. Because Facebook is a peer communication tool, peers may be both able and motivated to identify at-risk students using Facebook. As seen in our findings that students often displayed responses to depression references, students are a ready and willing audience to help peers in distress.[3,32,33] Given that Facebook is typically perceived as a peer communication tool, enlisting peers in efforts to identify at-risk students may reduce concerns about privacy violations.

Second, SNSs may provide new opportunities to increase student help-seeking behavior. A recent study evaluated an interactive web-based program designed to screen students for depression and suicide risk. After the initial online screening, 24% of students entered into an online dialogue with a counselor, 19% later attended an in-person session with the counselor, and 14% entered a treatment program.[35] SNSs may provide an innovative venue to provide access to online screening and follow-up resources, and could be seen as a "safe" venue in which to establish a therapeutic relationship. It is possible that such screening could be triggered by the content of a SNS profile. When Facebook users view their profile, advertisements triggered by keywords present on the profile are displayed at the side of the profile. Based on the content of a students' profile, anecdotal observations show that students are already seeing pop-up advertisements for weight loss products, beauty products, and even casino-themed online games. University counseling centers could utilize this service to link messages about counseling services or links to online screening to keywords, such as "depressed" or "hopeless." This method would deliver the message in a targeted manner that still protected the privacy of the profile owner.

Third, it is possible that SNSs have potential to impact college students' views regarding depression. Given the frequency of depression symptom displays on public profiles, SNSs could be an innovative avenue for raising self-awareness and combating stigma surrounding mental health conditions. We found responses to displayed symptoms were frequent, positive, and supportive. Despite the potential for

stigma related to mental illness, Facebook seems to be a venue in which personal disclosures of depression symptoms are acceptable. It is possible that the social support provided on Facebook is already impacting college students' experiences with depression. Older adolescents often report a preference to cope with mental health problems alone or with the help of friends, rather than making use of formal sources.[33] Social support has also been shown to have a buffering effect against depression among students.[36] It is possible that the support provided by online peers through Facebook may complement resources provided by university counseling centers without increasing the burden on these limited campus resources.

To our knowledge, this is the first study to describe mental health disclosures on a publicly accessible SNS. Future studies could evaluate associations between displayed depression symptoms and self-reported depression symptoms using a clinical scale, or how to design effective interventions using the health information displayed on SNSs. All these intervention ideas hinge on designing programs that are acceptable to students and respect their privacy and confidentiality. Given the personal and potentially stigmatizing nature of mental health disclosures, proper attention to privacy will be critical both in research and potential interventions involving SNSs.[37,38] There is reason to be optimistic that proper attention to privacy and acceptability may yield useful programs. A study assessing a web-based intervention program found that among students with an un-met need for mental health care, more than 90% reported interest in or intention to use the program.[39] However, with the difficulty in identifying students at risk for depression and the potential negative consequences of untreated depression, we cannot afford to ignore public health opportunities to reduce the burden of mental illness in this population.

Acknowledgments. The authors thank Mahaya Clark and Lyn Turkstra for their assistance with this project

REFERENCES

1. Hunt J, Eisenberg D. Mental health problems and help-seeking behavior among college students. J Adolesc Health 2010;46: 3–10.
2. Gallagher RP. National Survey of Couseling Center Directors, 2006, in Monograph Series No. 8P. 2007, International Assoication of Counseling Services, Inc.
3. Association ACH. American College Health Association: National College Health Assessment II: Reference Group Data Report Fall 2008. 2009, American College Health Association, Baltimore.
4. Statistics NCE. Digest of Education Statistics: 2009. Washington, DC: US Department of Eduction, National Center for Education Statistics; 2010.
5. Bramesfeld A, Platt L, Schwartz FW. Possibilities for intervention in adolescents' and young adults' depression from a public health perspective. Health Policy 2006;79:121–131.
6. Rao U. Links between depression and substance abuse in adolescents: neurobiological mechanisms. Am J Prevent Med 2006;31:S161–S174.
7. Garlow SJ, Rosenberg J, Moore JD, et al. Depression, desperation, and suicidal ideation in college students: results from the American Foundation for Suicide Prevention College Screening Project at Emory University. Depress Anxiety 2008; 25:482–488.
8. Rao U, Chen LA. Characteristics, correlates, and outcomes of childhood and adolescent depressive disorders. Dialogues Clin Neurosci 2009;11:45–62.
9. Deas D, Brown ES. Adolescent substance abuse and psychiatric comorbidities. J Clin Psychiatry 2006;67:e02.
10. Kessler RC, Foster CL, Saunders WB, Stang PE. Social consequences of psychiatric disorders. I: educational attainment. Am J Psychiatry 1995;152:1026–1032.
11. Association AP. Diagnostic and Statistical Manual of Mental Disorders. Washington, DC: American Psychiatric Association; 2000.
12. Regestein Q, Natarajan V, Pavlova M, Kawasaki S, Gleason R, Koff E. Sleep debt and depression in female college students. Psychiatry Res 2010;176:34–39.
13. Koffel E, Watson D. The two-factor structure of sleep complaints and its relation to depression and anxiety. J Abnorm Psychol 2009;118:183–194.
14. Moo-Estrella J, Perez-Benitez H, Solis-Rodriguez F, Arankowsky-Sandoval G. Evaluation of depressive symptoms and sleep alterations in college students. Arch Med Res 2005;36:393–398.
15. Lewinsohn PM, Rohde P, Seely JR. Major depressive disorder in older adolescents: prevalence, risk factors, and clinical implications. Clin Psychol Rev 1998;18:765–794.
16. Zivin K, Eisenberg D, Gollust SE, Golberstein E. Persistence of mental health problems and needs in a college student population. J Affect Disord 2009;117:180–185.
17. Eisenberg D, Golberstein E, Gollust SE. Help-seeking and access to mental health care in a university student population. Medical Care 2007;45:594–601.
18. Eisenberg D, Downs MF, Golberstein E, Zivin K. Stigma and help seeking for mental health among college students. Med Care Res Rev 2009;66:522–541.
19. Ross C, Orr ES, Sisic M, Arseneault JM, Simmering MG, Orr RR. Personality and motivations associated with facebook use. Comput Hum Behav 2009;25:578–586.
20. Ellison NB, Steinfield C, Lampe C. The benefits of Facebook "friends:" social capital and college students' use of online social network sites. JCMC 2007;12:1143–1168.
21. Lewis K, Kaufman J, Christakis N. The taste for privacy: an analysis of college student privacy settings in an online social network. JCMC 2008;14:79–100.
22. Hinduja S, Patchin JW. Personal information of adolescents on the Internet: a quantitative content analysis of MySpace. J Adolesc 2008;31:125–146.
23. Moreno MA, Parks MR, Zimmerman FJ, Brito TE, Christakis DA. Display of health risk behaviors on MySpace by adolescents: prevalence and associations. Arch Pediatr Adolesc Med 2009;163:27–34.
24. Moreno MA, Brockman LB, Wasserheit J, Christakis DA. Sexual reference display on Facebook is associated with self-reported sexual intention. Manuscript under review, 2011.
25. Planner GA, Ad Planner G. 2009 [cited December 14, 2009]; Available from: www.google.com/adplanner/planning/site_profile#siteDetails?identifier = facebook.com
26. Kimberlin CL, Winterstein AG. Validity and reliability of measurement instruments used in research. Am J Health Syst Pharm 2008;65:2276–2284.

27. Christofides E, Muise A, Desmarais S. Information disclosure and control on Facebook: are they two sides of the same coin or two different processes? Cyberpsychol Behav 2009;12:341–345.
28. Fergusson DM, Horwood LJ, Ridder EM, Beautrais AL. Subthreshold depression in adolescence and mental health outcomes in adulthood. Arch Gen Psychiatry 2005;62:66–72.
29. Wells VE, Klerman GL, Deykin EY. The prevalence of depressive symptoms in college students. Soc Psychiatry 1987; 22:20–28.
30. LaPook J. Preventing Suicides, in CBS.com. 2010.
31. George C. Experts offer tips to avert teen suicides, Houston Chronicle, Houston; 2010.
32. O'Grady MA, Wilson K, Harman JJ. Preliminary findings from a brief, peer-led safer sex intervention for college students living in residence halls. J Prim Prevent 2009;30:716–731.
33. Raviv A, Raviv A, Vago-Gefen I, Fink AS. The personal service gap: factors affecting adolescents' willingness to seek help. J Adolesc 2009;32:483–499.
34. Valkenburg PM, Peter J, Schouten AP. Friend networking sites and their relationship to adolescents' well-being and social self-esteem. CyberPsychol Behav 2006;9:584–590.
35. Haas A, Koestner B, Rosenberg J, et al. An interactive web-based method of outreach to college students at risk for suicide. J Am College Health 2008;57:15–22.
36. Tennant C. Life events, stress and depression: a review of the findings. Aust N Z J Psychiatry 2002;36:173–182.
37. Moreno MA, Fost NC, Christakis DA. Research ethics in the MySpace era. Pediatrics 2008;121:157–161.
38. Pujazon-Zazik M, Park MJ. To tweet, or not to tweet: gender differences and potential positive and negative health outcomes of adolescents' social internet use. Am J Men's Health 2010;4: 77–85.
39. Christensen H, Griffiths KM, Jorm AF. Delivering interventions for depression by using the internet: randomised controlled trial. BMJ 2004;328:265.