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Research paper

Frequency of social contact in-person vs. on Facebook: An examination of associations with psychiatric symptoms in military veterans

Alan R. Teo[a,b,c,*], Benjamin K. Chan[c], Somnath Saha[a,d], Christina Nicolaidis[c,d,e]

[a] VA Portland Health Care System, HSR&D Center to Improve Veteran Involvement in Care (CIVIC), 3710 SW US Veterans Hospital Rd (R&D 66), Portland, OR 97239-2964, USA
[b] Oregon Health & Science University, Department of Psychiatry, 3181 SW Sam Jackson Park Rd (Multnomah Pavilion, Room 2316), Portland, OR 97239-3098, USA
[c] Oregon Health & Science University and Portland State University, School of Public Health, Biostatistics and Design Program, 3181 SW Sam Jackson Park Rd (CB669), Portland, OR 97239-3098, USA
[d] Oregon Health & Science University, Division of General Internal Medicine & Geriatrics, 3181 SW Sam Jackson Park Rd L475, Portland, OR 97239-3098, USA
[e] Portland State University, School of Social Work, 1600 SW 4th Ave, Portland, OR 97201-5522, USA

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ABSTRACT

Introduction: Social isolation is closely associated with negative mental health outcomes. Social media platforms may expand opportunities for social contact, but whether online interactions are as effective as face-to-face, or in-person, interactions at protecting against the negative effects of social isolation is unclear.
Methods: Participants consisted of U.S. military veterans who served since September 2001 and used Facebook (n = 587). Our independent variables were frequency of social contact occurring in-person and on Facebook. Dependent variables were probable psychiatric disorders and suicidality, measured using several validated screening tools. The independent effect of each form of social contact was assessed using multivariate logistic regression, which included adjustment for several potential confounders.
Results: We found that veterans who frequently interacted on Facebook engaged in more in-person social contact than infrequent Facebook users ($p < .001$). More frequent in-person social interaction was associated with significantly decreased risk of symptoms of major depression and PTSD, compared with contact every few weeks or less. In contrast, increased frequency of social interaction on Facebook had no associations with mental health outcomes.
Limitations: All associations are cross-sectional (direction of association is unclear) and based on self-report measures.
Conclusions: Although veterans who frequently use Facebook are also typically social in their offline life, it is their offline (in-person) social interaction, rather than their social contact on Facebook, that is associated with reduced psychiatric symptoms.

1. Introduction

Decades of literature has established the benefits of social relationships for multiple aspects of psychological well-being and mental health (Cornwell and Waite, 2009; Kawachi and Berkman, 2001; Berkman et al., 2000; Cacioppo et al., 2010; Cohen, 2004; Newsom et al., 2003).

Social relationships have both structural (e.g., number of ties, type of relationship) and functional dimensions. The function of our social ties that has perhaps been most linked to health outcomes is social support.

Social support, either perceived availability or actual receipt of it, has been linked with better health outcomes across countless observational studies (Cohen, 2004; House et al., 1988). One of the leading theories of social support argues that it may act as a buffer, or insurance policy, against stressors that otherwise might induce depression, anxiety or other emotional problems (Cohen and Wills, 1985). In addition, neuroscience research suggests that social support arises, at least in part, from the literal physical presence of support. For instance, handholding by our close supports seems to provide a sense of security that our brains use to reduce negative emotion and physiological reactivity (Coan et al., 2006).

In today's world, communication with friends and family online—and particularly through social media—is part of daily life. The

* Corresponding author at: VA Portland Health Care System, 3710 SW US Veterans Hospital Road (R&D 66), Portland, OR 97239-2964, USA.
E-mail address: teoa@ohsu.edu (A.R. Teo).

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average time a user spends on Facebook is 50 minutes a day, almost as much time as people spend eating and drinking (Stewart, 2016). Given this modern reality, researchers and the general public alike are keenly interested in how online social contact—also referred to as computer-mediated communication—impacts our well-being and mental health. Nonetheless, much of the research on social support, has either predated contemporary modes of social interaction, not directly compared offline and online modes of social interaction, or implicitly assumed social contact to be face-to-face.

In a sample of community-residing older adults in the United States, we previously showed that as in-person social contact became more frequent, the risk of developing depression two years later declined in a dose-dependent fashion (Teo et al., 2015). In contrast, increasing amounts of contact via phone, writing, or email did not have such a protective effect against depressive symptoms. Still, it is unclear whether these findings differ when considering interactions on social media. Results of studies on social media use have been mixed, some suggesting increased risk for mental health problems (Kross et al., 2013; Shakya and Christakis, 2017; Verduyn et al., 2015) and others concluding a positive impact (Ellison et al., 2007; Nabi et al., 2013; Burke and Kraut, 2016). Additionally, other mental health outcomes besides depression warrant investigation. Among military veterans in the United States, for instance, rates of PTSD, substance use disorders, and suicide are also high (Ilgen et al., 2012; Reger et al., 2015; Seal et al., 2018,2011).

Finally, it is important to know whether relationships on social media might substitute for those in a person's offline life, a notion called *network substitution*. People have limited time for socialization. Knowing how much time and energy to invest in social media, or how much screen time is reasonable, is of great interest to the public (Molina, 2017), as well as researchers developing social media-based interventions (Coiera, 2013).

In this paper, we aimed to address two research questions. First, to what extent do veterans who socialize on Facebook also have in-person social contact? Second, is more social contact on Facebook (or conversely, in-person) associated with lower risk of screening positive for psychiatric disorders or suicidality in military veterans? We hypothesized that: (1) veterans using Facebook would not engage in less in-person social contact; and (2) both social contact on Facebook and in-person would be associated with lower risk of psychiatric symptoms.

2. Methods

2.1. Participants and recruitment

The target population for our study was U.S. military veterans who served since September 2001, a group often referred to as Iraq and Afghanistan era veterans. We chose this population as one with high rates of social isolation, depression, PTSD, and suicidality, and largely consisting of individuals who are online and facile with social media. Among the 1,329 who completed the online screener, 711 met eligibility criteria (age 18 or older, had been on active duty after September 2001 but not at the time of the survey). Of these, 605 completed the online survey, and we excluded from analysis individuals who completed surveys in less than five minutes (n = 10), had a duplicate or multiple survey responses (n = 6), or incorrectly answered a military-related 'insider knowledge' question designed to reduce chance of online survey misrepresentation (n = 2) (Pedersen et al., 2015; Kramer et al., 2014), resulting in a final analytic sample of 587 participants.

2.2. Procedure

Online survey participants were recruited using Facebook ads containing a call to action to participate in a health research study, which we describe in a separate publication (Teo et al., 2018). In brief, study ads broadly targeted Facebook users in the United States of any age or gender who had interests relevant to military veterans (e.g., an interest in the "United States Armed Forces"). Survey items confirmed respondents' status as a veteran. Ads were hosted by Facebook pages affiliated with Oregon Health & Science University (OHSU) and linked to an online survey. After completing an eligibility screener, participants proceeded to the full online survey, which was active between January and March 2017.

2.3. Measures

2.3.1. Independent variables: social contact

We assessed frequency of social contact occurring: (1) in-person and (2) on Facebook, by adapting previously validated survey items used by the Health and Retirement Study and Pew Research (Health and Retirement Study 2010; Pew Research Center 2016). We asked participants, "On average, how often do you do each of the following with any of your friends or family: Meet up-in person? Actively interact on Facebook, such as sharing, posting, commenting, or tagging?" We used a 5-point response scale ranging from "several times a day" to "every few weeks or less often."

2.3.2. Dependent variables: probable psychiatric disorders and suicidality

To screen for mental health problems, we employed a number of validated self-report tools. For PTSD, we used the Primary Care PTSD Screen for DSM-5 (PC-PTSD), a five-item scale assessing past-month symptoms of a lifetime traumatic event. A score of three or higher on the PC-PTSD indicates a positive screen (Prins et al., 2016). For alcohol use disorder, we used the Alcohol Use Disorders Identification Test Alcohol Consumption Questions (AUDIT-C), a three-item scale on frequency and intensity of drinking. An AUDIT-C score of four or higher for men, or three or higher for women, indicates a positive screen for problematic drinking (Bush et al., 1998). For major depression, we used the Patient Health Questionnaire-2 (PHQ-2), for which a score of two or higher indicates a positive screen (Kroenke et al., 2013). For suicidality, we used the Depressive Symptom Inventory Suicidality Subscale (DSI-SS), a four-item scale on suicidal ideation within the past two weeks (Joiner et al., 2002). A score of two or higher on the DSI-SS indicates a positive screen in a population-based sample (von Glischinski et al., 2016).

2.3.3. Covariates

Covariates and other variables used to describe the sample were taken from self-report survey items and included sociodemographic characteristics, assessment of frequency of social contact, social media platforms used, reasons for using social media platforms, interest in online health-related interventions, and psychiatric history.

2.4. Statistical analysis

To compare the proportion of participants at varying levels of social interaction on Facebook and in-person, we used a chi-squared test for trend. We used logistic regression to model the association between frequency of social contact and positive screening for psychiatric problems. Four models were estimated, one for each psychiatric problem. Both social contact measures were included in the same model in order to determine the independent effect of each. We examined multicollinearity of the independent variables, concluding that the correlation between in-person and Facebook social contact did not substantively bias associations between social contact and any of the outcomes. Social contact measures were modeled as a set of four indicator variables where the least frequent category ("every few weeks or less often") was the referent. Potential confounders included in the models were the number of social media platforms used in addition to Facebook, lifetime history of suicidal ideation, and lifetime history of suicide attempts. Subjects were excluded from model estimation when

Table 1
Descriptive characteristics of survey participants (N = 587).

Characteristic	n or mean	% or (SD)
Demographics and Military History		
Age, years	40.0	(12.0)
Gender, male	474	80.8
Racial or ethnic minority	110	18.9
Branch of military service		
Army	326	55.5
Navy	110	18.7
Air Force	109	18.6
Marine Corps or other	88	15.0
Service era(s)		
September 2001 to present	587	100
August 1990 to August 2001	213	36.3
July 1990 or earlier	141	24.0
Deployed to Iraq or Afghanistan	426	72.7
Education		
High school diploma or less	34	5.8
Some college, or vocational degree	250	42.6
College degree or greater	303	51.6
Marital status		
Single, never married	112	19.1
Divorced, separated, or widowed	111	18.9
Married or living as married	363	62.0
Frequency of Facebook use		
Every few weeks or less often	14	2.4
Weekly or a few times a week	47	8.0
Daily or more often	524	89.6
Frequency of actively interacting with friends or family on Facebook[a]		
Every few weeks or less often	70	11.9
Weekly or a few times a week	159	27.1
Daily or more often	358	61.0
Frequency of meeting friends or family in-person		
Every few weeks or less often	169	28.8
Weekly or a few times a week	184	31.4
Daily or more often	233	39.8
Number of social media platforms used other than Facebook[b]	0.7	1.0
Psychiatric Symptoms		
Positive depression screener[c]	164	28.0
Positive PTSD screener[d]	266	45.5
Positive alcohol use disorder screener[e]	243	41.4
Positive suicidal ideation screener[f]	132	22.6

Due to missing item response, the total number of respondents for certain characteristics is slightly less than the full sample of 587.

[a] "Actively interact" defined as activities on Facebook "such as sharing, posting, commenting, or tagging."

[b] Median number was 0 with an interquartile range of 0 to 1.

[c] PHQ-2 score ≥ 3.

[d] PC-PTSD-5 score ≥ 3.

[e] AUDIT-C score ≥ 4 (men) or ≥ 3 (women).

[f] DSI-SS score ≥ 2.

missing covariate values in survey responses.

As a secondary analysis, we used frequency of any Facebook use as the main predictor, instead of frequency of Facebook social contact. More specifically, we used a single survey item ("How often do you visit or use Facebook?") with a response scale ranging from "never" (0) to "several times a day" (5). This item is intended to measure any use of Facebook, including passive scrolling and reading of content on Facebook without necessarily two-way social interaction (Verduyn et al., 2015, 2007).

3. Results

3.1. Sample description

Participants were, on average, 40 years old. As indicated in Table 1, the majority were men, non-Hispanic white, had at least a college degree, were married or partnered, served in the Army, and had been deployed to Iraq or Afghanistan. Ninety percent of participants used Facebook at least daily. The median and mean number of other social media platforms used by participants were 0 and 0.7, respectively. Sixty-one percent (358/587) of participants reported at least daily social contact with friends and family on Facebook, whereas 40% (233/586) indicated at least daily in-person social contact with friends and family.

3.2. Correlations between demographic characteristics and frequency of social contact

Age was significantly associated with frequency of Facebook use, such that participants who used Facebook several times a day were modestly younger, on average, than less frequent users (39.2 years old vs. 42.8 years old, on average; p = .004). There were no other correlations between frequency of in-person or Facebook social contact with age, gender, or marital status.

3.3. Research questions

Research Question 1: To what extent do veterans who socialize on Facebook also have in-person social contact?

The Fig. 1 categorizes participants based on their frequency of self-reported social interaction with friends and family on both Facebook and in-person. Individuals who had frequent (daily or more often) social contact on Facebook tended to have more frequent in-person contact, compared to those with less-than-daily social contact on Facebook (p < .001).

More specifically, 37% percent (132/358) of participants with at least daily social contact on Facebook also met up in-person with family and friends several times a day (upper left blue bar). In contrast, only 19% (43/228) of those with less-than-daily social contact on Facebook had in-person social contact several times a day (upper right red bar). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Research Question 2: Is more social contact on Facebook (or conversely, in-person) associated with lower risk of screening positive for psychiatric disorders or suicidality in military veterans?

Table 2 summarizes the results of adjusted regression models for each of our four outcomes.

3.3.1. Major depression

In adjusted regression models, social contact on Facebook was not

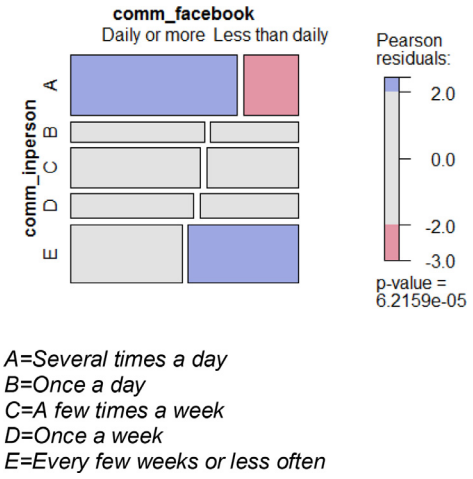

Fig. 1. Proportion of participants with varying levels of social interaction on Facebook and in-person (N = 586). *A = Several times a day. B = Once a day. C = A few times a week. D = Once a week. E = Every few weeks or less often.* (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 2
Multivariate logistic regression models of frequency of Facebook and in-person social contact as predictors of psychiatric symptoms.

Type of contact	Major depression			PTSD			Alcohol misuse			Suicidality		
	OR	SE	*p*	OR	SE	*p*	OR	SE	*p*	OR	SE	*p*
Facebook												
Every few weeks or less often	1.00	—	—	1.00	—	—	1.00	—	—	1.00	—	—
Once a week	1.06	.47	.90	1.13	.43	.78	.58	.42	.19	.73	.52	.54
A few times a week	.68	.36	.28	0.93	.32	.83	.80	.31	.47	.74	.38	.43
Once a day	.93	.37	.84	0.93	.34	.82	.62	.33	.14	.63	.41	.26
Several times a day	.81	.32	.51	.65	.30	.15	.97	.28	.90	.57	.36	.11
In-person												
Every few weeks or less often	1.00	—	—	1.00	—	—	1.00	—	—	1.00	—	—
Once a week	.79	.31	.46	0.78	.31	.43	1.35	.29	.30	.80	.34	.51
A few times a week	.36	.30	<.01	0.51	.26	.01	.95	.25	.85	.65	.32	.18
Once a day	.43	.39	.03	0.50	.33	.03	.80	.32	.48	.65	.44	.32
Several times a day	.40	.27	<.01	0.43	.24	<.01	.68	.23	.09	.66	.29	.15

OR: Odds Ratio; SE: Standard Error; PTSD: Post-traumatic stress disorder.

associated with screening positive for major depression on the PHQ-2. Having in-person social contact a few times a week (AOR = .36, SE = .30, p = .001), once a day (AOR = .43, SE = .39, p = .03), or several times a day (AOR = .40, SE = .27, p = .001) was associated with decreased risk of screening positive on the PHQ-2, compared to contact every few weeks or less.

3.3.2. PTSD

In adjusted regression models, social contact on Facebook was not associated with screening positive for PTSD on the PC-PTSD. Having in-person social contact a few times a week (AOR = .51, SE = .26, p = .010), once a day (AOR = .50, SE = .33, p = .03), or several times a day (AOR = .43, SE = .24, p < .001) was associated with decreased risk of screening positive on the PC-PTSD, compared to contact every few weeks or less.

3.3.3. Alcohol use disorder

In adjusted regression models, neither social contact on Facebook nor in-person was associated with AUDIT-C scores.

3.3.4. Suicidality

In adjusted regression models, neither social contact on Facebook nor in-person was associated with DSI-SS.

3.3.5. Secondary analysis

Results were very similar when using frequency of any Facebook use as an independent variable. The only difference in significant findings was for alcohol use disorder. In that case the highest level of in-person social contact (several times a day) was associated with a lower rate of screening positive for alcohol use disorder, compared to in-person contact every few weeks or less (AOR = .58, SE = .25, p = .03).

4. Discussion

4.1. Key findings

Our data suggest that, overall, veterans who use Facebook socialize more on social media than in-person. If that is true, one may wonder, then, if using Facebook poses a risk of forsaking real-world interaction. Our results refute the hypothesis that frequent Facebook users are engaging in less face-to-face social contact than infrequent users.

With these findings in mind, we can now consider the primary inquiry of this study: How do veterans' social interactions on Facebook compare to those occurring in-person in terms of associations with psychiatric risk? We found that in-person social interaction *at least a few times a week* is associated with lower rates of screening positive for major depression and PTSD—perhaps alcohol use disorder too. At this frequency of social contact and above, we consistently observed a 50% or more reduction in odds compared to the most socially isolated military veterans. In contrast, and somewhat to our surprise, maintaining social contact *via* Facebook was not associated, either positively or negatively, with risk for psychiatric symptoms.

All in all, these data suggest that frequent Facebook users are also very social in real life, but it is their *in-person* social interactions that account for any protective effect against psychiatric problems. This study's direct comparison of the independent effect of social contact occurring on social media vs. in-person is novel and important.

4.2. Limitations and future directions

A large portion of our sample screened positive for psychiatric disorders, a finding that we have previously reported (Teo et al., 2018). Though positive screening rates were high, they are in line with rates found in other studies (Pedersen et al., 2015). Moreover, a study using International Classification of Disease codes on over 100,000 Iraq and Afghanistan era veterans who utilized the VA found 25% received at least one mental health diagnosis and 56% of these individuals had multiple psychiatric diagnoses (Seal et al., 2007). Nonetheless, given the high co-morbidity between PTSD and depression, as well as our use of screening measures, it remains to be determined in future research whether our findings would remain consistent when evaluating formal diagnoses of psychiatric disorders.

Because our data were cross-sectional, we have no way to determine the directionality of the association between in-person social contact and screening positive for common psychiatric disorders. It is as conceivable that active psychiatric problems induce social isolation, as that social isolation causes heightened psychiatric problems. That said, the current study does align well with a large body of research that suggests a causal relationship between social relationships and poor health outcomes (Berkman et al., 2000; Cohen, 2004; House et al., 1988). Although military veterans are a vital target population given the prevalence of mental health issues, our results require corroboration in other populations.

Our analyses are based on a convenience sample of Facebook users who responded to Facebook ads, potentially leading to selection bias. Nonetheless, our sample appears comparable with other studies of non-help-seeking young adult veterans in terms of most demographic and clinical characteristics.For instance, in another study that recruited over 1,000 younger veterans from Facebook, the sample consisted of similar proportions of veterans who were white (71%), married or partnered (52%), served in the Army (60%), and screened positive for PTSD (47%), whereas their sample had more men (89%) and less educated participants (only 15% were college graduates) (Pedersen et al., 2015). In a large epidemiologic study that used random sampling of college students across dozens of post-secondary institutions in the United States, researchers found similarly elevated rates of active symptoms of

depression: 21% had a PHQ-9 score of 10 or higher indicating clinically significant depressive symptoms (Currier and McDermott, 2018). Their sample contained modestly lower proportions of male (70%), white (72%), and married/partnered veterans (44%) (Currier and McDermott, 2018).

Finally, our study examined just one aspect of social contact (frequency), whereas other aspects related to the quality of social contact bear examination. Future research could extend the work presented here by exploring more about the quality of social interactions occurring on social media, including more detailed or objective measures of interactions on social media (Kosinski et al., 2015; Erfani et al., 2016). One of the potential explanations as to why in-person social contact was uniquely associated with reduced risk of psychiatric symptoms in this study is that being face-to-face with someone is experienced as a higher quality, more supportive type of interaction than online exchange. Indeed, a number of studies have shown that the nature and depth of support is a strong predictor of depression and other mental health outcomes, more so than the number of people in one's social network (Vandervoort, 1999; Teo et al., 2013). Notwithstanding this, there may be unique value in online social contact among military populations, particularly new veterans who have recently separated from service and could benefit from maintaining support amongst former unit members. We also suggest future work examine longitudinal associations with symptoms of depression and PTSD.

Taken together, these results suggest that lack of face-to-face time with family and friends may pose a unique and specific risk to military veterans' mental health. These are dangers that are unlikely to be attenuated by trying to make up for social contact through interactions on Facebook. Put simply, "face-to-face" may matter more than "Facebook" for veterans trying to harness the mental health-promoting benefits of social contact with friends and family.

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Previous presentation

The contents of this paper have not been published elsewhere.

Conflicts of interest

None.

Contributors

Alan R. Teo, M.D, M.S.: study design, lit search, data analysis, data interpretation, writing

Benjamin Chan, M.S.: data analysis, data interpretation

Somnath Saha, M.D., M.P.H.: study design, data interpretation

Christina Nicolaidis, M.D., M.P.H.: data interpretation, writing

All authors have approved the final article.

References

B Bush, K, Kivlahan, DR, McDonell, MB, et al., 1998. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol use disorders identification test. Arch. Intern. Med. 158, 1789–1795.

Berkman, L, Glass, T, Brissette, I, et al., 2000. From social integration to health: durkheim in the new millennium. Soc. Sci. Med. 51, 843–857.

Burke, M, Kraut, RE, 2016. The relationship between facebook use and well-being depends on communication type and tie strength. J. Comput.-Mediat. Commun. 21, 265–281.

Cacioppo, JT, Hawkley, LC, Thisted, RA, 2010. Perceived social isolation makes me sad: 5-year cross-lagged analyses of loneliness and depressive symptomatology in the Chicago Health, Aging, and Social Relations Study. Psychol. Aging 25, 453–463.

Coan, J, Schaefer, H, Davidson, R.J., 2006. Lending a hand: social regulation of the neural response to threat. Psychol. Sci. 12, 1032–1039.

Cohen, S, 2004. Social Relationships and Health. Am. Psychol 59, 676–684.

Cohen, S, Wills, T, 1985. Stress, social support, and the buffering hypothesis. Psycho. Bull. 98, 310–357.

Coiera, E, 2013. Social networks, social media, and social diseases. BMJ 346, f3007.

Cornwell, EY, Waite, LJ, 2009. Social disconnectedness, perceived isolation, and health among older adults. J. Health Soc. Behav. 50, 31–48.

Currier, J, McDermott, R, 2018. Miner. Do student service members/veterans experience worse mental health stigma than their peers? A comparative study in a national sample. J. Am. Coll. Health 1–6.

Ellison, NB, Steinfield, C, Lampe, C, 2007. The benefits of facebook 'friends:' social capital and college students' use of online social network sites. J. Comput.-Mediat. Commun. 12, 1143–1168.

Erfani, S, Blount, Y, Abedi, B, 2016. The influence of health-specific social network site use on the psychological well-being of cancer-affected people. J. Am. Med. Inform. Assoc. 23, 467–476.

Health and Retirement Study, 2010. Participant lifestyle questionnaire. http://hrsonline.isr.umich.edu/modules/meta/2010/core/qnaire/online/HRS2010_SAQ_Final.pdf (accessed 29 November 2016).

House, JS, Landis, KR, Umberson, D, 1988. Social relationships and health. Science 241, 540–545.

Ilgen, MA, McCarthy, JF, Ignacio, RV, et al., 2012. Psychopathology, Iraq and Afghanistan service, and suicide among Veterans Health Administration patients. J. Consult. Clin. Psychol. 80, 323–330.

Joiner, TE, Pfaff, JJ, Acres, JG, 2002. A brief screening tool for suicidal symptoms in adolescents and young adults in general health settings: reliability and validity data from the Australian National General Practice Youth Suicide Prevention Project. Behav. Res. Ther. 40, 471–481.

Kawachi, I, Berkman, LF, 2001. Social ties and mental health. J. Urban Health Bull. N. Y. Acad. Med. 78, 458–467.

Kosinski, M, Matz, SC, Gosling, SD, et al., 2015. Facebook as a research tool for the social sciences: opportunities, challenges, ethical considerations, and practical guidelines. Am. Psychol. 70, 543–556.

Kramer, J, Rubin, A, Coster, W, et al., 2014. Strategies to address participant misrepresentation for eligibility in Web-based research. Int. J. Methods Psychiatr. Res. 23, 120–129.

Kroenke, K, Spitzer, RL, Williams, JBWD, 2013. The patient health questionnaire-2: validity of a two-item depression screener. Med. Care 41, 1284–1292.

Kross, E, Verduyn, P, Demiralp, E, et al., 2013. Facebook use predicts declines in subjective well-being in young adults. PloS One 8, e69841.

Molina, B, 2017. Facebook admits spending too much time on Facebook might be bad for you. USA Today. https://www.usatoday.com/story/tech/talkingtech/2017/12/18/facebook-admits-spending-too-much-time-facebook-might-bad-you/960418001/ (accessed 12 December 2017).

Nabi, R, Prestin, A, So, J, 2013. Facebook friends with (health) benefits? Exploring social network site use and perceptions of social support, stress, and well-being. Cyberpsychology Behav. Soc. Netw. 16, 721–727.

Newsom, J, Nishishiba, M, Morgan, D, et al., 2003. The relative importance of three domains of positive and negative social exchanges: a longitudinal model with comparable measures. Psychol. Aging 18, 746–754.

Pedersen, ER, Helmuth, E, Marshall, GN, et al., 2015. Using Facebook to recruit young adult veterans: online mental health research. JMIR Res. Protoc 4, e63.

Pew Research Center: Internet, science & technology 2016. www.pewinternet.org (access 1 Nov 2016).

Prins, A, Bovin, MJ, Smolenski, DJ, et al., 2016. The primary care PTSD Screen for DSM-5 (PC-PTSD-5): development and evaluation within a veteran primary care sample. J. Gen. Intern. Med. 31, 1206–1211.

Reger, M, Smolenski, DJ, Skopp, NA, et al., 2015. Risk of suicide among US military

service members following operation enduring freedom or operation Iraqi freedom deployment and separation from the US military. JAMA Psychiatry 72, 561–569.
Seal, K, Abadjian, L, McCamish, N, et al., 2012. A randomized controlled trial of telephone motivational interviewing to enhance mental health treatment engagement in Iraq and Afghanistan veterans. Gen. Hosp. Psychiatry 34, 450–459.
Seal, KH, Bertenthal, D, Miner, CR, Sen, S, Marmar, C, 2007. Bringing the war back home: mental health disorders among 103,788 US veterans returning from Iraq and Afghanistan seen at department of veterans affairs facilities. Arch. Intern. Med. 167 (5), 476–482.
Seal, KH, Cohen, G, Waldrop, A, et al., 2011. Substance use disorders in Iraq and Afghanistan veterans in VA healthcare, 2001-2010: Implications for screening, diagnosis and treatment. Drug Alcohol Depend. 116, 93–101.
Shakya, HB, Christakis, NA, 2017. Association of facebook use with compromised well-being: a longitudinal study. Am. J. Epidemiol. 185, 203–211.
Stewart, J, 2016. Facebook Has 50 Minutes of Your Time Each Day. It Wants More. The New York Times Mar 16.. https://www.nytimes.com/2016/05/06/business/facebook-bends-the-rules-of-audience-engagement-to-its-advantage.html (accessed 12 Dec 2017).
Teo, AR, Choi, H, Andrea, SB, et al., 2015. Does mode of contact with different types of social relationships predict depression in older adults? Evidence from a nationally representative survey. J. Am. Geriatr. Soc. 63, 2014–2022.
Teo, AR, Choi, H, Valenstein, M, 2013. Social relationships and depression: ten-year follow-up from a nationally representative study. PloS One 8, e62396.
Teo, AR, Liebow, SB, Chan, B, et al., 2018. Reaching those at risk for psychiatric disorders and suicidal ideation: Facebook advertisements to recruit military veterans. JMIR Ment. Health. 5, e10078.
Vandervoort, D, 1999. Quality of social support in mental and physical health. Curr. Psychol. 18, 205–221.
Verduyn, P, Lee, DS, Park, J, et al., 2015. Passive Facebook usage undermines affective well-being: experimental and longitudinal evidence. J. Exp. Psychol. Gen. 144, 480–488.
Verduyn, P, Ybarra, O, Résibois, M, et al., 2007. Do social network sites enhance or undermine subjective well-being? A critical review. Soc. Issues Policy Rev. 11, 274–302.
von Glischinski, M, Teismann, T, Prinz, S, et al., 2016. Depressive symptom inventory suicidality subscale: optimal cut points for clinical and non-clinical samples. Clin. Psychol. Psychother. 23, 543–549.