**Title:**

Can Social Interactions on Facebook Substitute for In-Person Social Contact? An Examination of Risk for Psychiatric Disorders and Suicidality in Military Veterans

**Abstract:**

Background: Social isolation is closely associated with negative mental health outcomes, but the influence of social contact on online (social media) vs. offline (in-person) is unclear.

Methods: Military veterans who served after September 2001 and responded to an ad on Facebook completed an anonymous online survey (n=587). Predictor variables were frequency of social contact occurring in-person and on Facebook. Outcome variables were reliable and valid screening tools for major depression (PHQ-2), PTSD (PC-PTSD), alcohol use disorder (AUDIT-C), and suicidality (DSI-SS). Multivariate regression models adjusted for

Results: Frequent social contact on Facebook was not correlated with lack of in-person social contact, nor was it associated with screening positive for any psychiatric disorders or suicidality. In contrast, lack of in-person social contact was correlated with increased risk of screening positive for major depression, PTSD, and alcohol use disorder, above and beyond the effect of social contact on Facebook.

Conclusions: Among recent military veterans in the United States*,* lack of in-person social contact may indicate increased risk for psychiatric disorders, a risk that may not attenuated by obtaining social interactions online.

**Possible Journals**: Psychiatric Services; JMIR

**Word count:** 176 (abstract); 1,837 (body)

**Introduction**

While an extensive literature has established the benefits of social relationships for depression prevention and other aspects of psychological well-being, this has largely been derived from examination offline social networks and from research that sometimes assumes social contact is occurring face-to-face1–3. In today’s world, though, communication with friends and family online and through social media is part of daily life. The average time a user spends on Facebook is about 50 minutes a day, almost as much time as people spend eating and drinking4. Given this modern reality, many are interested in how social contact mediated through online technologies—also referred to as computer-mediated communication—impacts our well-being and mental health.

Promoting the mental health of military veterans is an area of priority in the United States. Military veterans such as those who have served since September 2001, hereafter Iraq and Afghanistan era veterans, have high elevated rates of depression, PTSD, suicidal ideation, and – most tragically – suicide5–7.

In our previous research, we showed that as in-person social contact became more frequent, the risk of developing depression two years later declined in a dose-dependent fashion. In contrast, increasing amounts of contact via phone, writing, or email did not suggest such a protective effect against depressive symptoms8. However, it is unclear whether these findings differ when considering interactions on social media. In addition, researchers are interested in whether a relationship on social media might substitute for one in a person’s offline life. Evidence of this notion, called network substitution, would help support the validity of social media-based interventions9.

In this paper, we aimed to address two research questions. First, do military veterans substitute social interactions on Facebook for in-person social contact? Second, is social contact on Facebook (vs. in-person) associated with screening positive for psychiatric disorders or suicidality in military veterans?

**Methods**

*Participants and Recruitment*

The target population for the survey was U.S. military veterans of the Operation Enduring Freedom-Operation Iraqi Freedom (OEF-OIF) service era (September 2001- present), hereafter referred to as Iraq and Afghanistan era veterans. To be eligible for the survey, individuals needed to be age 18 or older, and been on active duty in the U.S. Armed Forces after September 2001 but not presently. We excluded individuals who completed surveys in less than five minutes, had a duplicate or multiple survey responses, or incorrectly answered a military-related ‘insider knowledge’ question (to reduce chance of online survey mis-representation)10,11.

*Procedure*

Online survey participants were recruited using Facebook ads containing a call to action to participate in a health research study. 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”). 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.

*Measures*

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 Research12,13. 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.”

Psychiatric disorder screening tools:

To screen for mental health problems, we employed reliable and valid 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 screen14. 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 drinking15. For major depression, we used the Patient Health Questionnaire-2 (PHQ-2), a two-item scale on anhedonia and depressed mood in the previous two weeks. A score of two or higher on the PHQ-2 indicates a positive screen16. For suicidality, we used the Depressive Symptom Inventory Suicidality Subscale (DSI-SS), a four-item scale on suicidal ideation within the past two weeks17. A score of two or higher on the DSI-SS indicates a positive screen in a population-based sample18.

Covariates: Covariates and other variables used to describe the sample were taken from self-report survey items, including 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.

*Statistical analysis*

Any model specification/regression diagnostics done?

Unadjusted and adjusted regression models

Handling missing data: participants with missing covariates were excluded from that particular analysis?

Explain what variables were included in each regression model (i.e., each outcome was a separate model, in person and FB social contact variables were put in the model together, etc)

In adjusted models, we included number of social media platforms used, lifetime history of suicidal ideation, and lifetime history of suicide attempts as covariates.

As a sensitivity analysis, we substituted the frequency of Facebook social contact variable for frequency of visiting or using Facebook. The former variable is considered a more specific indication of active use of Facebook, while the latter can include any use of Facebook, including passive scrolling and reading of content on Facebook without two-way social interaction19,20.

**Results**

*Descriptive*

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, and were married or partnered. 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 just 40% (233/586) indicated at least daily in-person social contact with friends and family.

*Research Question 1: Do military veterans substitute social interactions on Facebook for in-person social contact?*

Of the 358 who had social contact *on Facebook* at least daily, 167 (47%) also had at least daily in-person social contact while 191 (53%) had in-person social contact less than daily, a non-significant difference (p=###). Of the 233 who had *in-person* social contact at least daily, 167 (72%) also had at least daily social contact on Facebook while 66 (28%) had social contact on Facebook less than daily, a significant difference (p=###).

*Research Question 2: Is social contact on Facebook (vs. in-person) associated with 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. Overall, there were no significant correlations between frequency of social contact on Facebook and screening positive for psychiatric disorders or suicidality. In contrast, in-person social contact was correlated with decreased risk of screening positive for major depression, PTSD, and alcohol use disorder.

**Major Depression.** In adjusted regression models, social contact on Facebook was not associated with screening positive on the PHQ-2. Having in-person social contact a few times a week (AOR=0.36, SE=.30, p=.001), once a day (AOR=0.43, SE=.39, p=.03), or several times a day (AOR=0.40, SE=.27, p=.001) was associated with decreased risk of screening positive for major depression, compared to contact every few weeks or less.

**PTSD.** In adjusted regression models, social contact on Facebook was not associated with PC-PTSD. Having in-person social contact a few times a week (AOR=0.44, SE=.28, p=.004), once a day (AOR=0.49, SE=.36, p=.04), or several times a day (AOR=0.38, SE=0.26, p<.001) was associated with decreased risk of screening positive for PTSD, compared to contact every few weeks or less.

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

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

**Sensitivity analysis**. Results were very similar when we used the alternate independent variable for frequency of social contact on Facebook. There were no differences in significant findings, except for the outcome of alcohol use disorder. In this instance, in-person social contact several times a day was associated with decreased risk of a positive screen on the AUDIT-C (AOR=0.58, SE=.25, p=.03), compared to contact every few weeks or less.

**Discussion**

*Key Findings*

The primary finding from this study is that social isolation, *specifically in the form of infrequent in-person social contact*, is consistently and strongly associated with higher rates of screening positive for psychiatric disorders among recent military veterans in the United States. In contrast, maintaining social contact via Facebook was neither associated with decreased nor increased risk for psychiatric problems. The value of this study lies in its head-to-head comparison of the influence of social contact occurring on social media vs. in-person.

We did not detect evidence of substituting one form of social contact for the other. That is, military veterans with daily in-person social contact were likely to maintain similarly frequent social contact on Facebook. And military veterans with frequent social contact on Facebook were not more likely to miss out on in-person social contact. Nonetheless, our data suggest that veterans more commonly socialize on social media than in-person.

We do note some key limitations of this study. 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 conceivable that active psychiatric problems induces social isolation, inasmuch 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 outcomes3,21,22. Although military veterans are a vital target population given the prevalence of mental health issues, our results may not generalize to other populations.

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 which are unlikely to be attenuated by trying to make up for social contact through interactions on Facebook. Given these results, we believe it is worth calling out the importance of devoting time to meeting up to socialize with friends and family to promoting mental health and well-being. Put simply, there is importance in maintaining good, old-fashioned face-to-face time with friends and family.

**References**

1. Cornwell, E. Y. & Waite, L. J. Social Disconnectedness, Perceived Isolation, and Health Among Older Adults. *J. Health Soc. Behav.* **50,** 31–48 (2009).

2. Kawachi, I. & Berkman, L. F. Social ties and mental health. *J. Urban Health Bull. N. Y. Acad. Med.* **78,** 458–467 (2001).

3. Berkman, L., Glass, T., Brissette, I. & Seeman, T. From social integration to health: Durkheim in the new millennium. *Soc. Sci. Med.* **51,** 843–57 (2000).

4. Stewart, J. Facebook Has 50 Minutes of Your Time Each Day. It Wants More. *The New York Times* (2016).

5. Ilgen, M. A. *et al.* Psychopathology, Iraq and Afghanistan service, and suicide among Veterans Health Administration patients. *J. Consult. Clin. Psychol.* **80,** 323–330 (2012).

6. Seal, K. *et al.* A randomized controlled trial of telephone motivational interviewing to enhance mental health treatment engagement in Iraq and Afghanistan veterans. *Gen. Hosp. Psychiatry* **34,** 450–9 (2012).

7. Reger, M. *et al.* 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,** 561–9 (2015).

8. Teo, A. R. *et al.* 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 (2015).

9. Coiera, E. Social networks, social media, and social diseases. *BMJ* **346,** f3007 (2013).

10. Pedersen, E. R. *et al.* Using facebook to recruit young adult veterans: online mental health research. *JMIR Res. Protoc.* **4,** e63 (2015).

11. Kramer, J. *et al.* Strategies to address participant misrepresentation for eligibility in Web-based research. *Int. J. Methods Psychiatr. Res.* **23,** 120–9 (2014).

12. Health and Retirement Study: Participant Lifestyle Questionnaire. (2010). Available at: http://hrsonline.isr.umich.edu/modules/meta/2010/core/qnaire/online/HRS2010\_SAQ\_Final.pdf. (Accessed: 29th November 2016)

13. Pew Research Center: Internet, Science & Technology. (2016).

14. Prins, A. *et al.* 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 (2016).

15. Bush, K., Kivlahan, D. R., McDonell, M. B., Fihn, S. D. & Bradley, K. A. 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 (1998).

16. Kroenke, K., Spitzer, R. L. & Williams, J. B. W. D. The Patient Health Questionnaire-2: Validity of a Two-Item Depression Screener. *Med. Care* **41,** 1284–1292 (2003).

17. Joiner, T. E., Pfaff, J. J. & Acres, J. G. 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 (2002).

18. von Glischinski, M., Teismann, T., Prinz, S., Gebauer, J. E. & Hirschfeld, G. Depressive Symptom Inventory Suicidality Subscale: Optimal Cut Points for Clinical and Non-Clinical Samples. *Clin. Psychol. Psychother.* **23,** 543–549 (2016).

19. Verduyn, P., Ybarra, O., Résibois, M., Jonides, J. & Kross, E. Do Social Network Sites Enhance or Undermine Subjective Well-Being? A Critical Review. *Soc. Issues Policy Rev.* **11,** 274–302 (2017).

20. Verduyn, P. *et al.* Passive Facebook usage undermines affective well-being: Experimental and longitudinal evidence. *J. Exp. Psychol. Gen.* **144,** 480–488 (2015).

21. Cohen, S. Social Relationships and Health. *Am. Psychol.* **59,** 676–684 (2004).

22. House, J. S., Landis, K. R. & Umberson, D. Social relationships and health. *Science* **241,** 540–545 (1988).

**Table 1: Descriptive Characteristics of All 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 |
| 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 Facebook1 |  |  |
| 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 Facebook2 | 0.7 | 1.0 |
| *Clinical Characteristics* | | |
| Positive depression screener3 | 164 | 27.9 |
| Positive PTSD screener4 | 267 | 45.5 |
| Positive alcohol use disorder screener5 | 243 | 41.4 |
| Positive suicidal ideation screener6 | 132 | 22.5 |

1. “Actively interact” defined as activities on Facebook “such as sharing, posting, commenting, or tagging.”
2. Median number was 0 with an interquartile range of 0 to 1.
3. PHQ-2 score ≥ 3
4. PC-PTSD-5 score ≥ 3
5. AUDIT-C score ≥ 4 (men) or ≥ 3 (women)
6. DSI-SS score ≥ 2

**TABLE 2:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 2. Multivariate Logistic Regression Models of Frequency of Facebook and In-Person Social Contact As Predictors of Psychopathology** | | | | | | | | | | | | |
|  | **Major depression** | | | **PTSD** | | | **Alcohol Misuse** | | | **Suicidality** | | |
| Type of Contact | OR | SE | *p* | OR | SE | *p* | OR | SE | *p* | OR | SE | *p* |
| In-person |  |  |  |  |  |  |  |  |  |  |  |  |
| Once a week | 0.79 | .31 | .46 | 0.65 | .34 | .19 | 1.17 | .33 | .64 | 0.80 | .34 | .51 |
| A few times a week | 0.36 | .30 | <.01 | 0.44 | .28 | <.01 | 0.71 | .27 | .21 | 0.65 | .32 | .18 |
| Once a day | 0.43 | .39 | .03 | 0.49 | .36 | .04 | 0.80 | .36 | .53 | 0.65 | .44 | .32 |
| Several times a day | 0.40 | .27 | <.01 | 0.38 | .26 | <.01 | 0.61 | .26 | .05 | 0.66 | .29 | .15 |
| Facebook |  |  |  |  |  |  |  |  |  |  |  |  |
| Once a week | 1.06 | .47 | .90 | 1.17 | .46 | .74 | 0.44 | .46 | .07 | 0.73 | .52 | .54 |
| A few times a week | 0.68 | .36 | .28 | 1.09 | .35 | .81 | 0.58 | .35 | .12 | 0.74 | .38 | .43 |
| Once a day | 0.93 | .37 | .84 | 1.17 | .37 | .67 | 0.53 | .37 | .09 | 0.63 | .41 | .26 |
| Several times a day | 0.81 | .32 | .51 | 0.72 | .32 | .30 | 0.79 | .32 | .47 | 0.57 | .36 | .11 |

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

All odds ratios are comparisons to the reference frequency of “every few weeks or less often”.