**Title:**

Can Social Interactions on Facebook Substitute for In-Person Social Contact? An Examination of Risk for Mental Health Problems in Military Veterans

**Possible Journals**: JAMIA (Brief Communications, <2,000 words in body, 150 word abstract), JMIR, PLOS Medicine; Psychiatric Services

**Authors:**

Alan R. Teo, M.D., M.S.

Benjamin Chan, M.S.

Christina Nicolaidis, M.D., M.P.H.

**Word count:** 146 (abstract); 1,782 (body)

**Acknowledgements:** The authors express appreciation to Samuel Liebow for assistance with data preparation. [USUAL VA DISCLAIMER]

**Abstract:**

Social isolation is closely associated with negative mental health outcomes, but the influence of social interaction online (social media) vs. offline (in-person) is unclear. We analyzed results from an anonymous online survey (n=587) completed by military veterans who served after September 2001. Predictor variables were frequency of social contact occurring in-person and on Facebook. Outcome variables were reliable and valid screening tools for major depression, PTSD, alcohol use disorder, and suicidality. We found that individuals with frequent social interaction on Facebook did not substitute social media for in-person social contact. While frequency of in-person social contact was associated with decreased risk of major depression and PTSD, there were no associations between social interaction on Facebook and mental health outcomes. This suggests thatlack of in-person social contact may indicate increased risk for psychiatric disorders, a risk that may not attenuated by socializing with friends on Facebook.

**Introduction**

Decades of literature has established the benefits of social relationships for multiple aspects of psychological well-being and mental health1–6. Much of this research has implicitly presumed social interactions occur face-to-face and offline, or not closely examined the mode of social interaction among social network members. In today’s world, though, communication with friends and family online—and particulary 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 drinking7. 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.

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 fashion8. In contrast, increasing amounts of contact via phone, writing, or email did not suggest such a protective effect against depressive symptoms. However, 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 problems9–11 and others concluding a positive impact12–14.

Additionally, other mental health outcomes besides depression warrant investigation. Among military veterans in the United States, for instance, rates of not only depression but also PTSD, substance use disorders, and suicidal ideation and suicide are high15–18. Finally, researchers are also 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 interventions19.

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 or 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), also 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 misrepresentation)20,21.

*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*

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 Research22,23. 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.”

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 screen24. 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 drinking25. 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 screen26. For suicidality, we used the Depressive Symptom Inventory Suicidality Subscale (DSI-SS), a four-item scale on suicidal ideation within the past two weeks27. A score of two or higher on the DSI-SS indicates a positive screen in a population-based sample28.

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*

The association between positive screening for psychiatric disorder and frequency of social contact was modeled using logistic regression. Eight models were estimated, one for each psychiatric disorder and each social contact measure. The categorical social contact measures were modeled as a set of 4 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. Adjusted odds ratios were calculated from the models to compare the odds of screening positive for each level of social contact versus the “every few weeks or less often” level. Subjects were excluded from model estimation when missing covariate values in survey responses.

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 interaction11,29.

**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?*

Five hundred, eighty-six participants had valid responses for frequency of Facebook and in-person social contact. Among these, 167 (28%) had at least daily social contact both on Facebook and in-person, while 162 (28%) had less than daily social contact both on Facebook and in-person; 191 (33%) had at least daily social contact on Facebook but less than daily in-person social contact, and 66 (11%) had at least daily in-person social contact but less than daily Facebook social contact. In other words, social contact occurred with similar frequencies using both modes for 56%, while social contact was more frequent using either but not both modes for 44%. This association was highly significant (p<0.001).

*Research Question 2: Is social contact on Facebook or 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 for major depression 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 on the PHQ-2, compared to contact every few weeks or less.

**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=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 on the PC-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 regular *in-person* social interaction is associated with lower rates of screening positive for major depression and PTSD among recent military veterans in the United States. In contrast, maintaining social contact *via Facebook* was not associated with decreased risk for psychiatric problems (nor increased risk, for that matter). Social contact with friends and family had to occur *at least a few times a week* for a clear association to emerge, but when it did, we consistently observed a 50% to 60% or more reduction in odds for depression and PTSD compared to the most socially isolated individuals. 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 induce 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 outcomes3,5,30. Our analyses are based on a convenience sample of Facebook users who responded to Facebook ads and may not be representative. Although military veterans are a vital target population given the prevalence of mental health issues, our results require corroboration in other populations. Future research could extend the work presented here by collecting objective measures of interactions on social media31 and examining 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, despite the temptation from social media and other newer technologies, there is importance in devoting time and energy to maintaining good, old-fashioned face-to-face time with friends and family.

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**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 |  |  |  |  |  |  |  |  |  |  |  |  |
| Every few weeks or less often | 1.00 | — | — | 1.00 | — | — | 1.00 | — | — | 1.00 | — | — |
| Once a week | .79 | .31 | .46 | 0.65 | .34 | .19 | 1.17 | .33 | .64 | .80 | .34 | .51 |
| A few times a week | .36 | .30 | <.01 | 0.44 | .28 | <.01 | .71 | .27 | .21 | .65 | .32 | .18 |
| Once a day | .43 | .39 | .03 | 0.49 | .36 | .04 | .80 | .36 | .53 | .65 | .44 | .32 |
| Several times a day | .40 | .27 | <.01 | 0.38 | .26 | <.01 | .61 | .26 | .05 | .66 | .29 | .15 |
| Facebook |  |  |  |  |  |  |  |  |  |  |  |  |
| Every few weeks or less often | 1.00 | — | — | 1.00 | — | — | 1.00 | — | — | 1.00 | — | — |
| Once a week | 1.06 | .47 | .90 | 1.17 | .46 | .74 | .44 | .46 | .07 | .73 | .52 | .54 |
| A few times a week | .68 | .36 | .28 | 1.09 | .35 | .81 | .58 | .35 | .12 | .74 | .38 | .43 |
| Once a day | .93 | .37 | .84 | 1.17 | .37 | .67 | .53 | .37 | .09 | .63 | .41 | .26 |
| Several times a day | .81 | .32 | .51 | .72 | .32 | .30 | .79 | .32 | .47 | .57 | .36 | .11 |

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