Oregon Health & Science University
RESEARCH PROTOCOL

Protocol Title: Using Social Media to Engage Veterans in Health Care

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Objectives

Young military veterans from the Iraq and Afghanistan combat era are a vulnerable population with a number of critical support and health care needs. In the transition from military to civilian life, they face loss of a military identity, frequent psychosocial stressors, and difficulty developing new social support systems. With concomitant low levels of engagement in traditional health services, these transitions place them at heightened risk for developing mental health problems, and even suicide.

Researchers have long known that social support is a key predictor of mental health outcomes. The majority of the U.S. young adult population use social media for social interaction; Facebook is the most popular and also a common venue for emotional support. Despite the promise around social media for widespread reach and support of vulnerable veterans, major knowledge gaps critical to intervention development remain. How do veterans typically use social media? How do their social interactions on Facebook compare to their offline interactions? How can we reliably measure social support provided through social media? And what are veterans' needs and interests regarding engagement in mental health treatment via Facebook or other social media?

The overall objective of this study is to determine the feasibility of using Facebook for identifying military veterans at risk for psychiatric problems, then determine the appropriateness of multiple social media platforms for engaging, supporting, and assisting these at-risk veterans. In this mixed methods study, we propose the following aims:

Aim 1a: Determine the feasibility of reaching recently deployed military veterans through Facebook advertising. We will use Facebook ads to recruit 1000 self-reported veterans who have been deployed to Iraq or Afghanistan to participate in a national online survey. Ad recruitment metrics and level of social media use will determine feasibility of identifying and engaging veterans.

Aim 1b: Among those veterans reached via Facebook, quantify the extent to which they are at-risk for psychiatric problems. The online survey will assess suicidal ideation and behaviors, symptoms of depression, PTSD and alcohol misuse, health service use, and use of a variety of social media platforms. We will also determine associations between these psychiatric risk factors and level of social support among social media users, providing data for sample size determination for a subsequent study.

Aim 2: To prepare for intervention development, characterize recently deployed veterans' preferences around social media use and presence of social support in their interactions on social media. Using a rigorous qualitative methodology, we will conduct individual semi-structured interviews of 30 veterans in Oregon. We will also collect objective ratings of their social interactions of Facebook. These complementary data sources will give a robust understanding of their social media use, as well as the appropriateness of Facebook vs. other social media sites as a platform for outreach, for strengthening social support, and for minimizing mental health symptoms.

Aim 3: Determine whether social support received via social media is associated with reduced psychiatric symptoms. Using text data (e.g. Facebook messages, posts, and comments) collected from

the veterans in Aim 2, we will manually code text for presence of social support. We will then examine correlation of Facebook social support with symptoms of major depression.

Aim 4: Develop a natural language processing model to accurately identify presence of social support in Facebook posts. Using the text data obtained in Aim 3, we will develop a natural language processing model to automatically detect, quantify, and categorize social support in veterans' Facebook posts. The model will be trained to obtain 80% agreement, compared with gold standard manual coding.

Background and Significance

Why focus on recently deployed military veterans?

With U.S. combat involvement in Afghanistan and Iraq now longer than in any previous American war, we face a dire need to support a large, vulnerable population of military veterans. These young veterans often struggle with the transition from military to civilian life, citing the loss of a military identity and difficulty developing new social support systems in the civilian world after having spent long or multiple deployments in a warzone (1). Common psychosocial stressors, including relationship conflicts and difficulty finding steady, meaningful work, compound problems. This young population—nearly two million nationally and 35,000 in Oregon (2,3)—is at heightened risk for developing a variety of chronic mental health problems such as posttraumatic stress disorder (PTSD)(4,5) and, even more tragically, suicide (6).

Why a social media approach?

Social support from one's social network is a critical protective factor against deleterious mental health outcomes. Social support is multidimensional and can include emotional (e.g., expressions of caring), informational (e.g., direct suggestions or information on treatment options), and appraisal (e.g., offering feedback that empowers one to make a decision) help (7). Social support buffers against a variety of mental and physical illnesses (8), and when it is lacking, a host of problems—depression, posttraumatic stress disorder, substance use disorders, and suicide—can ensue (9–16). Observational studies and randomized control trials have demonstrated that both giving and receiving social support offers substantial health benefits (17–19). Even modest amounts of support can have major impacts, as shown in randomized control trials that have shown significant reductions in suicidal behaviors (20,21).

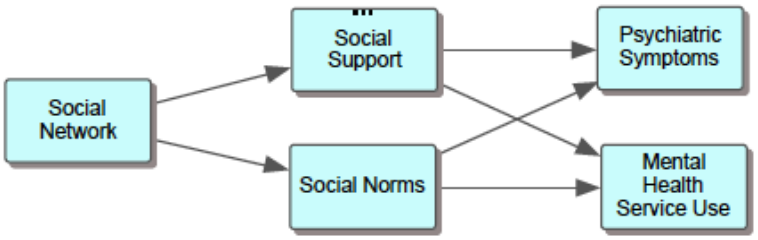
Social media sites are likely to be a key platform for social interaction, and for giving and receiving social support. (In this proposal, we use "social media" to refer to sites such as Facebook (social network), Tumblr (blog), and Yik Yak (anonymous text posting) that focus on the creation, sharing, and exchange of information in online communities and networks (22). Please note, however, that Facebook is the only social media platform that will be used to recruit participants for this study. Young adults use social media to maintain contact with core social contacts (23), display and reference their own symptoms of depression, and receive support from friends (24). Suicidal individuals spend significant amounts of time on social media sites (25). If social media is used well, it may be able to promote positive mental health outcomes, including self-esteem (26), social support (27,28), treatment engagement (29), and less loneliness (30) and depression (31).

Facebook is the best social media platform to recruit and engage participants and obtain data broadly generalizable to young adults. First, Facebook use among young adults continues to steadily increase each year; the most recent data from 2014 show 87% of online adults age 18 to 29 use Facebook (32). Second, Facebook is particularly useful for recruiting hard-to-reach populations, such as those interested in PTSD treatment and stigmatized sexual minorities, while also generating samples that are more representative and generalizable than competing sampling methods (33,34). Third, social media users are more actively engaged in Facebook than any other social media platform, with 70%

using it daily (32). Fourth, the majority of social media users use multiple social media sites, but when they use only one, it is almost always Facebook (32); this fact allows data to be gathered about multiple social media sites from Facebook users.

In our conceptual model (see Figure 1), we hypothesize that an individual's social network accessed via social media provides a platform from which social support can be harnessed and social norms transmitted. (Social norms, which operate via peer pressure or even simple observation of what others typically do, think, and say, have surprisingly potent and wide-ranging health effects, from heightening pain tolerance (35) to influencing willingness to seek mental health treatment (36)). These two factors then influence the individual's presence of common psychiatric symptoms and use of mental health services. Our model is adapted from Berkman and colleagues' model for social network influences on health and Andersen's model of health service use (37,38).

Figure: Conceptual Model for Influence of Facebook on Mental Health



Where to begin and what data to gather?

Little is known about the healthcare needs of the many veterans outside the Veterans Health Administration (VA) and how effectively they can be reached for psychiatric research via Facebook. Approximately 40% of Iraq and Afghanistan veterans have never accessed VA health services (2), and 78% of veterans who die by suicide do not either (39). Even if they do use the VA, engagement among Iraq and Afghanistan era veterans is low for traditional health services, especially mental health (40, 41). Two studies on alcohol misuse and PTSD symptoms have recruited young veterans from Facebook advertisements (33, 42), but little data exist on cost and efficiency. In this study, we will extend the reach of recruitment and potential mental health treatment beyond the confines of the VA, and determine the feasibility of identifying veterans via Facebook (Aim 1a).

It is unclear how military veterans typically use social media. We identified only one survey study conducted in 2013 that included just 59 veterans (43). Even studies of non-veterans tend to lack information on the user experience necessary for intervention development (44), and do not quantify social interactions with friends, family, and natural social networks on social media (45). By determining veterans' use and habits on Facebook using mixed quantitative and qualitative methods (Aim 1b and Aim 2), we will obtain data to support feasibility and appropriateness, two critical outcomes that should be evaluated in early stages of intervention development (46).

Although Facebook may influence mental health (26, 47–49), **strong empirically-tested conceptual models for how this may occur are lacking.** Our conceptual model (above) draws from the extant social support and social network literature, which has almost always presumed that social interactions occur face-to-face (50, 51). However, it is unknown whether and how these proposed mechanisms operate on social media (45). By interviewing veterans, objectively rating their social interactions on Facebook, and quantifying associations with mental health symptoms in this study (Aim 1b, Aim 2, and Aim 3), we will obtain empirical data to refine our conceptual model.

Study Design
This is a mixed methods study that will combine quantitative data from a national online cross-sectional survey of 1000 Iraq and Afghanistan veterans (Aims 1a and 1b), with qualitative interview data and objective text analysis of social media posts in a subsample of 30 survey respondents from Oregon (Aim 2). Furthermore, this project will develop novel methods to efficiently mine textual data from Facebook and precisely characterize users' social support (Aims 3 and 4). Together, these data will help describe and identify individuals at-risk for mental health problems, and assess the feasibility and appropriateness of a scalable social media-based intervention to engage and treat them.

Study Population
Number of Subjects: The enrolled sample will consist of 1000 veterans from Operation Enduring Freedom, Operation Iraqi Freedom, or Operation New Dawn (hereafter, OEF-OIF-OND, or simply Iraq and Afghanistan veterans).

Inclusion and Exclusion Criteria: The sole inclusion criterion for Aim 1 is 1) being a U.S. military veteran age 18 and over from the OEF-OIF-OND era. Additional inclusion criteria only for Aim 2 are: 2) being a Facebook user; 3) resident of the Portland metropolitan area; and 4) must speak English as a primary language. The exclusion criteria for Aim 1 are 1) providing survey responses which are illogical, nonsensical, or otherwise indicative of likely misrepresentation, or 2) providing survey responses associated with metadata indicative of likely misrepresentation or multiple survey completion. The one additional exclusion criterion for Aim 2 is 3) regular use of a language other than English in social media communications.

Vulnerable Populations: Children and neonates will be excluded from this study. Decisionally impaired adults, pregnant women, and prisoners may be incidentally included in the online survey; however, the study will not specifically collect information about subjects' status as a member of a vulnerable population.

Setting
The first part of the study (Aim 1a and Aim 1b) is an online survey reliant on online recruitment; therefore no use of facilities is required. Recruitment for the second part of the study (Aim 2) will be conducted over the phone, via mailed letter, or via email, and interviews will be conducted at Oregon Health & Science University. Data analysis will be performed at OHSU.

Recruitment Methods
An overview to the various stages of recruitment and enrollment into this study is provide in Figure 2 below.

To recruit participants for Aim 1a and 1b (N=1000), we will place Facebook advertisements inviting military veterans to participate in a research study about Facebook and their health. We will allow up to two months for recruitment but anticipate it to take no more than one month, given that two prior studies using Facebook ads have recruited 600 veterans over 46 days (33) and 1,000 veterans over 24 days (42).

We will solicit input from the Veteran Engagement Group created by our local research center and OHSU social media staff to help develop the Facebook ads, create multiple iterations, and monitor the effectiveness of each ad variation. Our recruitment methods draw on principles of community-based participatory research (CBPR). The use of CBPR approaches has grown dramatically in recent years. Importantly, CBPR offers significant advantages in terms of engaging groups that are under-represented

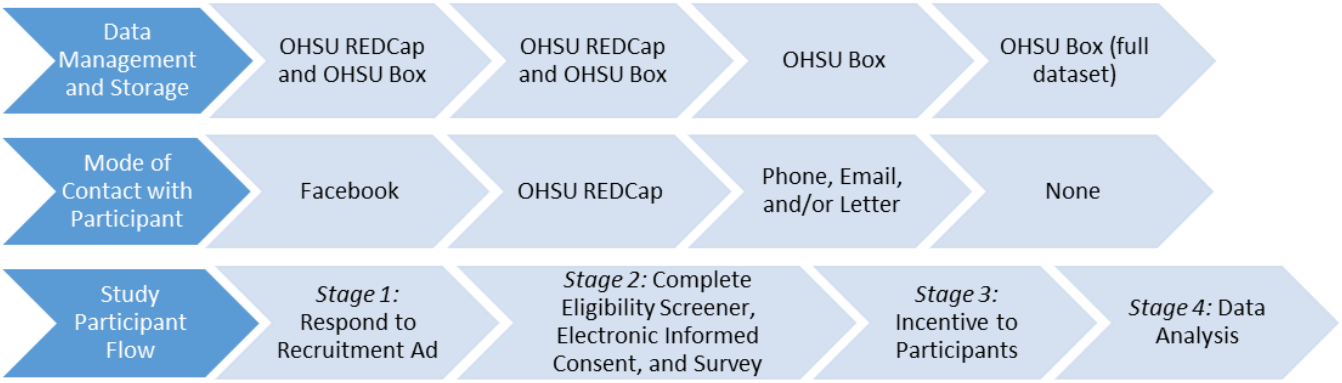
in medical research, including low-income, minority, rural, and other traditionally disadvantaged community members (59). As a consequence of veteran input being part of the research project itself, we cannot provide final ad versions at this stage. However, we can provide representative ads, which include the possible images and text that may be used in our ads. See "Facebook Ads" included with this submission).

Facebook provides advertisers with options to help target who receives ads, based on information that users provide to Facebook, such as date of birth, location, and gender. Facebook also allows advanced targeting features based on interests and activities, which can be identified by Facebook based on what people share on their Timelines, what apps they use, and pages they "Like."

Advertisers (in this case, our research project team) do not have access to any personally identifiable information or protected health information. In fact, advertisers have no access to any individual-level information, which is instead maintained solely by Facebook.

For this study, we will select for our ads to target men and women, ages 18 and over, who reside in the U.S. We will oversample women and those in the Portland metropolitan area. We will include targeting of ads to Facebook users with interests related to military veterans (e.g., those who post status updates with the keyword "veteran" or "Army," and those who "Like" veteran-related pages, events and activities). All ads will meet Facebook's advertising size and word specifications and be reviewed and approved by the Facebook advertisement team prior to placement.

Figure 2



Clicking on the advertisements will redirect the user to OHSU REDCap, a secure, web-based platform for online surveys and data management used at OHSU. Potential subjects will log into REDCap, where they will be directed to an online survey. The survey will first present a consent information sheet and mental health resources. Subjects will click on a box to indicate consent to the study (i.e., in lieu of written informed consent). Subjects will then complete a brief eligibility screener to assess the inclusion/exclusion criteria outlined above. Eligible subjects will then have the option to proceed to the full study survey. To allow for participation in the in-person interview (i.e., Aim 2) and potential for longitudinal data collection in a future study, we will collect name and contact information (i.e., mailing address, email address, phone number) of interested subjects; survey respondents who are not interested in participating in the in-person interview and decline to be included in the sweepstakes are not required to submit their name or contact information.

Next, to recruit subjects for the in-person study visit, a research staff member will contact potentially interested subjects (up to three contact attempts over three weeks) to arrange the study visit at OHSU. Contact methods may include email, telephone, and/or postal mail as preferred by the subject. These subjects will be purposefully sampled (N=30) based on mental health symptom burden and health service use, an approach that can ensure diverse representation in our sample (60).

Aims 3 and 4 will not require any additional subject recruitment, as all analyses will be based on data collected for the Aim 2 portion of the study.

Subject Compensation
We will use incentives and have opted for a sweepstakes (i.e., raffle or lottery) as survey research indicates this approach increases participation rate more than other methods and reduces misrepresentation on self-report measures (42,60). Each eligible subject who completes the online survey (defined as answering the last survey item) will be entered into a sweepstakes. Each subject will have an equal chance of receiving a sweepstakes prize. Two subjects will be selected at random and will receive a tablet-style electronic device with an approximate value of $400. The total value of sweepstakes incentives is approximately $800. Each subject completing the in-person interview will also receive a $30 gift card. Compensation will not be pro-rated for partial study completion. The amount and terms of payment are outlined in the consent forms.

Consent Process
Aims 1a and 1b: The consent process for Aims 1a and 1b will occur electronically using OHSU REDCap. Potential subjects who click on a Facebook advertisement for the study will be redirected to the study information sheet. The subject will click on a box to indicate consent to the study. Documentation of electronic consent will be captured and stored in the REDCap database.

Aim 2: On the day of the in-person interview, the study will be described in detail, and subjects will be provided a current version of the OHSU Institutional Review Board-approved consent form to review. The purpose of the study, procedures, risks, benefits, and alternatives will be discussed. Subjects will be informed that participation in the study repository is optional. Subjects will be given adequate time to ask questions prior to signing. No study procedures will occur prior to obtaining signed consent from the subject. The study staff will collect and store the signed consent forms in the research records, and the subjects will receive a copy. Documentation of the consent process will be maintained in the research record.

Procedures

Pilot Testing – Aim 1a

In order to ensure that the online survey instrument for Aim 1a is clear and usable, we will conduct pilot testing with four to eight veteran volunteers. Pilot testers will include members from a Veteran Steering Committee for an established research protocol (VA-IRB #3675, PI: Carlson) and may also include members of the Veteran Engagement Group. Pilot testers will take the survey with study personnel present, and then we will perform cognitive interviewing using a combination of "think-aloud" and verbal probing techniques. For the former, the pilot tester is asked to "Tell me what you are thinking" as they complete each survey question. For the latter, we may ask the pilot tester, "How did you arrive at that answer?" No actual interview guide will be used. Survey responses and written notes based on comments from pilot testers will be recorded, and used to finalize the survey. The process will take about an hour for each tester, and each tester will receive a $20 gift card as compensation for their time.

Study Procedures – Aims 1a and 1b
Potential study subjects will click on a Facebook ad and will be redirected to OHSU REDCap. The initial REDCap screen will present the study information sheet and mental health resources. If interested, potential study subjects will click on a box to indicate consent for the study, which includes

inclusion of survey responses in a repository. Participants will then redirected to an eligibility screening survey (see "Section 2. General Background" of REDCap Survey V4.9 included with this submission). Completion of the screening survey will take approximately 2 minutes. Eligible subjects will then be redirected to a second survey. Completion of this survey will take approximately 10-20 minutes. The scope of each survey is presented in the "Measures and Data Collection" section of this protocol. Coded survey responses will be included in a repository at study close (see "Data and Specimen Banking"). Upon completion of the second survey, subjects will have the option to provide their name and contact information for participation in the in-person study visit (Aim 2). All subjects will be entered to win a sweepstakes prize at the completion of the second survey.

Study Procedures – Aims 2, 3 and 4

A research staff member will contact potentially interested subjects to arrange a study visit at OHSU. IRB-approved study personnel will have a full discussion with the potential subject, including information about the interview questions, use of Facebook content, and will answer any questions at this time. Subjects will have the option of including their data in a repository at study close (see "Data Specimen Banking"). Subjects will sign an OHSU IRB-approved consent and authorization form and will be provided with a copy for their records. Completion of the in-person interview will take approximately 90 minutes and will be audio recorded for analysis. Subjects' Facebook data will be downloaded from OHSU computers for analysis. All subjects will receive a $30 gift card upon completion of the in-person interview.

Withdrawal Procedures

Subjects will be withdrawn from the study in the event of any of the following: 1) subject withdraws consent; 2) any other reason that, in the opinion of the Investigator, would justify removing the subject from the study. There are no pre-defined stopping rules for termination of the study.

Measures and Data Collection

Aim 1a and 1b: The main variables are summarized in Table 1 and will be gathered from two sources: Facebook advertisement data and online survey measures. To help ensure self-report of being a military service member, we will incorporate multiple measures that have been shown to reduce misrepresentation, such as "insider knowledge" questions (42,61). All Facebook ad statistics (e.g., ad clicks, cost) are objective data, readily gathered through Facebook's advertising program (62). Measures of social support (63) and psychiatric symptoms (i.e., PTSD, depression, alcohol misuse, and suicidal ideation)(64–68) are based on reliable and valid self-report tools, which are also consistent with current clinical practice.

Table 1	
Variable	**Specific Measures and Instruments**
Feasibility of recruitment via Facebook advertisement	• Number of advertisement clicks • Number (and %) of individuals reaching survey • Number of individuals who complete survey • Cost per completed participant
Online social media use	• Validated survey items on which social media sites used and frequency and amount of use, developed by the Pew Research Center • Items on reasons for social media use and style of use (posting vs. "lurking")
Social support	• NIH Toolbox Adult Social Relationship Emotional Support Scale (63) • NIH Toolbox Adult Social Relationship Instrumental Support Scale (63)
Mental health service utilization	• Validated survey items on mental health services use in the past year, adapted from the CDC's National Health and Nutrition Examination Survey to assess VA and non-VA use • Validated survey items on psychotropic medication use
PTSD	• Primary Care PTSD Screen (64)
Major depression	• Patient Health Questionnaire (PHQ-9) (65)
Alcohol use disorder	• Alcohol Use Disorders Identification Test (AUDIT-C) (66)
Suicidal ideation	• Suicidality Subscale of the Depressive Symptom Inventory (DSI-SS) (67,68)

Aim 2: Two complementary approaches to data collection have been chosen to generate both granular and objective data. The first approach will entail a digitally recorded, semi-structured qualitative interview with the research subject lasting up to 90 minutes, similar to how we have previously gathered sensitive information from Iraq and Afghanistan veterans (1). Interview questions will address and probe the topics described in Table 2, which will address not only Facebook but all social media platforms. The second data collection approach, for participants who are Facebook users, will be a download of their objective Facebook data and then coding of their social interactions (described in "4. Data Analysis"). This file can be readily downloaded and includes Timeline information and the "Activity Log," a reverse chronological list of one's posts, activity, and interactions with social network members (69).

Table 2	
Interview Domain	**Sample Interview Questions**
Social Media Use and Preferences	• What social media sites do you use? *Probes*: Facebook? Instagram? Twitter? Snapchat? YouTube? Pinterest? Tumblr? Google+? YikYak? • Tell me how you typically use [social media]. How about other [social media]? • Can you give me an example of when you post or comment or like something on [social media]? • Why do you *enjoy* about [social media A] as compared with [social media B]? How about what is *useful*?
Online Social Interactions	• Can you tell me about a time when you gave or got support from a friend on [social media]? • How do you feel when you are on [social media]? *Probes*: How about before and after you use it?
Offline Social Interactions	• What people do you interact with offline? *Probes*: Are they different from your friends on [social media]? • How are your interactions with people offline compared with your interactions on [social media]?
Social Norms	• How do you think most people you know use [social media]? • What do think most people you know share vs. keep private about themselves on [social media]?
Appropriateness of Social Media for an Intervention	• How do you feel about [social media] as a place to get information about mental health care? How about information about suicide prevention? • How do you feel about discussing your emotions, stress, or other mental health issues on [social media]? *Probes*: Would you discuss on [social media] with friends? How about with a counselor? • How do you feel about getting help from a counselor to build your social connections on [social media] in order to promote your mental health? *Probes*: Would you join or follow a group on Facebook? Does it matter if it is a "private" group? Does it matter if the social media platform is anonymous?

Aim 3 and 4: No additional data collection or measures beyond those already contained in Aims 1 and 2 are necessary to conduct these study aims.

Handling of Data

All data will be assigned a unique subject code as described in the "Privacy, Confidentiality and Data Security" and "Risks to Subjects" sections in this protocol. The key to the code will be limited only to IRB-approved study personnel. Unique identifiers will be assigned at the time of electronic consent and kept consistent for the duration of the study.

The key to the code and any data containing PHI will be stored at OHSU.box.com. Box is a cloud storage option with added protections in place for OHSU confidential and restricted data or protected health information. OHSU and Box have entered into a Business Associate Agreement that meets all policy compliance requirements. Data stored on OHSU.box.com will be transferred to a repository at study closure (see "Data and Specimen Banking).

Information will be stored in a password-protected database. Access to the database will be limited to IRB-approved study staff. The data will be stored in a REDCap database on an OHSU ITG supported shared network drive with password protection and firewalls. REDCap is a secure, customizable, web-based application for building and managing databases (see https://octri.ohsu.edu/redcap/index/php). REDCap resides on a server housed in ITG's Advanced Computing Center (ACC). The servers are maintained by ITG Database Administrators and Systems Administrators in accordance with all relevant OHSU policies and guidelines. REDCap is hosted on ACC servers and maintained by developers in the Oregon Clinical and Translational Research Institute (OCTRI) in accordance with all relevant OHSU policies and guidelines. Additionally, ACC employs a second firewall within the OHSU network to attain a high level of security and access control. The ACC's architecture has been reviewed by the OHSU Office of Integrity, and undergoes periodic internal security audits.

All CRFs and pertinent data, correspondence, original or amended protocol, all reports and all other material relating to the study will be maintained securely in the Investigator's files according to HIPAA policy. If the PI retires, relocates, or for other reasons withdraws from the responsibility of keeping the study records, custody will be transferred to a person who will accept the responsibility. The IRB will be notified in writing of the name and address of the new custodian.

Sharing of Results with Subjects

Research data will not be shared with subjects or their providers. Subjects indicating symptoms of active suicidal ideation will be given acute treatment resources (e.g., Veterans Crisis Line) and we will facilitate locating local mental health treatment resources.

Data and Specimen Banking

Data from this study will be shared with the existing VA-IRB approved Center to Improve Veterans Involvement in Care (CIVIC) data repository (VA-IRB #3565, PI Dobscha). The CIVIC repository hosts a range of clinical datasets that are identifiable and de-identifiable from previous and existing research protocols and research data repositories. Data will be submitted to the CIVIC repository as described in the repository standard operating procedures.

All data coming into the repository will be electronic and will be stored in restricted access folders on the VA network that will follow the VA standard for encryption and password protection for research data. Data will be stored in electronic form in a locked folder on the VA network. This locked folder will be accessible only by the repository principal investigator and other IRB-approved research personnel. The data will be protected by VA encryption standard on all VA computers, including password protected computer logins and restricted access folders. The data will be stored indefinitely in this repository and may be used for future unspecified research.

Survey responses will automatically be included in the CIVIC data repository. Subjects participating in the in-person interview will indicate whether they wish to be included in the CIVIC data repository during the informed consent process. The transfer of data will occur at the time of study closure. Maintained variables will include general demographic data, data on diagnosis, treatment including treatment utilization, and mental, physical, and cognitive health variables (e.g., survey responses). Qualitative data in the form of transcripts will also be maintained.

1. Veteran Status:
   - Veteran status
   - Branch of military service
   - Era of active duty service
   - Whether deployed during OEF-OIF-OND
   - Pay grade at discharge
   - Name of discharge record

2. Background and Demographics
   - Race and/or ethnicity
   - Age
   - Gender
   - Highest level of education
   - Marital status

3. Online Social Media Use
   - Frequency of communicating with friends and family on Facebook and in person
   - Which social media sites used
   - Use of social media for health purposes
   - Frequency of use of language besides English on Facebook
   - Facebook Measure of Social Support

4. Intervention Interest
   - Interest in discussing various health topics with health care provider
   - Desired frequency, duration
   - Interest in discussing medical information through social media
   - Reasons for disinterest, if applicable

5. Health Service Utilization
   - Overall health
   - VA health care usage

6. Primary Care PTSD Screen (PC-PTSD-5)

7. Depression screen: PHQ-2

8. Alcohol abuse screen: AUDIT-C

9. Suicidality screen: Depressive Symptom Inventory – Suicidal Subscale (DSI-SS) and Suicidal Behavior History

10. Qualitative data
    - ☐ Full transcripts

Contact information will be maintained solely for the purposes of 1) tracking mental health, physical health, cognitive symptoms, and treatment data in the patient's electronic medical record; and 2) being able to contact the patient in the future for additional IRB-approved research participation:

- ☐ Name (first and last; REDCap survey collects only first name and last initial)
- ☐ Email address
- ☐ Phone number
- ☐ Birthdates
- ☐ Last four digits of social security numbers

Data Analysis

Aim 1a: After data cleaning to ensure reliable survey responses (42,61), we will conduct descriptive analyses on recruitment and participation rates. We will calculate per-participant enrollment and retention costs and compare efficiency of different Facebook ads using ANOVA and t-tests; for instance, we will compare ads that state the study is about "mental health" vs "suicide prevention" vs. "social support." Frequency of social media use will also contribute to assessment of feasibility for each social media platform.

Aim 1b: Our descriptive analyses will analyze frequency of suicidal ideation, suicidal behaviors, social support, health service utilization, and symptoms of probable PTSD, major depression, and alcohol misuse. We will construct multivariable regression models adjusting for potential confounders. Primary analyses will quantify associations between: a) social media use and social support; and b) social support and psychiatric symptoms, including suicidality. Power calculation for Aim 1b: Based on a sample size of 600, we estimate $\geq$ 99% power to detect a correlation coefficient of 0.5 (H_0: r = 0.3) between social support (NIH Toolbox Emotional Support Scale) and suicidal ideation (DSI-SS) or major depression (PHQ-9) using the Fisher z-score.

Aims 2 and 3: We will perform qualitative analyses of the interview transcripts and downloaded Facebook textual data using a grounded theory approach (70). First, a draft codebook will be developed based on the empirical literature on social support and adaption of codes from a study analyzing social support in a Facebook exercise intervention (71). Then, a senior study investigator will review a subset of 10% of the interviews and 10% of text from Facebook Timelines and Activity Logs, looking for evidence of draft codes, and generating inductive codes based on themes discovered in this initial review. Subsequently, two research assistants will double-code the entire set of interviews and Facebook data. The two coders will meet periodically (in approximately 20% data intervals) to iteratively modify the codebook. A senior study investigator will assist in adjudicating differences as needed. Downloaded Facebook data will also be quantitatively analyzed for number of supportive/unsupportive comments and number of "likes." All coding and qualitative analysis will be conducted using the software package ATLAS.ti.

Aim 4: Analysis for this aim will employ a text mining approach to develop a novel natural language processing model. Text mining software will be used to identify semantic characteristics specific to the psychological construct of social support. We will use statistical measures of association including association rules, correlation tests, co-occurrences and similarity indices to quantify accuracy of the model. The model is expected to employ predictive algorithms to classify text as containing evidence of social support.

Data Safety and Monitoring: The conduct of the study will be closely monitored by the principal investigator following GCP guidelines. The principal investigator is responsible to ensure protocol and regulatory compliance through proper monitoring of the investigation. The principal investigator is responsible for conducting the study in accordance with the investigational plan (protocol, IRB application, and other instructions) applicable laws, and any conditions of approval imposed by the reviewing IRB. The principal investigator must also accept responsibility for all aspects of the study, including the actions of any co-investigators participating in the study at the investigational sites.

As monitor, the principal investigator will perform periodic assessments of the following items:

1) Completion of required study documentation
2) Continued acceptability of the facilities
3) Adherence to the protocol
4) Adherence to applicable regulators regarding the obligations of the investigator and maintenance of records

Privacy, Confidentiality and Data Security
Subject confidentiality will be maintained in accordance with HIPAA regulations. The confidentiality of subjects will be protected in the following ways: subjects will be given a unique ID number (001, 002, 003, etc.) that will be used on all research records stored by the PI (source documents for the study will be fully identifiable); only IRB-approved study personnel will have access to the master list and key to the code containing names and codes; the electronic master list and key to the code will be stored on OHSU's Box away from all study data and limited to IRB-approved study personnel; any hard copy of the electronic master list and key to the code will be kept in a locked file away from all study data and limited to IRB-approved study personnel; access to study data will be limited to IRB-approved study personnel and those with regulatory oversight responsibilities; hard copies of data will be stored in locked file cabinets in locked rooms(s); electronic data will be password-protected and backed-up on the OHSU network behind the OHSU firewall; study procedures will be approved by the OHSU IRB; and all study staff will complete the required research ethics and HIPAA training. No study data will be stored on laptops unless they meet OHSU data security policies.

Risks to Subjects:
There is a potential risk of breach of confidentiality. This will be minimized by maintaining subject confidentially in accordance with HIPAA regulations as described in the "Privacy, Confidentiality and Data Security" section of this protocol. To guard against any breach of confidentiality (e.g., an external person accessing the survey or participants' responses), online questionnaires will be administered via a secure REDCap as described in the "Handing of Data" section of this protocol. Additionally, we will only analyze content posted by consented participants; any incidentally discovered content from non-consented individuals will be de-identified in order to protect anonymity of content about others present in the participants' Facebook data.

Due to the nature of the survey and in-person interview questions, there is a potential risk for emotional distress. Participants may refuse to answer any of the questions they do not wish to answer. If the questions make the participant upset, we will help them find appropriate outside help. To mitigate potential distress related to the study survey and interview measures, all participants will be given mental health referral resource information at the time of electronic consent. In addition, those indicating symptoms of active suicidal ideation will be given acute treatment resources (e.g., Veterans Crisis Line) and we will facilitate locating local mental health treatment resources.

Potential Benefits to Subjects:
The subjects will not derive benefit from this work directly.

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