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TITLE: The PTSD Practitioner Registry: An Innovative Tracking, Dissemination, and Support Tool for Providers in Military and Nonmilitary Settings

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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

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14. ABSTRACT
The PTSD Practitioner Exchange was an innovative research project for clinicians in three service sectors—the VA, DoD, and the community—which aims to disseminate the most recent clinically relevant information and resources supporting delivery of key practices endorsed in the VA-DoD Clinical Practice Guideline for the Management of PTSD; to support clinician well-being; and to identify factors enabling the implementation of clinical best practices in the treatment of PTSD. In order to provide this Exchange a two-phase study was conducted. In Phase I, qualitative interviews were conducted with 53 providers to assess practitioner needs and interests in the registry as well as pre-test the proposed registry survey. In Phase II, an RCT was conducted to evaluate the impact of registry participation on practices/CPG awareness, receptivity and implementation. To date, the study team has completed all phases of the study. Four manuscripts have been submitted for review at various journals and the PTSD Clinicians Exchange website has been transferred to the VA for final dissemination.

15. SUBJECT TERMS
PTSD, qualitative interviews, survey development, best practices, CPGs

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1. INTRODUCTION:

The delivery of best practice care for PTSD and other combat-related disorders is a compelling priority for clinicians working with active-duty Warriors and Veterans with Post Traumatic Stress Disorder (PTSD). The PTSD Practitioner Exchange was an innovative research project for clinicians in three service sectors—the VA, DoD, and the community—which aimed to disseminate the most recent clinically relevant information and resources supporting delivery of key practices endorsed in the VA-DoD Clinical Practice Guideline for the Management of PTSD; to support clinician well-being; and to identify factors enabling the implementation of clinical best practices in the treatment of PTSD. This clinician-informed online survey and portal connected providers with a wide array of resources and serve as a support mechanism for clinicians with the goal of increasing their knowledge of and receptivity to best practices, and ultimately improving the quality of care for Warriors and Veterans with PTSD as well as their families. It also provided a way of monitoring the levels of burnout among PTSD treatment providers, assessing perceptions of the local organizational climates for implementing practices, and tracking awareness and implementation of key practices within the Clinical Practice Guideline. Following completion of the RCT, a subset (N=60) of RCT completers were asked to participate in cognitive debriefing interviews. Participants were asked to comment on specific aspects of the registry that were most beneficial in overcoming barriers and implementing EBP's in everyday clinical practice, and on those aspects that were least useful or clinically relevant. Impact on practice-related stress and burnout was also be discussed. GOAL: Because our study showed benefit for improving familiarity with clinical best practices, we will be maintaining and expanding the PTSD Practitioner Registry as a novel mechanism for research and training of mental health practitioners across multiple practice settings.

2. KEYWORDS:

PTSD, trauma, Clinical Practice Guidelines (CPGs), best practices, qualitative interview, survey development

3. ACCOMPLISHMENTS: The PI is reminded that the recipient organization is required to obtain prior written approval from the awarding agency Grants Officer whenever there are significant changes in the project or its direction.

What were the major goals of the project?
List the major goals of the project as stated in the approved SOW. If the application listed milestones/target dates for important activities or phases of the project, identify these dates and show actual completion dates or the percentage of completion.

Goals up to December 2018: (all research sites contributed to completing all SOW tasks, which are listed below):

1) Obtain IRB approval from Stanford University; NERI; DoD; and VA Palo Alto Healthcare System (10/14-3/15) 100% complete on 06Jul2015: In order to streamline the study in the long-term, DoD requested an IRB deferral to Stanford IRB. This additional process shifted the timeline for Year 1 major tasks. Following this initial delay, all tasks proceeded as anticipated and the project remained on target to be completed as expected.
2) Develop and pre-test interview modules (10/14-11/14) 100% complete on March 2015.
3) Recruit providers for interview assessments (10/14-03/15) 100% complete as of 05Nov2015
4) Conduct provider interview assessments, n=60 (03/15-06/15) 100% complete on 05Nov2015. A total of 54 interviews were conducted.
5) Code, QC, and analyze interviews (03/15-06/15): 100% complete as of 27May2016
6) Prepare final descriptive report of needs assessment interviews (06/15-07/15): 100% complete as of 27May2016
7) Develop initial registry format (10/14-11/14) 100% completed June 2015.
8) VHA web host programmers provide specifications and guidance to web programmers and database programmers (10/14-11/14) 100% completed on 5Feb2015
9) Develop on-line materials to assess the feasibility and usability of the registry (5/15-6/15) 100% completed on 25Aug2015
10) Completion of on-line questions and pre-testing of PTSD Provider Survey (7/15-8/15) 100% completed in August 2015
11) Develop provider recruitment materials (7/15-11/15) 100% complete on 26Oct2015
12) Define and provide nonmonetary incentives for regular use of the registry (7/15-11/15) 100% complete on 26Feb2016. The team has determined how we can provide clinicians with resources that will allow clinicians in all sectors to receive CEUs, in addition to integrating badging, interactive resources, and feedback mechanisms into the site, all of which we believe will be incentives for return site use.
13) Program automatic e-mail reminders/interaction with providers (7/15-11/15) Content 100% complete on 28Mar2016. Email reminders have been finalized and will be sent out by VA study staff.
14) Finalize all provider content (9/15 – 11/15) 100% complete on 26Feb2016
15) Finalize all modifications to registry design (11/15): 100% complete on 25Apr2016. The registry website went live on 25Apr2016.

16) Program and test randomization system for RCT (3/16): 100% completed on 28Mar2016
17) Program Active Registry surveys (PTSD Provider Survey) and materials (9/15-11/15): 100% completed on 30Mar2016
18) Program Baseline Assessment Measures (9/15 – 11/15): 100% completed on 28Mar2016
19) Develop message for Email Only Controls (9/15 – 11/15): 100% completed on 21Mar2016
20) Develop provider recruitment materials (7/15 – 11/15) 100% complete on 17Feb2016 Protocol, ICFs and recruitment materials were developed by the study team for Phase II.
21) Recruit, screen and collect data on N = 600 providers in the RCT (11/15 – 11/17): Recruitment started 05Apr2016, 100% complete as of February 2017
22) Monitor participation rates; data collection and data quality (11/15 – 2/18): 100% complete. Follow-up was completed in March 2018.
23) Create and provide feedback materials and reports to registry participants (5/16 – 2/18): 100% Complete. Task started after randomization. Participants in both groups received regular email notifications, with the active group getting bi-weekly email notifications regarding features of the website plus a bi-monthly newsletter and the control group receiving only the bi-monthly newsletter. This task ended following the last waves Year 1 visit.
24) Create interim and final analytic data sets: The database was closed in March 2018. 100% complete as of 17Dec2018.
25) Cognitive debriefing of n=60 RCT Active Registry participants and n=20 Email Only Registry participants: 100% complete. In October 2016, it was determined by the project team that participants assigned to the active registry only would be asked to participant in cognitive debriefing interviews. The Phase II interviews are intended to evaluate the effectiveness and user receptivity of the website materials, therefore the email only participants that received the NCPTSD Trauma Update Newsletter would not be able to provide such feedback. Also, due to the time and resources needed to complete 60 interviews in Phase I the study team concluded that the 60 RCT Active Registry participants would provide the necessary information to update the website for long term use. A total of 56 interviews were conducted across the three service sectors and were completed in March 2018.
26) Analyze cognitive debriefing interviews: 100% complete. A final report analyzing the 56 qualitative interviews was completed in May 2018.
27) Transition study website to long-term hosting on VA server: 100% complete. The study website has been packaged and transferred to the VA web development team for long-term support. A public-facing version of the website was launched December 2018.
28) Author and co-author evaluation findings: 4 manuscripts have been developed and submitted to various journals: Main Results, Web Usage, Burnout and Secondary Traumatic Stress; 100% complete as of 31Dec2018

What was accomplished under these goals?

For this reporting period describe: 1) major activities; 2) specific objectives; 3) significant results or key outcomes, including major findings, developments, or conclusions (both positive and negative); and/or 4) other achievements. Include a discussion of stated goals not met. Description shall include pertinent data and graphs in sufficient detail to explain any significant results achieved. A succinct description of the methodology used shall be provided. As the project progresses to completion, the emphasis in reporting in this section should shift from reporting activities to reporting accomplishments.

IRB Approval:

- Stanford received IRB approval for v.2.1 of the protocol and Phase II regulatory documents (19Feb2016)
- NERI received IRB approval for v.2.1 of the protocol and Phase II regulatory documents (24Feb2016)
- WRAIR received commander approval for v.2.1 of the protocol and Phase II regulatory documents (21Mar2016)
- HRPO approval was provided for Stanford, NERI and WRAIR (25Feb2016, 04Mar2016, 04Mar2016)
- Stanford received IRB approval for v. 2.2 of the protocol and recruitment flyer (26Jul2016)
- NERI received IRB approval for v. 2.2 of the protocol and recruitment flyer (29Jul2016)
- WRAIR received commander approval for v. 2.2 of the protocol and recruitment flyer (15Aug2016)
- Stanford received IRB approval for v. 2.3 of the protocol and participant packets (28Mar2017)
- NERI received IRB approval for v. 2.3 of the protocol and participant packets (06Apr2017)
- WRAIR received commander approval for v. 2.3 of the protocol and participant packets (25Apr2017)
- HRPO continuing review approval was provided for Stanford, NERI and WRAIR (27Apr2017,03Apr2017, 13Apr2017, 01Mar2018).

Qualitative Assessment:

- Qualitative Interviews were scheduled to begin this quarter but were delayed due to delays with obtaining the DoD deferral to Stanford IRB and then full HRPO IRB approval. Recruitment for qualitative interviews began on 07Jul2015.
- A total of 54 interviews were completed as of November 2015. A total of 60 interviews were anticipated to be completed for Phase I; however, the DoD was informed by the Navy and Air Force that neither branch would be able to provide lists for this phase of the project; Both branches confirmed support for the second phase of the project and will be able to provide lists for Phase II. Because the qualitative interviews to date have achieved information "saturation", which is the intention of qualitative interviews, it was decided that no further qualitative interviews will be necessary beyond the current targeted n=54.
- Qualitative discussion guide was created for Phase II.
- Phase II qualitative interviews began on 23Aug2017. All interviews (N=56) were completed as of March 2018.

Survey development:

- Final survey content completed (15Dec2015)

Web development:

- Website go-live (25Apr2016)

Survey programming:

- Survey programmed into eCOS (28Mar2016)

Recruitment

- Initial recruitment email sent (05Apr2016)
- Recruitment completed N=605
- 6-month assessment data collection began 16Nov2016 and was completed on 13Sep2017. 379 (62.6%) participants completed the 6-month assessment.
- 12-month assessment data collection began 18May2017 and was completed on 14Mar2018. 395 (65.3%) participants completed the 12-month assessment.

Additional Tasks:

- Recruitment Plan was finalized for Phase II
- Presentation at 2016 MHSRS (August 2016)
- Three presentations at 2017 MHSRS (August 2017)
- 2nd place winner of poster session at 2017 MHSRS
- Four presentations at 2018 ISTSS (November 2018)
- Symposium presentation at 2018 MHSRS (August 2018)
- Poster presentation at 2018 MHSRS (August 2018)
- Submission of 4 manuscripts (December 2018) – final drafts included as appendices
- Completion of transfer of study site to VA (December 2018)

What opportunities for training and professional development has the project provided?
If the project was not intended to provide training and professional development opportunities or there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe opportunities for training and professional development provided to anyone who worked on the project or anyone who was involved in the activities supported by the project. "Training" activities are those in which individuals with advanced professional skills and experience assist others in attaining greater proficiency. Training activities may include, for example, courses or one-on-one work with a mentor. "Professional development" activities result in increased knowledge or skill in one's area of expertise and may include workshops, conferences, seminars, study groups, and individual study. Include participation in conferences, workshops, and seminars not listed under major activities.

- The study team developed a poster that was presented at the 2016 MHSRS conference.
- The study team developed 3 posters that were presented at the 2017 MHSRS conference. The poster titled "Providing Evidence-based Treatments for PTSD and the Risk of Secondary Traumatic Stress: Results from the PTSD Clinicians Exchange" received 2nd place in one of the two poster sessions.
- The study team developed 4 posters that were presented at the 2017 ISTSS conference.
- The study team developed a poster that was presented at the 2018 MHSRS conference.
- The study team developed an oral symposium presentation for the 2018 MHSRS conference.
- The study team submitted 4 manuscripts for publication.

How were the results disseminated to communities of interest?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how the results were disseminated to communities of interest. Include any outreach activities that were undertaken to reach members of communities who are not usually aware of these project activities, for the purpose of enhancing public understanding and increasing interest in learning and careers in science, technology, and the humanities.

The Advisory Board members are key members within the PTSD community from the three service sectors (VHA, DoD, and community). One of the key functions of the advisory board was to assist with dissemination of key findings once the study has concluded. An advisory board meeting took place in October 2016, an advisory board meeting for 2017 took place on October 17th, 2017 and a final meeting took place on August 2nd, 2018.

What do you plan to do during the next reporting period to accomplish the goals?
If this is the final report, state "Nothing to Report."

Describe briefly what you plan to do during the next reporting period to accomplish the goals and objectives.

- Nothing to report

4. IMPACT: Describe distinctive contributions, major accomplishments, innovations, successes, or any change in practice or behavior that has come about as a result of the project relative to:

What was the impact on the development of the principal discipline(s) of the project?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how findings, results, techniques that were developed or extended, or other products from the project made an impact or are likely to make an impact on the base of knowledge, theory, and research in the principal disciplinary field(s) of the project. Summarize using language that an intelligent lay audience can understand (Scientific American style).

The PTSD Clinicians Exchange is a novel dissemination method for increasing familiarity, perceived benefit, and implementation of evidence-based practices (EBPs) for PTSD and other mental health concerns. Based on feedback from front-line clinicians, the Exchange was developed to be a streamlined "one stop shop" for getting up-to-date, top-vetted resources and information about EBPs in an easy-to-use format. Our clinicians reported that it can be difficult to find quality resources that they can trust, such as manuals, handouts, trainings, etc. They also reported that many websites are overly cumbersome, making it difficult to sift through the plethora of information to find what they need, when they need it. Clinicians who participated in the follow-up qualitative interviews reported that the Exchange addressed these challenges and provided a quick way to access important materials related to assessment and treatment of PTSD. Results from our study can be found in the various manuscripts provided as appendices.

What was the impact on other disciplines?
Describe how the findings, results, or techniques that were developed or improved, or other products from the project made an impact or are likely to make an impact on other disciplines.

Nothing to report.

Describe ways in which the project made an impact, or is likely to make an impact, on commercial technology or public use, including:

- *transfer of results to entities in government or industry;*
- *instances where the research has led to the initiation of a start-up company; or*
- *adoption of new practices.*

The final PTSD Clinicians Exchange website has been transitioned to the VA for future use. The VA has completed programming the website to be public-facing and sustainable long-term. The public-facing version of the website, www.core-exchange.org, was launched in December 2018.

What was the impact on society beyond science and technology?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how results from the project made an impact, or are likely to make an impact, beyond the bounds of science, engineering, and the academic world on areas such as:

- *improving public knowledge, attitudes, skills, and abilities;*
- *changing behavior, practices, decision making, policies (including regulatory policies), or social actions; or*
- *improving social, economic, civic, or environmental conditions.*

Now that the PTSD Clinicians Exchange website is publicly available, the objective is to engage the broader community of clinicians treating veterans with PTSD and connect them to an easily accessible and engaging repository of clinical best practices. Detailed results describing the main findings, more granular discussion of website usage, and the impact of stress and burnout can be found in the associated manuscripts (See Appendix #).

Future goals for the Exchange including widening the focus of the Exchange to address clinical best practices to mental health more broadly, which has the potential to make an impact on the mental health field beyond assessment and treatment of PTSD.

5. **CHANGES/PROBLEMS:** The Project Director/Principal Investigator (PD/PI) is reminded that the recipient organization is required to obtain prior written approval from the awarding agency

Grants Officer whenever there are significant changes in the project or its direction. If not previously reported in writing, provide the following additional information or state, "Nothing to Report," if applicable:

Changes in approach and reasons for change
Describe any changes in approach during the reporting period and reasons for these changes. Remember that significant changes in objectives and scope require prior approval of the agency.

Nothing to report.

Changes that had a significant impact on expenditures

Describe changes during the reporting period that may have had a significant impact on expenditures, for example, delays in hiring staff or favorable developments that enable meeting objectives at less cost than anticipated.

There have been no changes that had a significant impact on expenditures.

Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents
Describe significant deviations, unexpected outcomes, or changes in approved protocols for the use or care of human subjects, vertebrate animals, biohazards, and/or select agents during the reporting period. If required, were these changes approved by the applicable institution committee (or equivalent) and reported to the agency? Also specify the applicable Institutional Review Board/Institutional Animal Care and Use Committee approval dates.

Significant changes in use or care of human subjects

There have been no significant changes in use or care of human subjects.

Significant changes in use or care of vertebrate animals.

n/a

Significant changes in use of biohazards and/or select agents

n/a

6. PRODUCTS: List any products resulting from the project during the reporting period. If there is nothing to report under a particular item, state "Nothing to Report."

- **Publications, conference papers, and presentations**
  Report only the major publication(s) resulting from the work under this award.

  Journal publications. *List peer-reviewed articles or papers appearing in scientific, technical, or professional journals. Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).*

No papers have been published to date, however, 4 manuscripts have been submitted to various journals. The submitted papers are provided as appendices.

Books or other non-periodical, one-time publications. *Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like. Identify for each one-time publication: Author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (e.g., book, thesis or dissertation); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).*

Nothing to report.

Other publications, conference papers, and presentations. *Identify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication as noted above. List presentations made during the last year (international, national, local societies, military meetings, etc.). Use an asterisk (*) if presentation produced a manuscript.*

Presentations

1. Wilkinson, A., Ortigo, K., Simon, E., Coleman, J.L., Clarke-Walper, K., Zincavage, R., Marceau, L., Wilk, J., Ruzek, J.I., Rosen, R.C. The PTSD Practitioner Registry: A Novel Tool for Dissemination and Training of Best Practices/Clinical Practice Guidelines for PTSD Providers. Poster presented at the Military Health System Research Symposium, Fort Lauderdale, FL, USA, Aug 15-17, 2016.
2. Coleman, J.L., Magnavita, A.M., Simon, E., Clarke-Walper, K., Penix, E., Zincavage, R., Marceau, L., Wilk, J., Ruzek, J.I., Rosen, R.C: PTSD Clinicians Exchange: Understanding Clinicians' Use of the Clinical Practice Guideline for the Management of PTSD and Best Practices in Three Service Sectors. Poster presented at the Military Health System Research Symposium, Fort Lauderdale, FL, USA, Aug 2017.
3. Simon, E., Ortigo, K., Regala, S., Clarke-Walper, K., Coleman, J.L., Magnavita, A.M., Zincavage, R., Dwyer, J., , Marceau, L., Wilk, J., Rosen, R.C., Ruzek, J.I.: The PTSD Clinicians Exchange: Development of an Online Clinician-Centered Community of Practice Resource for Treatment of PTSD in Military Populations. Poster presented at the Military Health System Research Symposium, Fort Lauderdale, FL, USA, Aug 2017.
4. Penix, E., Clarke-Walper, K., Magnavita, A.M., Simon, E., Regala, S., Ortigo, K., Ruzek, J.I., Rosen, R.C., & Wilk, J.: Providing Evidence-based Treatments for PTSD and the Risk of Secondary Traumatic Stress: Results from the PTSD Clinicians Exchange. Poster presented at the Military Health System Research Symposium, Fort Lauderdale, FL, USA, Aug 2017.
5. Wilk, J.E., Clarke-Walper, K., Magnavita, A., Simon, E., Ruzek, J.I., & Rosen, R.C.: Assessment of Practitioner Attitudes, Behaviors and Wellbeing in the PTSD Practitioner Exchange. Poster presented at the ISTSS 33rd Annual Meeting, Chicago, IL, USA, Nov 2017
6. Ruzek, J.I., Wilk, J.E., Simon, E., Magnavita, A., & Rosen, R.C.: Rationale, Design and Implementation of the PTSD Practitioner Exchange: A Novel Method for Measuring Dissemination and Uptake of Clinical Practice Guidelines for PTSD Management. Poster presented at the ISTSS 33rd Annual Meeting. Chicago, IL, USA, Nov 2017.
7. Magnavita, A., Raymond, R.C., Simon, E., Wilk, J.E., & Ruzek, J.I.: Design, Development and Dissemination of a Clinical Practice Guidelines Internet Resource for Clinicians: The PTSD Clinicians Exchange. Poster presented at the ISTSS 33rd Annual Meeting. Chicago, IL, USA, Nov 2017.
8. Simon, E., Ortigo, K., Clarke-Walper, K., Regala, S., Magnavita, A., Coleman, J., Penix, E., Marceau, L., Wilk, J.E., Rosen, R.C., & Ruzek, J.I.: Clinician Awareness and Use of Best Practices across Three Service Sectors. Poster presented at the ISTSS 33rd Annual Meeting. Chicago, IL, USA, Nov 2017.
9. Clarke-Walper, K.; Penix, E., Trachtenberg, F., Magnavita, A., Simon, E., Coleman, J., Regala, S., Ortigo, K., Ruzek, J.I., Rosen, R.C., & Wilk, J.E.: How Effective is a Behavioral Health Clinician Registry at Mitigating Burnout in the VA, DoD, and Community? Results from the PTSD Clinicians Exchange. Poster Presented at the Military Health System Research Symposium, Fort Lauderdale,

10. Coleman, J., Marceau, L., Magnavita, A., Ambrosoli, J., Zincavage, R., Trachtenberg, F., Simon, E., Regala, S., Ortigo, K., Clarke-Walper, K., Penix, E., Wilk, J.E., Ruzek, J.I., & Rosen, R.C.: Website Analytics in the Evaluation of a New Tool for Increasing Clinician Awareness, Receptivity, and Implementation of Evidence-Based Practices for the Treatment of PTSD: The PTSD Clinicians Exchange. Oral presentation at the Military Health System Research Symposium, Fort Lauderdale, FL, USA, Aug 2018.

Manuscripts

1. Clarke-Walper, K., Penix, E., Trachtenberg, F., Simon, E., Coleman, J., Magnavita, A., Ortigo, K., Regala, S., Marceau, L., Ruzek, J.I., Rosen, R.C., & Wilk, J.E. (submitted 2019). How effective is a web-based tool for reducing behavioral health clinician burnout? Results from the PTSD Clinicians Exchange. Psychiatric Research and Clinical Practice.
2. Penix, E., Clarke-Walper, K., Trachtenberg, F., Magnavita, A., Simon, E., Ortigo, K., Coleman, J., Marceau, L., Ruzek, J.I., Rosen, R.C., & Wilk, J.E. (submitted 2019). Risk of secondary traumatic stress in treating traumatized military populations: Results from the PTSD Clinicians Exchange. Journal of Traumatic Stress.
3. Ruzek, J.I., Wilk, J.E., Simon, E., Marceau, L., Trachtenberg, F., Magnavita, A., Coleman, J., Ortigo, K., Ambrosoli, J., Zincavage, R., Clarke-Walper, K., Penix, E., & Rosen, R.C. (submitted 2019). A randomized controlled trial of web-based intervention to disseminate clinical practice guidelines for PTSD: the PTSD Clinicians Exchange. Journal of Traumatic Stress
4. Coleman, J., Marceau, L., Zincavage, R., Magnavita, A., Ambrosoli, J., Shi, L., Simon, E., Ortigo, K., Clarke-Walper, K., Penix, E., Wilk, J.E., Ruzek, J.I., & Rosen, R.C. (submitted 2018). Understanding how clinicians use a new web-based tool for disseminating evidence-based practices for the treatment of PTSD; the PTSD Clinicians Exchange. MHSRS supplement of Military Medicine.

- **Website(s) or other Internet site(s)**

List the URL for any Internet site(s) that disseminates the results of the research activities. A short description of each site should be provided. It is not necessary to include the publications already specified above in this section.

Website:
The Exchange: www.core-exchange.org

- **Technologies or techniques**

Identify technologies or techniques that resulted from the research activities. In addition to a description of the technologies or techniques, describe how they will be shared.

Nothing to report.

- **Inventions, patent applications, and/or licenses**
  Identify inventions, patent applications with date, and/or licenses that have resulted from the research. State whether an application is provisional or non-provisional and indicate the application number. Submission of this information as part of an interim research performance progress report is not a substitute for any other invention reporting required under the terms and conditions of an award.

Nothing to report.

- **Other Products**
  Identify any other reportable outcomes that were developed under this project. Reportable outcomes are defined as a research result that is or relates to a product, scientific advance, or research tool that makes a meaningful contribution toward the understanding, prevention, diagnosis, prognosis, treatment, and/or rehabilitation of a disease, injury or condition, or to improve the quality of life. Examples include:
  - *data or databases;*
  - *biospecimen collections;*
  - *audio or video products;*
  - *software;*
  - *models;*
  - *educational aids or curricula;*
  - *instruments or equipment;*
  - *research material (e.g., Germplasm; cell lines, DNA probes, animal models);*
  - *clinical interventions;*
  - *new business creation; and*
  - *other.*

Nothing to report.

7. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

What individuals have worked on the project?
Provide the following information for: (1) PDs/PIs; and (2) each person who has worked at least one person month per year on the project during the reporting period, regardless of the source of compensation (a person month equals approximately 160 hours of effort). If information is unchanged from a previous submission, provide the name only and indicate "no change."

Name: Craig Rosen
Project Role: Principal Investigator
Nearest person month worked: 1
No change.

Name: Josef Ruzek
Project Role: Co-Investigator
Nearest person month worked: 4
No change.

Name: Robyn Walser
Project Role: Co-Investigator
Nearest person month worked: 1
No change.

Name: Sara Landes
Project Role: Co-Investigator
Nearest person month worked: 1
No change.

Name: Erica Simon
Project Role: Project Manager
Nearest person month worked: 3
No change.

Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

If the active support has changed for the PD/PI(s) or senior/key personnel, then describe what the change has been. Changes may occur, for example, if a previously active grant has closed and/or if a previously pending grant is now active. Annotate this information so it is clear what has changed from the previous submission. Submission of other support information is not necessary for pending changes or for changes in the level of effort for active support reported previously. The awarding agency may require prior written approval if a change in active other support significantly impacts the effort on the project that is the subject of the project report.

Nothing to report.

What other organizations were involved as partners?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Organization Name: New England Research Institutes
Location of Organization: Watertown, MA
Partner's contribution to the project: The NERI team is the co-awardee of the project. NERI and NCPTSD worked collaboratively on all portions of the project.

Organization Name: Walter Reed Army Institute of Research (WRAIR)
Location of Organization: Silver Spring, MD
Partner's contribution to the project: The WRAIR team is also a part of the overall team and was involved in the scientific and programmatic functions of the project.

8. SPECIAL REPORTING REQUIREMENTS

COLLABORATIVE AWARDS:

QUAD CHARTS:

9. APPENDICES: Attach all appendices that contain information that supplements, clarifies or supports the text. Examples include original copies of journal articles, reprints of manuscripts and abstracts, a curriculum vitae, patent applications, study questionnaires, and surveys, etc.

Appendix A – Main Results Manuscript (submitted for review to Journal of Traumatic Stress)

Appendix B – Web Usage Manuscript (submitted for review to MHSRS supplement of Military Medicine

Appendix C – Burnout Manuscript (submitted for review to Psychiatric Services, but has been rejected. The paper will be submitted to Psychiatric Research and Clinical Practice)

Appendix D – Secondary Traumatic Stress Manuscript (submitted for review to Journal of Traumatic Stress)

DISSEMINATION OF PTSD CLINICAL PRACTICE GUIDELINES

A randomized controlled trial of a web-based intervention to disseminate clinical practice guidelines for PTSD: the PTSD Clinicians Exchange

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Abstract

Delivery of best practice care for post-traumatic stress disorder (PTSD) is a priority for clinicians working with active duty military personnel and veterans. The PTSD Clinicians Exchange, an internet-based intervention, was designed to assist in dissemination of clinically-relevant information and resources supporting delivery of key practices endorsed in the Veterans Administration (VA)-Department of Defense (DoD) Clinical Practice Guideline (CPG) for the Management of Post-Traumatic Stress. We conducted a randomized controlled trial to examine the effectiveness of the Clinicians Exchange intervention in increasing familiarity and perceived benefits of 26 CPG-related and emerging practices. The intervention consisted of ongoing access to an internet resource featuring best-in-class resources for the practices, self-management of burnout, and bi-weekly email reminders highlighting selected practices. 605 mental health clinicians were recruited from three service sectors (VA, DoD, community). A minority (33%) of those assigned to the internet intervention accessed the site to view resources. Nonetheless, those offered the intervention increased their practice familiarity ratings significantly more than those assigned to a newsletter only control condition ($p=0.005$). From baseline to 6 months to 12 months, ratings of those in the intervention group increased from 3.0 ± 0.6 to 3.2 ± 0.6 to 3.4 ± 0.6 on a 1-5 scale ("not at all" to "extremely" familiar); control group clinicians had scores of 3.2 ± 0.6 at all time points. Clinicians generally viewed the CPG practices favorably, rating them as likely to benefit their clients. Results suggest that internet-based resources may aid more comprehensive efforts to disseminate CPGs, but that it will be important to increase clinician engagement.

Across multiple sectors of health care services delivery, a significant gap exists between best practices as delineated in clinical practice guidelines and the routine standard of care provided in most treatment systems. Whereas results from multiple randomized controlled trials (RCTs) have confirmed the benefits of evidence-based treatments for active duty service personnel and veterans with PTSD, large numbers of providers continue to lack the knowledge, clinical skills, practice attitudes, or supportive organizational context to deliver standard-of-care PTSD treatments (Rosen et al., 2017). In their review of mental health care for veterans, service members and their families, the Institute of Medicine concluded that "…the committee has serious concerns about inadequate and untimely clinical follow up and low rates of delivery of evidence-based treatments, particularly psychotherapies to treat PTSD and depression and approved pharmacotherapies for substance use disorder" (Institute of Medicine, 2013).

A key foundational step in implementation of best practices is to delineate evidence-based practices (EBPs). This process is accomplished in Clinical Practice Guidelines (CPGs) that provide detailed practice recommendations based on a comprehensive review of empirical evidence. For those exposed to traumas during military service, the joint Veterans Administration-Department of Defense (VA-DoD) CPG for Management of Post-Traumatic Stress (VA/DoD Clinical Practice Guideline Working Group, 2010) offers organizationally-endorsed recommendations for practice. Despite their assumed importance, it is widely recognized that publication of guidelines generally has minimal impact on practice. Practitioners often remain unaware of guidelines and unfamiliar with their content. Although VA and DoD have maintained national training programs to equip practitioners to deliver two evidence-based treatments for PTSD - Prolonged Exposure (PE; Foa, Hembree, & Rothbaum, 2007) and Cognitive Processing Therapy (CPT; Resick, Monson, & Chard, 2016), these programs have

significant limitations as mechanisms for disseminating the more comprehensive content of CPGs. They are costly and challenging to implement, and they may fail to reach large numbers of providers, especially in the general community. Moreover, CPGs typically include a considerable number of diverse practices for which specialized training programs are relatively difficult to access. To address these needs, we developed a novel mechanism, the PTSD Clinicians Exchange, with the expectation that an easily accessed, online resource could be used to facilitate dissemination of the VA-DoD CPG.

We conceived of practice implementation as representing a continuum of change, ranging from simple awareness of and perceived familiarity with a given practice to actual personal use of the practice and/or referral for its delivery. In this study, we measured clinician perceptions of familiarity and benefit/harm of 26 key practices (core elements of the VA-DoD CPG and emerging best practices in PTSD care), as well as self-reported implementation and referral for those practices. We sought to recruit PTSD treatment providers from the three major sectors (VA, DoD, community) serving active duty military personnel and veterans. We hypothesized that use of the PTSD Clinicians Exchange would be associated with increases in our two primary outcome variables, familiarity with the practices and perceptions of benefits for clients, over the 12-month period of the study. We also assessed impact on secondary variables of self-reported referral for the practices and attitudes towards EBPs. To evaluate whether the approach would be more effective than a maximally scalable intervention, we conducted an RCT comparing the Clinicians Exchange with delivery of a bimonthly newsletter.

Method

Procedure

The PTSD Clinicians Exchange was developed, implemented and evaluated in two sequential phases: (a) formative interviews were conducted in a group of 54 behavioral health providers representing each service sector to assess practitioner needs and interests in practitioner registry participation, and (b) a randomized dissemination trial was performed to evaluate the impact of the Clinicians Exchange. The trial design is shown in Figure 1.

Data collection occurred at baseline, 6-, and 12-month assessments. Each assessment was administered by means of an online survey that required approximately 30-40 minutes to complete. Participants had a 5-week window to complete the assessments at each time point. VA study staff sent up to 10 emails and made up to 5 phone calls per participant throughout the 5-week window to provide participants with survey login credentials and reminders to complete surveys. To aid with subject retention, "participation packets" were sent to all randomized providers, and included a study-branded lanyard and desk cube (items of minimal monetary value) and a letter thanking them for their participation. Participants who completed the 12-month assessment also received a certificate of completion. Control group participants were given access to the PTSD Clinicians Exchange website at the end of the study.

The study was approved by [removed for blind review].

Participants

Recruitment. We recruited mental health clinicians providing PTSD treatment in the DoD, VA, and general community. Interested participants received invitational emails sent to distribution lists of mental health clinicians generated by key contacts within the DoD, VA, and community-based networks. Recruitment emails were sent out weekly from May 2016 - February 2017 when overall enrollment goals were reached. The enrollment goal was 600 clinicians (200 from each service sector). This overall goal was exceeded, in that our total

number of randomized participants was 605 (VA = 263, DoD = 108, community = 234). Due to lower enrollment in the DoD, we recruited additional participants in the VA and community service sectors to ensure that we would achieve our overall recruitment goal of 600 clinicians. Participation was voluntary and participants received neither monetary compensation nor continuing education credits. Clinicians completing the screener, consent form, and baseline survey were considered "enrolled" and were randomized in eight monthly "waves," to streamline follow-up survey invitations and bi-weekly email "blasts" for the active intervention arm.

Enrollment and randomization. Clinicians who responded to recruitment emails were directed to the PTSD Clinicians Exchange website to learn about the study and complete a study registration form and screener. Participants met the eligibility criteria if they a) were employed as a clinician in a mental health treatment setting; b) provided treatment to at least one active duty service member or veteran with PTSD in the past year; c) had at least 10 contact hours with clients in an average week; d) treated clients using some form of psychotherapeutic treatment; and e) had reliable internet and telephone access. Eligible clinicians completed an electronic consent form and baseline survey.

A total of 792 clinicians provided consent. 605 completed the baseline survey, were deemed eligible, and were randomized 3:1 to either (1) the active intervention (PTSD Clinicians Exchange website with bi-weekly emails and bi-monthly newsletters) or (2) the control condition (bi-monthly newsletters only). See Supplementary Online Figure 1 for consort diagram.

Measures

Demographics. Participants completed survey items regarding their demographic characteristics, including service sector, years of experience treating mental health disorders, and professional discipline, in addition to the usual categories of age, gender, race, and ethnicity.

Dissemination/implementation. Likert scale items were developed for assessing practice familiarity, perceptions of benefit or harm associated with each practice, and self-reported implementation and referral of each of the 26 practices included in the web resource. Familiarity and perceived benefit were computed across the 26 practices, and percent of practices with referrals computed. Perceived familiarity was assessed by the following item: "How familiar are you with this practice for treating Veterans or military personnel with PTSD?" Items were scored on a five-point scale ranging from *not at all familiar/never heard of it* to *extremely familiar/know it very well*. For each practice that was rated as slightly familiar or higher, benefit/harm perceptions were assessed, by asking how much benefit or harm their clients would receive. This item was scored on a seven-point Likert scale (1 = *great harm* to 7 = *great benefit*) with an alternative *don't know* option. The category of "*don't know*" was excluded from analysis. Referral behavior was assessed with a specific item (if a practice was rated as slightly familiar or higher): "In the last 90 days, did you refer any of your Veteran or military clients with PTSD for this practice?" If participants answered *"yes"*, they were asked: "If yes, thinking about your Veteran or military clients with PTSD for whom this practice may be considered: In the last 90 days, what percentage of these clients did you refer for this practice?" If participants answered *"no"*, they were asked to specify: *"No, I treat patients using this practice", "No, referrals for this practice are not available in my system or in the community", "No, not sure if services for this practice are available in my system or in the community", "No, I have no applicable patients", or "No, other [specify]"*; subjects responding *"No, I treat patients using this practice"* or *"No, I have no applicable patients"* were excluded from analysis of this outcome, as referrals would not be needed. Although we also attempted an exploratory assessment of self-reported implementation of each practice, due to the nature of the survey

design, whereby participants were only asked to provide self-reported implementation for practices with which they were at least *"moderately familiar"*, these exploratory questions resulted in a large amount of missing data, so results for this outcome are not reported.

Evidence-Based Practices Attitudes Scale (EBPAS). Overall attitudes towards EBPs were measured using the EBPAS (Aarons, 2004), a validated self-report measure with 15-items, each rated on a five-point Likert scale (0 = *not at all* to 4 = *to a very great extent*). The measure consists of four subscales, and a total score representing global attitude towards adoption of EBPs. Subscales include: 1) "appeal of EBP," 2) "likelihood of adopting EBP," 3) "openness to new practices," and 4) "perceived divergence" from EBPs (Aarons, 2004). After transforming the four reverse-scored items, responses were averaged (Cronbach's α = .77).

Professional Quality of Life. The Professional Quality of Life (ProQOL) scale (Stamm, 2010) measures three constructs related to professional wellbeing: clinician burnout, compassion satisfaction, and secondary traumatic stress (using three 10-item subscales). This scale is widely used to describe positive and negative effects of working with trauma survivors (Craig & Sprang, 2010). Items were answered on a five-point scale (1 = *never* to 5 = *very often*) and averaged to create the three subscales; higher scores indicate higher levels of burnout (Cronbach's α = .75), secondary traumatic stress (α = .81), and compassion satisfaction (α = .88).

PTSD Clinicians Exchange website utilization. Usage metrics were captured at the individual user level and assessed by a tracking system which extracted every interaction with the PTSD Clinicians Exchange for each participant randomized to the intervention, including: *Number of pages viewed,* calculated by totaling the number of times a participant clicked onto any page within the website (including multiple views of the same page); *Number of links clicked,* to understand the types of resources accessed by subject and resource type; *Time spent*

viewing the site, calculated by totaling the number of minutes between the timestamps on the first and last pages visited during a single visit; and *Number of visits to the site*. See Coleman et al. (In press) for full details of the evaluation of website use.

Summative Qualitative Interviews. A series of 56 summative, qualitative interviews were conducted with 20 VA, 20 community, and 16 DoD clinicians at the 12-month assessment (see Coleman et al, In press, for details of interview questions and findings).

Interventions

Clinicians Exchange intervention. To design the PTSD Clinicians Exchange, we conducted semi-structured, formative interviews with 54 clinicians from the three service sectors. Clinicians shared ideas about professional development, use of CPGs, professional wellbeing, and website features and content. The resulting resource (see Supplementary Online Figure 2) provided curated content and interactive resources for a set of 26 key practices, those figuring prominently in the VA/DoD CPG as well as emerging practices. It offered 5-9 best educational materials for each of the practices, as well as ongoing bi-weekly email blasts, each featuring a useful resource and reminding clinicians to access the site. The web resource also included a section on clinician wellbeing and discussion boards. Individuals assigned to receive the experimental intervention also received the newsletter intervention delivered to the control group (described below).

The Clinicians Exchange was organized into three main sections: (1) ”Engage,” providing access to a wide range of practice-specific resources for 26 best practices, including trainings, manuals, articles and books, audio/video resources, handouts, and worksheets; (2) “Connect,” also known as “Clinicians’ Corner,” providing multiple avenues for connecting with other clinicians, including discussion forums, an “Ask an Expert/Peer Support Specialist”

feature, structured interviews with leading experts in the field, and goal setting activities; and (3) "Inspire," with self-care suggestions and an interactive ProQOL survey, where clinicians could assess their current level of compassion satisfaction, burnout, and secondary traumatic stress.

Newsletter-only control condition. Those randomized to the control condition received a bi-monthly National Center for PTSD *Clinicians Trauma Update* newsletter that provided brief summaries of recent PTSD research findings.

Data Analysis

We assumed that the reason outcomes and covariates were missing was not dependent upon the unobserved data (commonly referred to as missing-at-random), and applied the method of imputing via one maximum likelihood iteration (Graham, 2012) to provide unbiased estimates for EBPAS scales, PROQOL scales, age (*n*=18 missing), years of experience treating mental illness (*n*=2 missing), years of experience treating military populations (*n*=4 missing), number of clients treated in past week (*n*=11 missing), number of clients treated with PTSD in past week (*n*=12 missing), hours of administrative work (*n*=11 missing), and hours doing client care (*n*=11 missing). For EBPAS scales, imputation was only performed for subjects with at most one missing item per 3-4 item subscale (*n*=85, imputed across scales and time points). Likewise, for PROQOL scales, imputation was only performed for subjects with at most two missing items per 10-item subscale (*n*=43 to 72 imputed per scale, across time points).

Baseline characteristics and outcome measures of clinicians across the three service sectors were compared using ANOVA and chi-square tests. Baseline characteristics of clinicians who did and did not complete the 6- and 12-month assessments were also compared using ANOVA and chi-square tests. A repeated measures regression model was fit with intervention group and time considered as fixed effects and subject as the repeated measure, controlling for

service sector. Time was used as a categorical variable (3 time points) for this analysis. The interaction of intervention group and time was tested to assess whether the trajectories of practice implementation varied by group assignment (intervention vs. control) and was included in final models when significant. In a secondary analysis, backwards elimination modeling also adjusted for service sector, any significant interactions of service sector with intervention group or time, PROQOL scales, total EBPAS scale (for other outcomes), organizational support, and other covariates. Additional regression models were fit for the total number of practices showing increases in familiarity, perceived benefit, and referrals from (1) baseline to 6 months, (2) 6 to 12 months, and (3) baseline to 12 months, by group assignment. Analyses were conducted using SAS v9.4 (SAS Institute Inc., Cary, NC); statistical significance was tested at level 0.05.

Intention to Disseminate and Per Protocol Analyses. Intention-to-disseminate (ITD) analyses were performed on available scores from all participants randomized to either intervention or control conditions, regardless of whether they accessed the Clinicians Exchange resources. A per-protocol completer analysis was performed comparing participants who actively used the Clinicians Exchange resource to those who did not or were randomized to the control condition.

Results

Participants

Demographic characteristics, disciplinary training, and years of clinical experience of the study participants are shown in Table 1. Clinicians in each sector were mostly female and over 40 years of age, although roughly one third of DoD and VA clinicians were under age 40. Social workers and psychologists accounted for about 90% of clinician participants from VA and DoD, with almost 40% of community clinicians having mental health counselor credentials. There was

wide variation in amount of clinical experience; about 10% of each group reported less than 5 years, while more than half of the DoD clinicians reported more than 20 years of experience.

Among the randomized subjects, 379 (62.6%) completed the 6-month assessment and 395 (65.3%) completed the 12-month assessment; 311 (51.4%) completed both assessments. Completion was similar at 6 months between treatment arms (61.6% for the intervention group, 65.8% for controls, p=0.354), but was somewhat higher at 12 months for the control group (62.9% vs. 72.4%, p=0.034). Assessment completion varied by practice setting. At 6 months, it was 68.1% for the VA, 54.6% for DoD, and 60.3% for community practice settings (p=0.033); at 12 months, it was 70.0% for the VA, 56.5% for DoD, and 64.1% for the community (p=0.041).

Baseline Scores

Practice familiarity and perceived benefit/harm. Figure 2 and Supplementary Online Figure 3 present the baseline ratings of familiarity and perceived harm/benefit for the 26 practices assessed in the study and Table 2 presents baseline ratings across settings. Practices varied in familiarity between individual practices and across practice settings. For the entire sample, the individual practice with the highest mean familiarity rating at baseline was anger management (4.16), with Skills Training and Affective Regulation (STAIR) having the lowest familiarity rating (1.90). For PTSD-specific interventions, mean baseline familiarity ratings for CPT, PE, Eye Movement Desensitization and Reprocessing (EMDR), and Stress Inoculation Training (SIT) were 4.12, 3.73, 3.14, and 2.01, respectively. Clinicians in the different service delivery sectors showed different patterns of familiarity with individual practices, with VA and DoD clinician subgroups reporting highest average familiarity (3.17 and 3.18 compared to 2.93 in the community). For example, VA and DoD subgroups reported greater familiarity with CPT (VA, 4.38; DoD, 4.28; Community, 3.75) and PE (VA, 3.91; DoD, 4.04; Community, 3.39).

Those working in VA were less familiar with EMDR (2.70) than those in DoD (3.42) and the community (3.52).

There was relatively little variability in ratings of harm/benefit, with all practices being rated very positively with means of 5.37 (out of 7) or above at all time points and a mean score of approximately 5.9 across practices. Across the sample as a whole, mean ratings ranged from 6.34 for psychoeducation for loved ones to 5.42 and 5.37 for web-based interventions and SIT. There were few differences across the service settings, but PE was perceived as more beneficial by VA (5.85) and DoD (5.67) clinicians, compared to clinicians in the general community (4.89).

EBPAS. EBPAS subscale scores for the 3 service sectors are shown in Table 2. VA and DoD clinicians had significantly more positive attitudes towards evidence-based practices than community clinicians. However, the total EBPAS scores for all service sectors (VA, 4.01; DoD, 4.05; Community, 3.90) were noticeably higher than the mean score of 2.7 reported in a national survey that included 1,089 clinicians from 100 clinics in 26 states (Aarons et al., 2010).

ProQOL. VA clinicians reported significantly higher levels of burnout than DoD and community colleagues (21.74 vs. 19.02 and 18.46, respectively; $p<0.001$). See Clarke-Walper et al. and Penix et al. (Manuscripts submitted for publication) for detailed ProQOL results.

Web Resource Utilization

Less than one third (148/453; 32.7%) of participants assigned to the intervention condition visited the site during the 12-month period of access. The mean number of visits to the site was 2.03 (ranging from 1 to 10). Clinicians viewed a mean of 7.44 pages (ranging from 1-41), and spent a mean of 13.49 minutes on the site (ranging from 0.13 to 87.24). Detailed analyses of site use and the association with intervention outcomes are reported in Coleman et al. (In press).

Intervention Effects on Primary Outcomes: Practice Familiarity and Benefit/Harm

Results of the ITD analyses are presented in Table 3. There was limited support for our primary hypothesis that the PTSD Clinicians Exchange intervention would result in greater practice familiarity and perceived benefits than the newsletter only control condition. Practice familiarity for the active intervention group increased significantly more than for controls over the 12 months of monitoring (intervention over time: 3.05 to 3.22 to 3.38; controls over time: 3.17 to 3.19 to 3.21; p=0.005 for the interaction). Participants in the Clinicians Exchange condition also showed significantly greater increases when familiarity was assessed in terms of number of skills showing increased familiarity ratings. They reported increases in more skills (8.71) than were reported by the control group (7.26) between baseline and 12 months (p=0.005). There were no significant differences between intervention and control conditions in the average ratings of perceived benefit/harm or in the number of practices for which referrals were made.

EBPAS. There were no significant differences in attitudes towards evidence-based practices between treatment arms or assessments (see Table 3).

ProQOL. There were no differences between conditions in changes in levels of burnout or secondary traumatic stress. See Clarke-Walper et al. (Manuscript submitted for publication) and Penix et al. (Manuscript submitted for publication) for details of ProQOL results.

Per Protocol (Completer) Analyses

Given that fewer than one-third of participants assigned to the active web intervention ever visited the website, we conducted per protocol analyses in keeping with the overall aims of the study to investigate effects of exposure to our web-based Clinicians Exchange. These analyses are described in Coleman et al. (In press) and are briefly summarized here. There were no differences over time between participants randomized to the web intervention who visited

the site at least once, compared to those who never visited the site. However, there was a significant association between number of pages viewed from baseline to 12 months and both of our main study outcomes, familiarity (p=0.029) and perceived benefit (p=0.016). Those engaging at higher levels with the site showed greater increases in familiarity and perceived benefit.

Comparison of Clinician Service Sectors

There were no significant interactions of service sector with either intervention group or time. At baseline, the service sectors differed in relative composition of professional disciplines, with community clinicians including fewer social workers and doctoral level psychologists and more professional mental health counselors than VA and DoD (see Table 1), likely reflecting the different professional makeup of the sectors. Community-based clinicians reported significantly more years of experience treating both mental illness and military populations. Those in VA reported significantly more clients treated in the past week and more clients with PTSD treated in the last week. DoD clinicians reported more hours of administrative work (see Table 1).

Mean baseline ratings of familiarity averaged across the 26 practices were significantly greater for those in VA and DoD sectors, compared with community clinicians. VA clinicians reported making referrals for significantly more of the practices (10.30), compared to community clinicians (7.19), with DoD clinicians intermediate (8.86) between the two.

Compared with community clinicians, VA and DOD clinicians had significantly higher total scores on the EBPAS and on the Openness subscale (3.97 and 4.01 vs. 3.84; p=0.055), indicating general openness to trying new interventions. They had lower Divergence subscale scores (1.85 and 1.93 vs. 2.04; p=0.004), reflecting perception of EBPs as not clinically useful and less important than clinical experience. Absolute differences in scores were modest.

Discussion

The current study evaluated the impact of a low-intensity internet-based intervention designed to increase dissemination of elements of CPGs for PTSD. We reasoned that bi-weekly email messaging plus access to a curated website that included best resources for each of the 26 key practices assessed in the study might be sufficient to increase clinician familiarity with the practices as well as perceptions of likely benefit or harm on their clients.

The Clinicians Exchange intervention was associated with small but significant effects on two indices of perceived familiarity of practices, with no differential impact among clinician groups. Relative to our control condition (a bi-monthly email newsletter summarizing recent PTSD research findings), increases in mean ratings of familiarity averaged across the 26 practices were significantly greater in the Clinicians Exchange condition. Also, the number of practices for which individuals reported an increase in familiarity from baseline to 12-month assessment was significantly greater for the Clinicians Exchange group. However, both Clinicians Exchange and newsletter only control groups showed sizable increases in the number of practices with improved familiarity (8.71 vs. 7.26 practices, respectively). Changes in the control condition could be attributable to the content of the newsletter (which mentioned research findings related to some of the key practices), exposure to other sources of information about the practices, or placebo effects. In addition, two-thirds of those assigned to the Clinicians Exchange group did not visit the website, likely limiting our ability to detect effects of website use. Overall, the magnitude of effects was small and their clinical significance is unclear.

The intervention had no significant impact on perceived benefit of the key practices. However, mean ratings across practices were approximately 5.8 on a 7-point scale at baseline, suggesting a ceiling effect for this variable. The high overall ratings at baseline are an encouraging finding in that the majority of clinicians, across service sectors, endorsed positive

views of the potential benefits of CPG practices for their clients with PTSD. The intervention also had no significant effects on clinician-reported rates of referral or clinician quality of life. Referral rates would be affected by ease of access to those who could provide them, and it is possible that many of the practices might be relatively unavailable or that clinicians might not know how to locate colleagues who have such skills. The various measures of professional quality of life did not change during the course of the study and were not related to intervention condition. Previous web-based interventions for burnout have also shown little impact (Shoji, Benight, & Stearns, 2016) and absolute levels of burnout were low in the current study.

A key goal of the project was to establish the feasibility of prospectively assessing attitudes towards a range of important practices, as well as quality of life and burnout, among a large cohort of PTSD clinicians. We succeeded in recruiting a large sample with representation from the most significant PTSD treatment delivery sectors for veterans and active duty personnel, gathering data at three time points, and simultaneously assessing a large number (n=26) of practices. Such a practitioner registry in which a clinician workforce is assessed prospectively might enable monitoring of practice patterns and clinician needs and inform leadership decision-making. For example, results could help leaders decide whether to address attitudes towards EBPs or determine what trainings to make available.

Practices varied considerably in familiarity ratings, both between the practices themselves and among clinician groups working in different practice settings. Familiarity scores ranged from a mean of 4.16 (out of 5) for anger management to 1.90 for STAIR. Practice-specific ratings of benefit/harm showed less variability, ranging from 6.34 (out of 7) for psychoeducation for loved ones to 5.42 and 5.37 for web-based interventions and SIT, respectively. There were few differences among the service settings, although PE was perceived

as more beneficial for clients by VA (5.85) and DoD (5.67) clinicians compared to those in the general community (4.89). Observed differences in ratings of benefit for clients were largely consistent with what might be expected given differences in training programs and visibility of practices across the three systems of care. Among evidence-based treatments for PTSD, CPT was the most familiar to clinicians, followed by PE, EMDR, and SIT. Treatments with broad applicability and now largely in the mainstream of clinician awareness and training (e.g., Mindfulness, Motivational Interviewing) were more familiar than those focusing on more narrow problem areas not yet disseminated widely (e.g., Imagery Rehearsal Therapy).

Although clinicians in the three service sectors were not differentially affected by the intervention, they did show differences in familiarity with practices at baseline. For example, EMDR was much less familiar to VA providers than those in DoD and the community, reflecting an emphasis in VA on national training programs for PE and CPT. By contrast, the STAIR emotional regulation training intervention and Seeking Safety treatment for concurrent PTSD and substance abuse were much more familiar to those in VA, probably because the developers of both interventions have worked in the VA and the treatments have been featured in research projects and training programs and distributed via phone apps. Cognitive-Behavioral Therapy for Insomnia and issues of Moral Injury have also been the focus of significant research and educational dissemination in VA and DoD, and their clinicians were more familiar with these interventions than those working in community settings. Similarly, VA and DoD clinicians were more familiar with mental health phone app resources, compared with those in the general community, a finding that is expected given the development of apps by DoD and VA. Clinicians in DoD, where a national system for outcomes monitoring has been mandated for use, were much more familiar with ongoing monitoring of treatment outcomes than the other groups.

In addition to differences in perceived familiarity and benefit/harm, there were differences in attitudes towards evidence-based practices, with VA and DoD groups reporting more positive attitudes. It should be noted that all clinician subsamples in the current study showed very positive attitudes towards EBPs compared to clinicians responding to a national survey. This could be due to more positive attitudes in those treating veterans and active duty personnel with PTSD, a selection bias related to volunteering for the research study, or to the high percentage of social workers in the current study compared to the EBPAS national normative study, in which individuals trained in social work were found to have more positive attitudes (Aarons et al., 2010). Clinician groups were also different in terms of levels of burnout, with VA clinicians reporting higher levels (see Clarke-Walper et al., Manuscript submitted for publication).

The design of the current study permitted objective observation of web engagement by clinicians, in terms of number of visits to the site, individual time spent, and number of pages opened. Use of the web-based resource among those assigned to the active intervention condition was surprisingly low, with only 32% ever viewing the website; among those who did view the website, amount of use was low (means of 7.4 pages viewed and 13.5 minutes spent on the site across clinician groups). Post-participation debriefing interviews with a sample of clinicians in the intervention arm suggested that they struggled to find time to access the site and explore its resources. The rates of use may have also been lessened by the requirement for participants to use assigned passwords for site entry, and the experience of some firewall barriers for VA and DoD clinicians. Roughly half of all participants who accessed the website linked to external resources, where the most valuable knowledge could be imparted (n=77, 52%). The amount of time viewing these resources may have been considerable, and we were not able to

measure duration of time using them. Despite the limitations in our measurements of website engagement, we observed a significant relationship between amount of site use and outcomes.

The number of pages viewed was positively associated with changes from baseline to 12 months in familiarity (p=0.03) and perceived benefit (p=0.02) (Coleman et al., In Press). Strengths of the study include the randomized controlled design, large sample size, good rates of completion of assessments, simultaneous assessment of multiple practices, comparison of clinicians from three different clinical settings, use of an active comparison intervention, and access to objective web use data. Study limitations include recruitment of self-selected samples of clinicians, limiting generalizability to the larger populations of clinicians. Low rates of use of site materials may have limited our ability to detect effects of the intervention in the intention-to-disseminate evaluation, although we attempted to control for it in our completer analysis. Measurement of familiarity with, use of, and referral for key practices was limited to self-report, and the psychometrics of our measures of dissemination are unknown. We were not successful in our efforts to measure self-reported implementation of the practices, an important outcome.

Clinician perceptions of the web resource by those who used it were generally positive. Qualitative interviews indicated that materials were seen as very useful and practically valuable. Clinicians liked the range of practices covered, and appreciated the ease of access to materials all gathered in one place. Despite low engagement with the website, attributed by participants to time pressures, most clinicians wished to have the materials remain available for use. Given the significant, albeit modest, benefits of the low-intensity Clinicians Exchange intervention, and our finding of a significant positive relationship between number of pages viewed and increases in familiarity of practices, we suggest that future research should examine barriers to use of web resources, predictors of clinician engagement, and methods of increasing engagement.

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Table 1. Provider characteristics across service sectors.

	Practice Setting						
	VA		DoD		Community		
Characteristic	*n*	(%)	*n*	(%)	*n*	(%)	p-value
Gender Identity							0.552[1]
Male	77	(29.3)	37	(34.3)	67	(28.6)	
Female	184	(70.0)	70	(64.8)	164	(70.1)	
Other/missing	2	(0.8)	1	(0.9)	3	(1.3)	
Professional Discipline							<0.001
Social Worker	130	(49.4)	52	(48.1)	63	(26.9)	
Psychologist, doctorate-level	104	(39.5)	43	(39.8)	70	(29.9)	
Professional mental health counselor	14	(5.3)	7	(6.5)	92	(39.3)	
Medical professional with psychiatry focus	10	(3.8)	6	(5.6)	5	(2.1)	
Other/missing	5	(1.9)	0	(0.0)	4	(1.7)	
Race							0.264
Caucasian	210	(79.8)	73	(67.6)	178	(76.1)	
Black or African American	14	(5.3)	12	(11.1)	21	(9.0)	
Hispanic	14	(5.3)	5	(4.6)	6	(2.6)	

Asian	7	(2.7)	4	(3.7)	6	(2.6)	
Mixed	9	(3.4)	7	(6.5)	9	(3.8)	
Other/missing	9	(3.4)	7	(6.5)	14	(6.0)	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	p-value
Age	45.16	(10.54)	45.73	(10.41)	51.76	(12.24)	<0.001
Years of experience treating mental illness	15.59	(8.98)	15.42	(9.38)	19.67	(10.98)	<0.001[2]
Years of experience treating military populations	7.84	(6.32)	7.96	(6.33)	9.76	(7.46)	0.005[2]
Number of clients treated in past week	25.30	(12.22)	22.28	(11.53)	23.33	(12.88)	0.014[2]
Number of clients treated with PTSD in past week	18.89	(12.51)	8.46	(6.54)	4.10	(5.35)	<0.001[2]
Hours of administrative work	12.67	(6.97)	13.97	(6.80)	10.96	(7.96)	<0.001
Hours doing client care	25.01	(8.23)	24.04	(7.59)	23.59	(10.44)	0.211

[1] p-value for male vs. female
[2] ANOVA of log-transformed variable, due to skew.
Note. Valid percentages were reported to account for missing participant responses.

Table 2. Baseline scores for study outcome measures across service sectors.

	Practice Setting						
	VA		DoD		Community		ANOVA
Outcome Measures	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*p*-value
Familiarity[1]	3.17	(0.56)	3.18	(0.61)	2.93	(0.68)	<0.001
Perceived benefit[2]	5.86	(0.48)	5.87	(0.51)	5.95	(0.49)	0.058
Referrals[3]	10.30	(3.80)	8.86	(3.93)	7.19	(4.30)	<0.001
EBPAS requirements[4]	3.49	(1.02)	3.65	(1.08)	3.42	(1.19)	0.190
EBPAS appeal	4.32	(0.56)	4.35	(0.56)	4.26	(0.55)	0.302
EBPAS openness	3.97	(0.69)	4.01	(0.74)	3.84	(0.73)	0.055
EBPAS divergence	1.85	(0.62)	1.93	(0.62)	2.04	(0.63)	0.004
EBPAS total	4.01	(0.49)	4.05	(0.52)	3.90	(0.52)	0.014

[1] Familiarity is measured on a scale of 1 – 5 for all practices and averaged across the 26 practices. 1 = Not at all familiar/never heard of it; 2 = Slightly familiar; 3 = somewhat familiar; 4 = Moderately familiar; 5 = Extremely familiar/know it very well

[2] Perceived benefit is measured on a scale of 1 – 7 and averaged across the 26 practices. 1 = Great harm; 2 = Moderate harm; 3 = Slight harm; 4 = Neither harm nor benefit; 5 = Slight benefit; 6 = Moderate benefit; 7 = Great benefit

[3] Referrals is measured on a scale of 0 – 23. 0 – 23 represents the number of practices to which a clinician refers a client.

[4] The Evidence-Based Practice Attitude Scale (EBPAS) and its subscales are measured on a scale of 1 – 5.

Table 3. Intention-to-disseminate analyses of intervention effects at 6- and 12-months post-randomization on primary and secondary outcomes.[a]

		Treatment Arm					
		Clinicians Exchange		Control			
Measure	*Assessment*	*n*	*M (SD)*	*n*	*M (SD)*	*p*-values	
Familiarity[1]	Baseline	453	3.05 (0.62)	152	3.17 (0.63)	Assessment:	<0.001*
	6-Months	279	3.22 (0.58)	100	3.19 (0.63)	Treatment Arm:	0.459*
	12-Months	285	3.38 (0.62)	110	3.21 (0.65)	Interaction:	0.005*
Number of practices with increase in familiarity[2]	Baseline to 6-Months	279	7.20 (4.09)	100	6.19 (3.82)	Treatment Arm:	0.032**
	6 to 12-Months	285	5.62 (4.60)	110	5.14 (4.34)	Treatment Arm:	0.341**
	Baseline to 12-Months	285	8.71 (4.70)	110	7.26 (4.13)	Treatment Arm:	0.005**
Perceived benefit[3]	Baseline	453	5.88 (0.50)	152	5.94 (0.46)	Assessment:	0.948*
	6-Months	278	5.89 (0.43)	100	5.86 (0.43)	Treatment Arm:	0.826*

	12-Months	285	5.91 (0.49)	110	5.86 (0.47)	Interaction:	NS*
Number of practices with increase in perceived benefit[4]	Baseline to 6-Months	278	4.85 (3.37)	100	4.38 (3.19)	Treatment Arm:	0.231**
	6 to 12-Months	285	3.99 (3.72)	110	3.67 (3.58)	Treatment Arm:	0.444**
	Baseline to 12-Months	285	5.52 (3.69)	110	4.88 (3.31)	Treatment Arm:	0.114**
Referrals[5]	Baseline	453	8.80 (4.28)	152	8.97 (4.19)	Assessment:	0.001*
	6-Months	279	8.86 (5.06)	100	8.33 (4.53)	Treatment Arm:	0.059*
	12-Months	285	9.16 (5.14)	110	8.47 (5.00)	Interaction:	NS*
Number of practices with increase in referrals[6]	Baseline to 6-Months	279	1.62 (1.87)	100	1.95 (2.24)	Treatment Arm:	0.129**
	6 to 12-Months	285	1.50 (2.21)	110	1.16 (1.56)	Treatment Arm:	0.356**
	Baseline to 12-Months	285	1.98 (2.23)	110	1.80 (2.11)	Treatment Arm:	0.740**
	Baseline	452	3.51 (1.08)	152	3.43 (1.14)	Assessment:	0.552*

EBPAS requirements scale[7]	6-Months	243	3.50 (1.08)	90	3.24 (1.08)	Treatment Arm:	0.111*
	12-Months	270	3.43 (1.14)	105	3.40 (1.12)	Interaction:	NS*
EBPAS appeal scale	Baseline	453	4.29 (0.54)	152	4.34 (0.59)	Assessment:	0.439*
	6-Months	244	4.31 (0.56)	90	4.21 (0.54)	Treatment Arm:	0.329*
	12-Months	270	4.37 (0.56)	105	4.26 (0.61)	Interaction:	NS*
EBPAS openness scale	Baseline	453	3.90 (0.71)	152	3.99 (0.73)	Assessment:	0.206*
	6-Months	244	3.83 (0.73)	90	3.86 (0.73)	Treatment Arm:	0.556*
	12-Months	271	3.92 (0.73)	105	3.86 (0.78)	Interaction:	NS*
EBPAS divergence scale	Baseline	452	1.94 (0.62)	152	1.93 (0.66)	Assessment:	0.393*
	6-Months	244	1.93 (0.63)	90	1.95 (0.74)	Treatment Arm:	0.781*
	12-Months	271	1.98 (0.64)	105	2.01 (0.64)	Interaction:	NS*

EBPAS total	Baseline	452	3.97	152	3.99	Assessment:	0.473*
scale			(0.50)		(0.54)		
	6-Months	243	3.96	90	3.88	Treatment	0.396*
			(0.48)		(0.55)	Arm:	
	12-Months	270	43.96	105	3.91	Interaction:	NS*
			(0.47)		(0.54)		

[1] Familiarity is averaged across the 26 practices and has a range of 1 – 5: not familiar to extremely familiar.

[2] Number of practices with increase in familiarity has a range of 0 – 26.

[3] Perceived benefit is averaged across the 26 practices and has a range of 1 – 7: great harm to great benefit.

[4] Number of practices with increase in perceived benefit has a range of 0 – 26.

[5] Referrals has a range of 0 – 23 and represents the number of practices to which a clinician refers a client.

[6] Number of practices with increase in referrals has a range of 0 – 23.

[7] All EBPAS scales have a range of 1 – 5.

* Models that included all study assessments have p-values for treatment arm, study assessment, and the interaction of treatment arm and study assessment, if significant.

** Models for increases in number of practices from one study assessment to another have p-values only for treatment arm.

[a] The results of models including covariates were similar.

Figure 1. Design of Clinicians Exchange (active registry) dissemination trial.

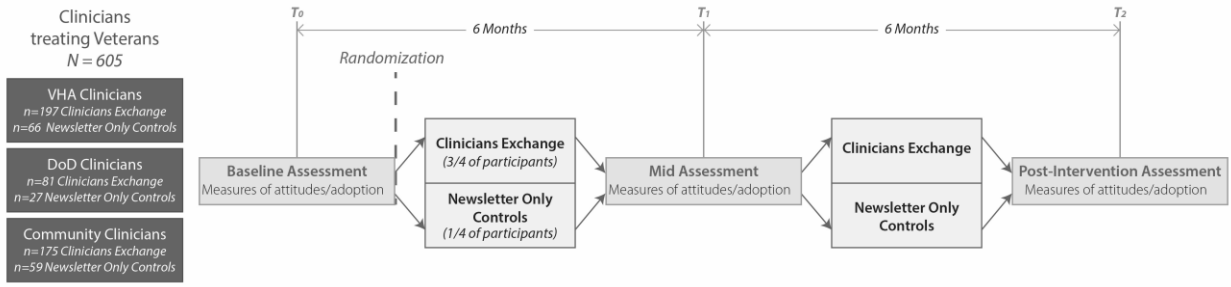


Figure 2. Baseline ratings of familiarity across practices.

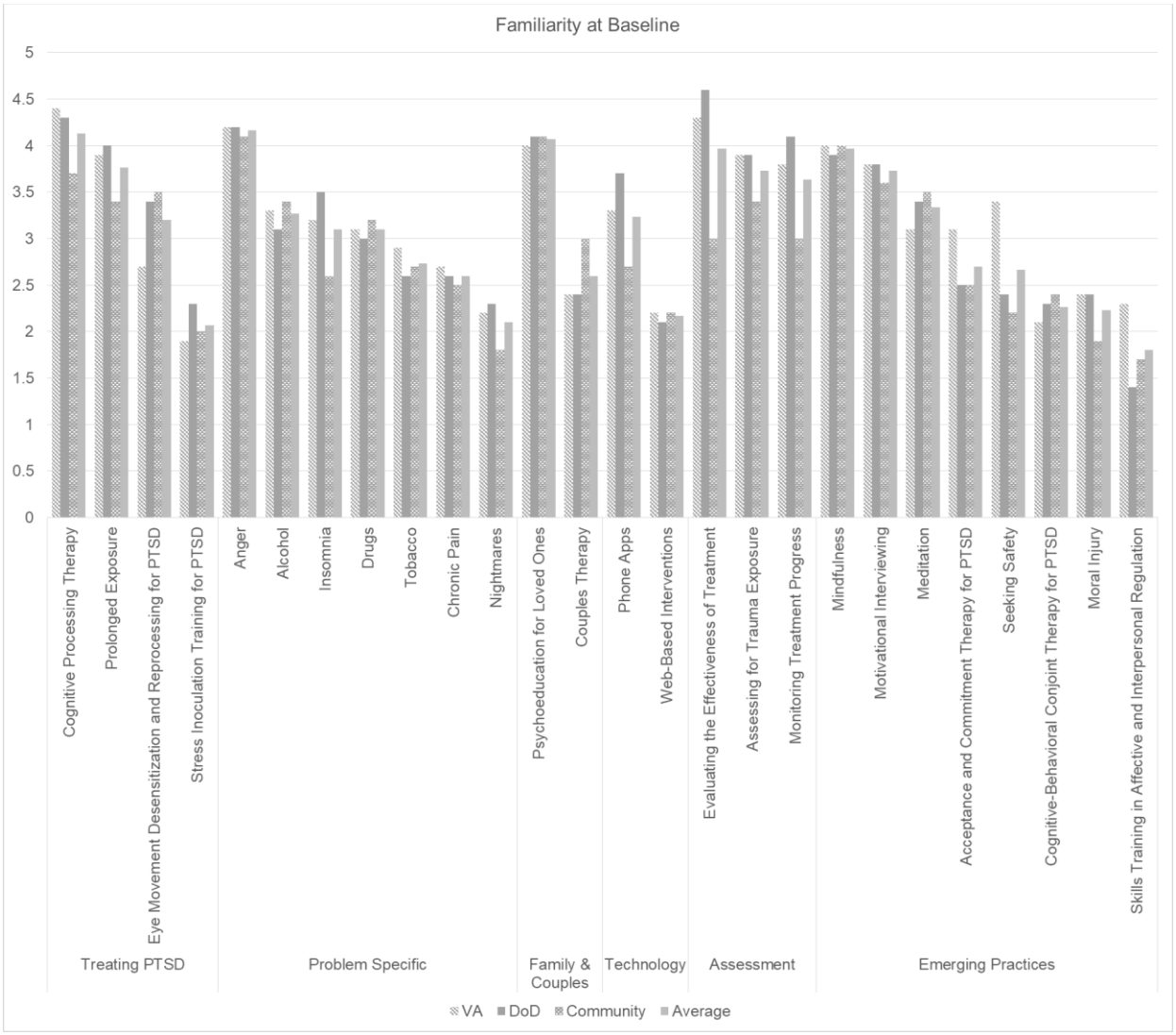


Figure 1. Consort diagram of recruitment and retention.

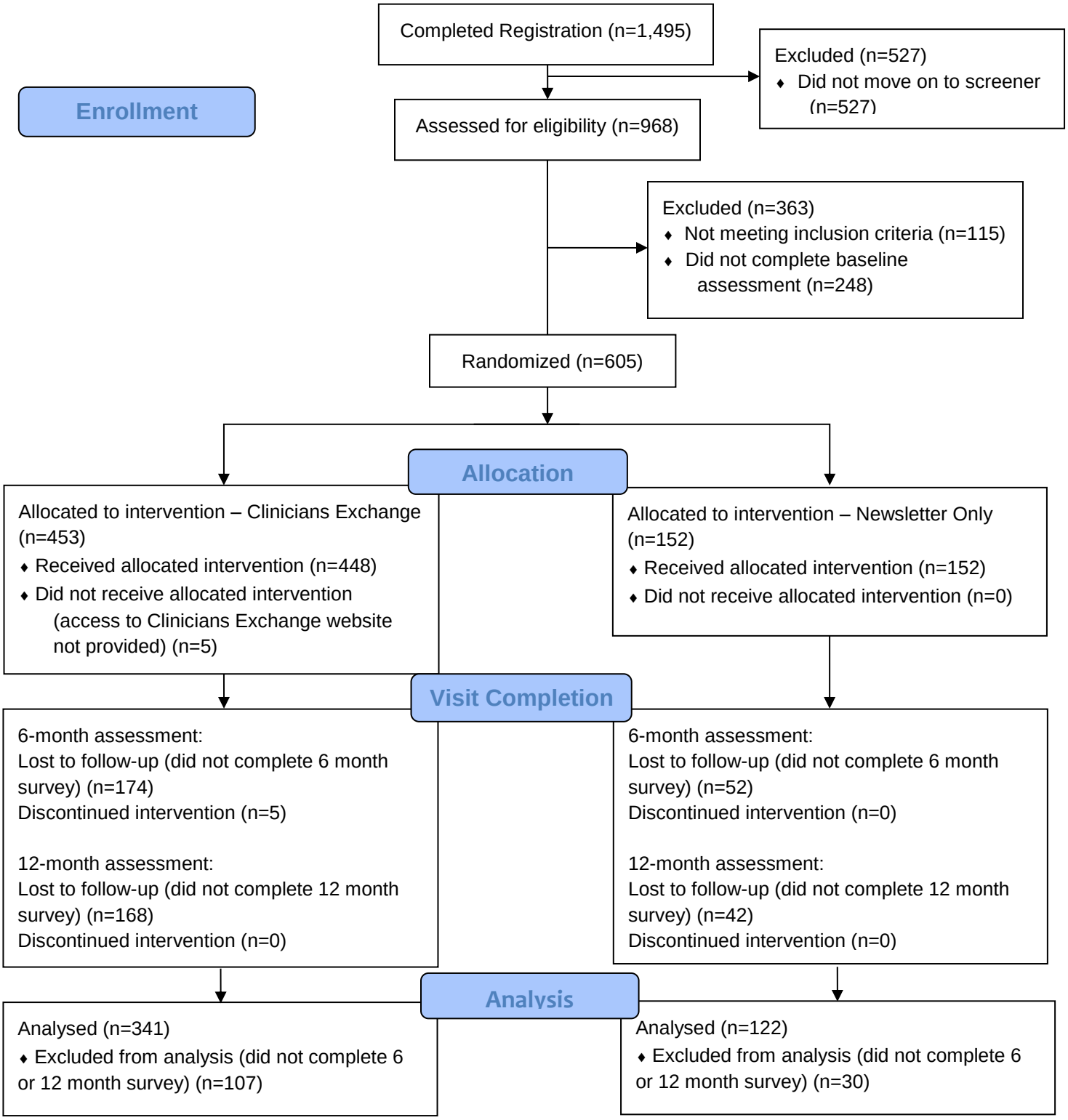


Figure 2. Screenshot of Clinicians Exchange website.

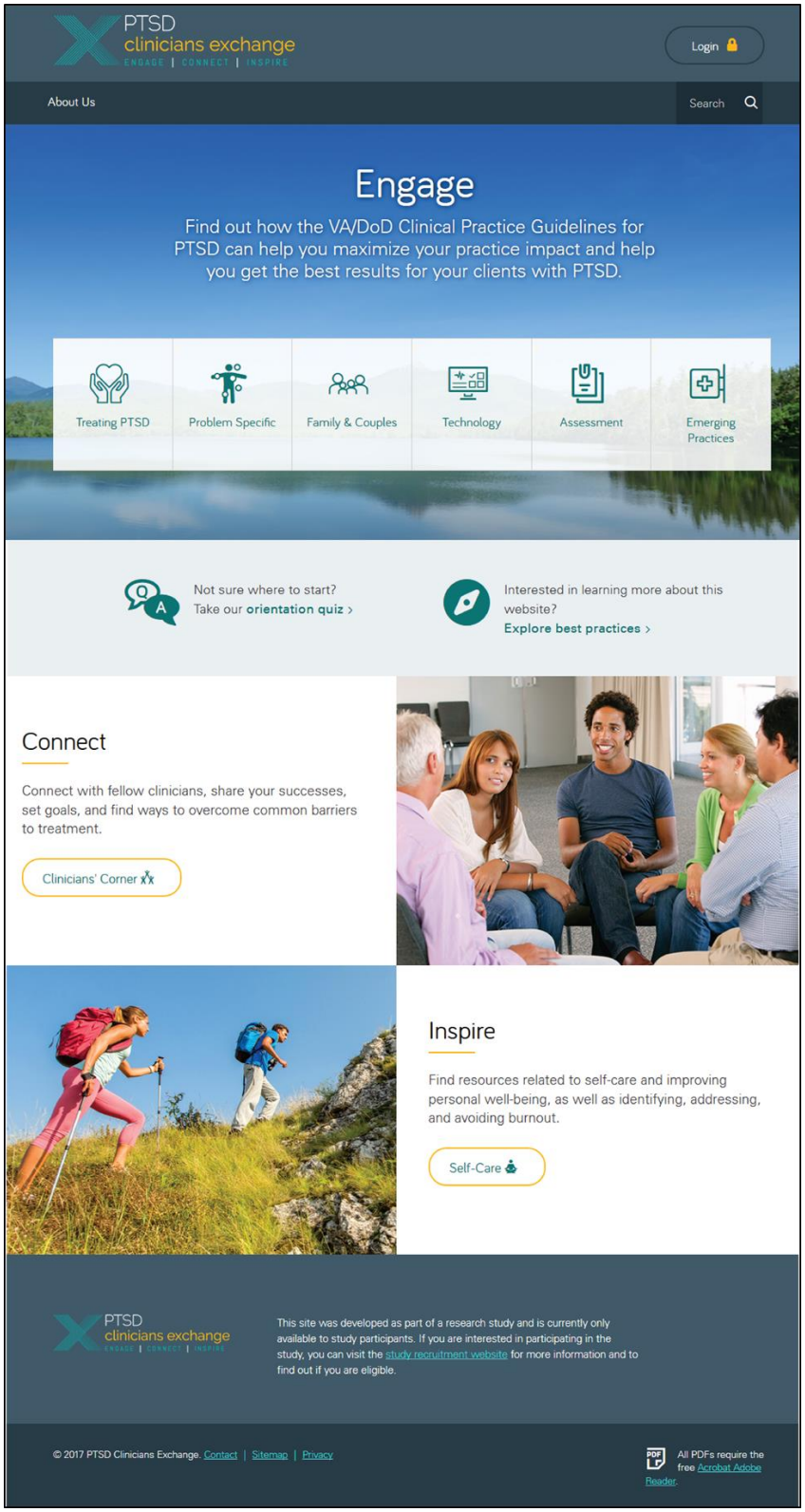
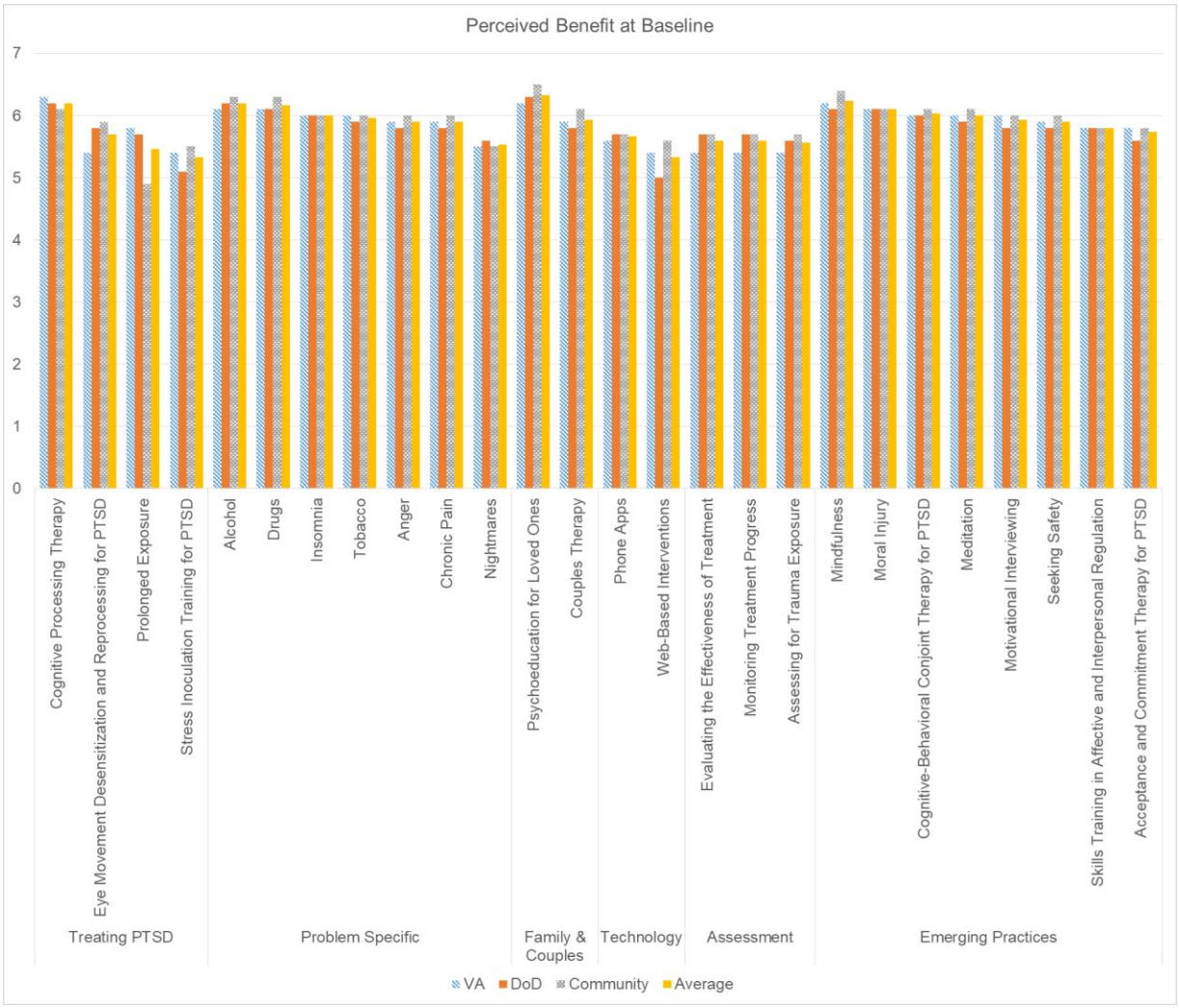


Figure 3. Baseline ratings of perceived benefit across practices.



WORDS: 5,000
TABLES: 4
FIGURES: 8
APPENDICES: 2
REFERENCES: 19

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Understanding How Clinicians Use a New Web-based Tool for Disseminating Evidence-Based Practices for the Treatment of PTSD: The PTSD Clinicians Exchange

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Abstract
The PTSD Clinicians Exchange is a website to support clinicians treating veterans and active duty military personnel with PTSD. The Exchange was evaluated in a large-scale randomized controlled trial (N=605). Qualitative feedback was also obtained before the development of the website (N=56) and again after participation in the trial (N=54). This manuscript explores the extent to which clinicians randomized to the intervention (n=453) engaged with the Exchange by investigating detailed web analytics and qualitative feedback. It describes the "*who, how, when, what,* and *why"* of website engagement, and to what effect on study outcomes. Only 32.7% of clinicians randomized to the intervention arm ever accessed the website. For those who did use the website, number of pages viewed was positively associated with changes from baseline to 12 months in familiarity (p=0.03) and perceived benefit of practices (p=0.02). Despite low rates of use, engagement did predict improvement in outcomes. Importantly, findings indicate that clinicians are interested in a wide range of practices and are seeking resources that they can easily integrate into their practice. This study demonstrates the importance of measuring website engagement in order to improve the design of web-based resources.

Background
The delivery of evidence-based care for post-traumatic stress disorder (PTSD) is a priority for clinicians working with active-duty military personnel and veterans.[1-4] To improve quality of care for these populations it is essential to ensure that clinicians are adequately informed, trained, and supported in the delivery of best practices. Significant research confirms the benefits of evidence-based treatment for PTSD,[5,6] yet large numbers of clinicians continue to lack the clinical skills, practice attitudes, or necessary knowledge to deliver standard-of-care services.[7-9] The VA-DoD Clinical Practice Guideline for PTSD delineates best practices in management of PTSD.[10] However, it is widely recognized that publication of guidelines has only a small impact on practice, and clinicians often remain unaware of guidelines and unfamiliar with their content.[11]

Several factors account for the failure of dissemination of best practices in this area, including outmoded training models, institutional barriers, lack of support or incentives for change, and limited awareness or adoption readiness on the part of clinicians.[12-14] Clinicians often report having insufficient time or opportunity for advanced training in new evidence-based practices. Systematic communication strategies must "pave the way", increasing readiness and motivation to adopt elements of practice guidelines.[15] Yet, there is no widely implemented system for tracking or monitoring changes in provider attitudes, knowledge, or practices over time. Despite ongoing efforts to disseminate evidence-based and emerging practices, existing programs face significant challenges. These limitations include the high cost and limited reach of in-person trainings, a lack of established networks or practitioner registries for delivering trainings to large numbers of clinicians, an emphasis on specific individual manualized practices rather than a cohesive framework for integrating the variety of evidence-based approaches that might be needed, and challenges in reaching the many community clinicians who treat active duty military personnel and veterans.

The PTSD Clinicians Exchange (the Exchange) is a website designed to support clinicians treating veterans and active duty military personnel with PTSD across the Department of Veterans Affairs (VA), the Department of Defense (DoD), and community-based settings. The

Exchange was developed using an iterative process that brought together behavioral health researchers, clinical experts, digital strategists, and end-user perspectives. The Exchange was evaluated in a large-scale randomized controlled training trial. Qualitative feedback was also obtained from end-users before the development of the website and again after participation in the trial.

This manuscript explores how participants randomized to the intervention arm of the trial used the Exchange. Few research studies have analyzed detailed user-level tracking data to understand how utilization impacts web training objectives and study outcomes. Studies examining usage patterns have primarily relied on aggregate data from Google Analytics, preventing an examination of the correlation between usage and outcomes. A systematic review of web-based interventions to improve health outcomes found that only three publications have ever evaluated the role of information architecture (the design and features of websites) on impacting health outcomes.[16]

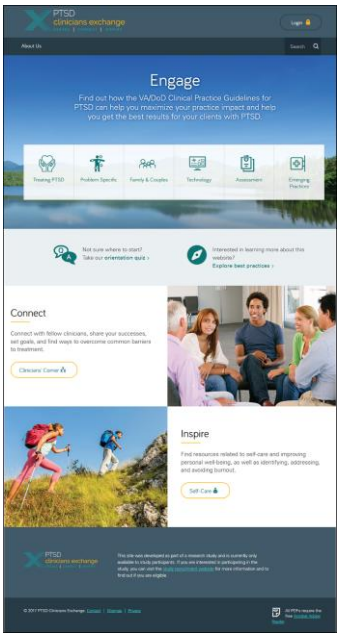
The current study measures the extent to which clinicians engaged with the Exchange by investigating detailed web analytics for each individual participant. Specifically, it considers the "*who, how, when, what,* and *why"* of participants' engagement with the intervention, and to what effect on study outcomes. Incorporating qualitative findings provides further insight into patterns of use.

Methods

Intervention

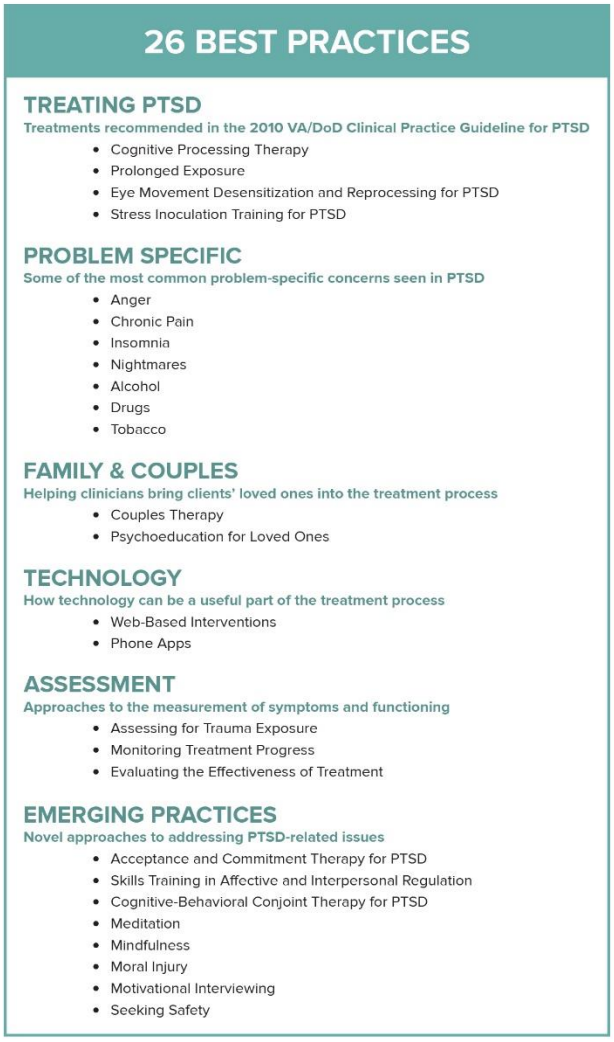
The Exchange connects clinicians with clinically relevant information and resources supporting the delivery of evidence-based and emerging practices for the treatment of PTSD. It includes collaborative features linking clinicians together as well as resources for reducing burnout and supporting clinician well-being (**Figure 1**).

Figure 1. Screenshot of the PTSD Clinicians Exchange



The "Explore Best Practices" section contains curated resources for 26 best practices, organized into six categories (**Figure 2)**. Each individual practice has its own page which includes a brief description of the practice and its importance, hyperlinks to 5-9 external resources, brief explanatory videos (when available) to provide context, and a concept quiz where clinicians can test their knowledge and work toward earning "badges" for exploring the content.

Figure 2. Outline of the Six Practice Categories and Individual Practices Covered



"Clinician's Corner" focuses on connecting clinicians with guidance from experts and peers. It includes interviews with experts discussing their perspectives on the practices, as well as a Q&A section where participants can submit questions to be answered by an expert or peer support specialist. It also contains a discussion board for participants to communicate with one another directly. Other features in this section include sharing successes, setting goals, and vignette case examples with quizzes.

The "Self-Care" section emphasizes clinician well-being, providing tools and resources related to reducing burnout and practicing self-care. It also contains an electronic version of the

Professional Quality of Life Scale (ProQOL), allowing participants to assess their levels of compassion satisfaction and fatigue.

"Resources" is a library-style section containing links to all curated external resources organized by resource type. This section provides participants with easy, direct access to tools such as handouts, articles, and trainings to use in their daily practice.

Measurements of Engagement with the Exchange

Usage metrics were captured at the individual user level, enabling not only the ability to describe how participants used the Exchange, but also to assess the relationship between participants' engagement and corresponding changes in outcomes. Objective website usage was assessed by a tracking system which extracted every interaction with the Exchange for each participant randomized to the intervention, including:

1. Number of pages viewed, calculated by totaling the number of times a participant clicked onto any page within the website (including multiple views of the same page). Each view was cataloged according to the section and individual practice within the website to understand where within the site participants went.

2. Number of links clicked, because the Exchange provides over 100 links to external resources, it was important to measure access to these resources. While it was not possible to capture the extent to which participants engaged with these external tools, link clicks were measured to understand the types of resources accessed by subject and resource type.

3. Time spent viewing the site was calculated by totaling the number of minutes between the timestamps on the first and last pages visited during a single visit. When a participant viewed only one page during a visit to the site, there was no "next page viewed" during that visit and thus no time spent was calculated. Accordingly, the N for this variable is smaller, as this measure includes only participants who viewed more than one page.

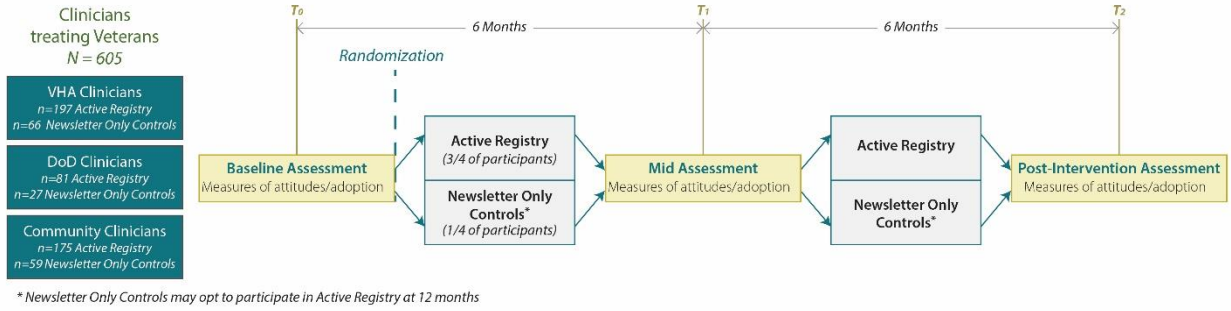
4. Number of visits to the site, when identifying the total number of visits an individual made to the site, any time interval of more than 30 minutes between two page views was categorized as a separate visit. There were typically days or months between each visit, but in some cases participants did access the site more than once in the same day. To address this, the total number of days each participant accessed the site was also calculated.

Study Design

The Exchange was evaluated in a large-scale randomized controlled trial of 605 mental health clinicians in three service sectors (263 VA, 234 Community, 108 DoD) at three time points (baseline, 6 months, 12 months) (**Figure 3**). All website usage data and corresponding outcomes of interest in this manuscript are measured from randomization to 12 months post-randomization. This study approved by Stanford University and New England Research Institutes Institutional Review Boards (Approval #: C01528).

A total of 453 of 605 clinicians (3:1 ratio) were randomized to the intervention arm which included access to the Exchange and bi-weekly email reminders highlighting specific practices for 12 months. All participants, in either arm, received a bi-monthly *Clinicians Trauma Update* newsletter produced by the National Center for PTSD containing summaries of research pertaining to the treatment of PTSD unrelated to the website. The objective of the trial was to systematically evaluate the impact of the Exchange intervention on clinician familiarity, perceived benefit, and referral for best practices for PTSD care.

Figure 3. Trial Design



Quantitative Methods

Descriptive statistics of web usage are presented in the form of counts and percentages for categorical data and mean, standard deviation (SD), median, and inter-quartile range (IQR) for continuous data. P-values are presented for simple correlation/regression between number of pages and descriptive variables. Comparison of web usage by demographics and background characteristics was performed using student t-test or analysis of variance (ANOVA), as appropriate. Correlation between calculated and self-reported time spent the website was explored using ANOVA testing. To examine the association between exposure and change in outcomes, unadjusted linear regression models were first fit with each usage metric as the only predictor, then adjusted models were fit step-by-step by adding covariates significant in the unadjusted analyses at the $p<0.1$ level. Finally, backwards variable selection was used to create the final model. All analyses were performed using SAS software (version 9.4; SAS Institute Inc., Cary, NC).

Qualitative Methods

To inform the development of the Exchange, semi-structured interviews (N=54) were conducted to understand both the practical and conceptual training needs of clinicians related to their treatment of PTSD. This feedback resulted in strategic design decisions regarding the development of the Exchange to help ensure that it would meet the needs of, and appeal to, the target audience. Upon completion of the randomized controlled trial, additional semi-structured interviews (N=56) were conducted with clinicians from the intervention arm who identified as having spent at least one hour using the Exchange. The objective of these interviews was to hear clinicians' first-hand experiences with the Exchange.

Results

Who Used the Exchange ("who"):

Out of the 453 clinicians randomized to the intervention arm, 148 participants (32.7%) logged into the website at least once during the 12 month study period. DoD clinicians were

significantly more likely to access the Exchange than their Community and VA counterparts ($p<0.001$). There were no other significant differences between users and non-users. Results reported in this manuscript are focused on a sub-group analysis of those participants in the intervention arm who accessed the Exchange at least once (N=148). Results of intention-to-treat analyses are currently under development (unpublished manuscript).

Among those who accessed the Exchange, participants from the DoD ($p=0.02$) and those who reported experiencing less burnout ($p<0.001$) viewed significantly more pages than those in other practice settings or those reporting more burnout (**Table 1**). Similar findings were seen when looking at the total number of visits participants made to the Exchange. Psychologists spent significantly less time on the Exchange ($p=0.003$, an average of 8 minutes compared to 18 minutes for social workers), as did those with less organizational support for trying out new practices ($p=0.03$, an average of 12 minutes compared to 19 minutes).

Table 1. Number of Pages Viewed by Demographics and Background Characteristics

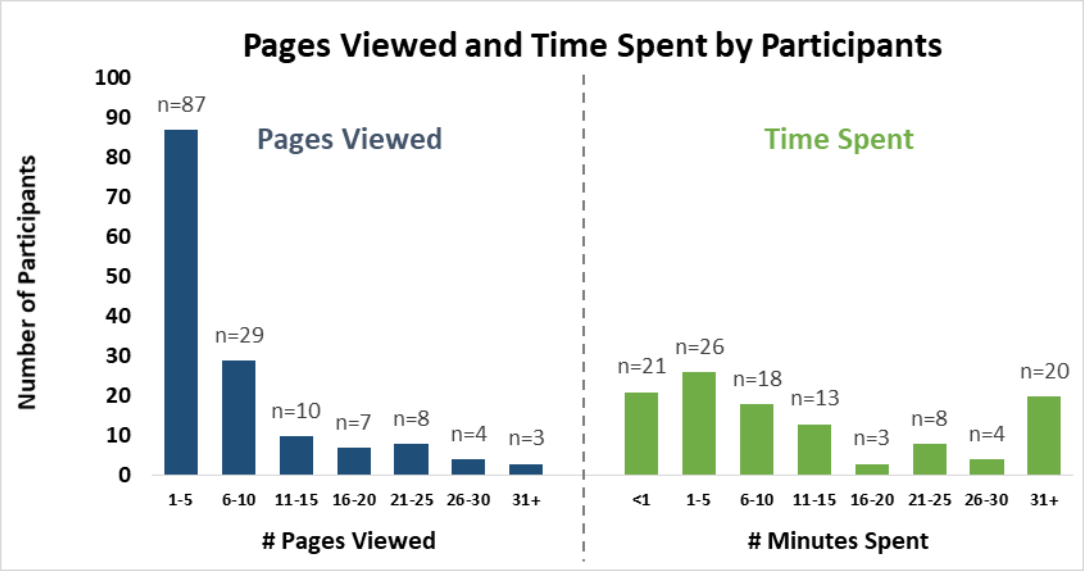
		N	Mean (SD)	Median, IQR	Range	Slope	SE	p-value
Practice setting								
	VA	75	6.7 (8)	4, 1-8	1, 41			(ref)
	DoD	37	10.4 (9.3)	7, 3-17	1, 33	3.70	1.59	0.02
	Community	36	5.9 (5.7)	4, 2-8.5	1, 26	-0.79	1.60	0.62
Years of experience with mental health								0.37*
	0-15 Years	77	7.8 (9.1)	4, 1-9	1, 41			(ref)
	>15 years	70	7.1 (6.9)	4, 2-10	1, 29	-0.69	1.34	0.6
Years of experience with veterans								0.99*
	0-6 Years	76	7.2 (7.8)	4, 2-9	1, 37			(ref)
	>6 years	71	7.7 (8.4)	5, 2-10	1, 41	0.58	1.33	0.67
Age								0.45*
	<= 47	73	8.3 (10)	4, 2-11	1, 41			(ref)
	> 47	71	6.5 (5.5)	5, 2-9	1, 22	-1.86	1.35	0.17
Gender								
	Female	96	7.4 (7.9)	4, 2-10	1, 41			(ref)
	Male	49	7.4 (8.6)	5, 1-8	1, 37	0.01	1.43	0.99
Race								
	Caucasian	114	7.2 (8.2)	4, 2-9	1, 41			(ref)
	Black or African American	9	7.2 (5.9)	5, 2-11	1, 17	-0.01	2.80	1
	Other/missing	9	8.1 (8.4)	5, 2-10	1, 26	0.88	2.80	0.75
	Hispanic	7	5.1 (5.2)	2, 2-11	1, 14	-2.09	3.15	0.51
	Mixed	7	10.9 (7.5)	8, 5-20	3, 22	3.63	3.15	0.25
	Asian	2	13.5 (16.3)	13.5, 2-25	2, 25	6.27	5.77	0.28
Primary specialty								
	Social worker	70	9 (9.1)	6, 2-12	1, 41			(ref)
	Psychologist (doctorate)	46	6.1 (6.7)	3.5, 1-8	1, 28	-2.88	1.52	0.06
	Professional mental health counselor	23	5.8 (6.5)	4, 2-8	1, 23	-3.23	1.92	0.09
	Other/missing	5	4 (2.1)	4, 3-6	1, 6	-5.01	3.70	0.18
	Medical professional with psychiatry focus	4	8.8 (11.6)	4, 2-15.5	1, 26	-0.26	4.10	0.95
Trainee (intern, resident, fellow)								

		N	Mean (SD)	Median, IQR	Range	Slope	SE	p-value
	No	140	7.4 (8.1)	4, 2-10	1, 41			(ref)
	Yes	4	8.8 (8.7)	6.5, 3-14.5	1, 21	1.33	4.12	0.75
Organizational support – using treatments supported by research								0.86*
	Score ≥ 8	75	7.5 (7.4)	5, 2-10	1, 29			(ref)
	Score < 8	30	7.6 (10.1)	3.5, 2-8	1, 41	0.17	1.79	0.93
Organizational support – trying out new practices								0.30*
	Score ≥ 8	57	7.1 (7.4)	4, 2-9	1, 29			(ref)
	Score < 8	49	7.9 (9.1)	4, 2-12	1, 41	0.79	1.61	0.62
ProQOL Burnout Scale at baseline								0.01*
	BO Scale > 50	76	5.3 (6.5)	3, 2-6	1, 41			(ref)
	BO Scale ≤ 50	72	9.7 (8.9)	7, 3-14.5	1, 37	4.42	1.27	<0.001
EBPAS Requirements subscale		148				0.46	0.62	0.45*
EBPAS Appeal subscale		148				0.99	1.19	0.41*
EBPAS Openness subscale		148				1.06	0.92	0.25*
EBPAS Divergence subscale		148				-1.44	1.04	0.17*
**p values from simple correlation/regression between number of pages and X as a continuous variable*								

How Participants Used the Exchange ("how"):

Of those who viewed the Exchange, approximately one in four (23.6%) never viewed more than one page, and more than half (58.8%) never viewed more than five pages throughout the entire study period. On average, participants visited the Exchange approximately two times with 7.44 pages viewed and 13.49 minutes per visit (**Figure 4, Appendix 1**).

Figure 4. Pages Viewed and Time Spent by Participants



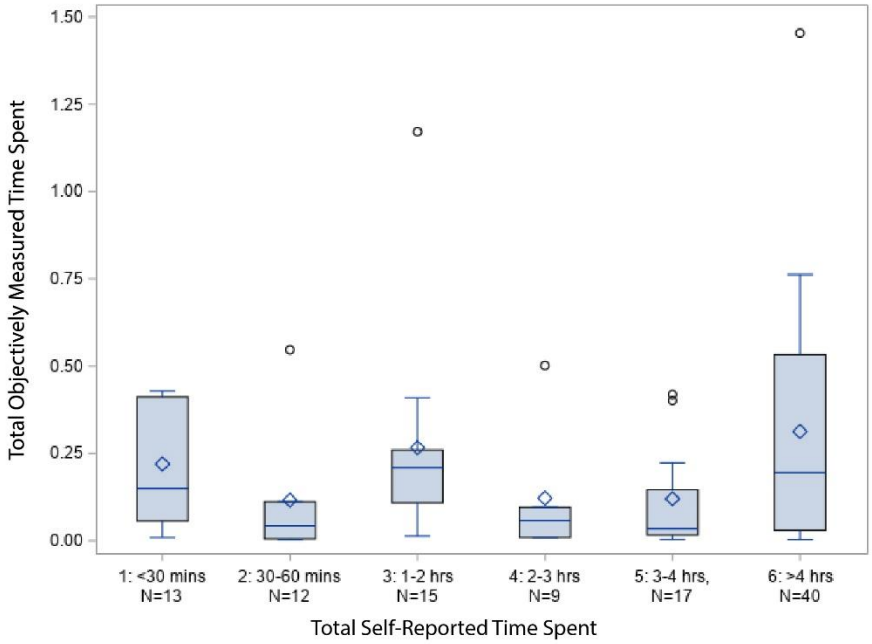
During qualitative interviews, self-reported use varied widely from one hour over the study period to *"a couple of hours a week."* In general, one third of clinicians indicated they used the website for less than 2 hours over the course of the study; 38% indicated they used the site more than two hours but less than 10 hours; and 30% said they used the Exchange more than 10 hours over the course of the study. Although a handful of respondents reported they checked the website, *"once a week"* or *"periodically,"* most respondents lamented they did not use the

website as much as they *"should have"* or "*would have liked."* As one participant explained, *"To be honest, I didn't use it very often, so that was the part that nagged at me during the study period, is that I knew that resource was there, but I just didn't get on it as often."*

Clinicians reported barriers that interfered with their ability to use the Exchange. The most common included time, competing commitments, technological problems and a general lack of interest. By far the most frequently reported barrier was lack of time, detailed by 64% of interviewed clinicians. As one explained, *"My work demands are such that it's made it really tough for me to find any time to use the resources you guys provided that look to be so fantastic."*

In addition to the objective measurement and qualitative self-reports of time spent, at the 12-month assessment all participants in the intervention arm provided a self-reported estimate of their total time spent on the Exchange. Among those who viewed more than one page by objective measurement and also completed the 12 month assessment (n=106), there was no correlation between objective and self-reported time spent using ANOVA testing (p=0.21), with participants substantially over-estimating the time they spent on the Exchange (**Figure 5**). Moreover, among the 305 participants who never accessed the Exchange based on objective data, of those who completed the 12-month assessment, only 20% (32/158) reported spending 30 minutes or less. Sixty-six percent (66%) reported spending at least an hour, and 29% reported spending more than four hours, despite having never accessed the tool.

Figure 5. Relationship between Self-Report and Actual Time Spent

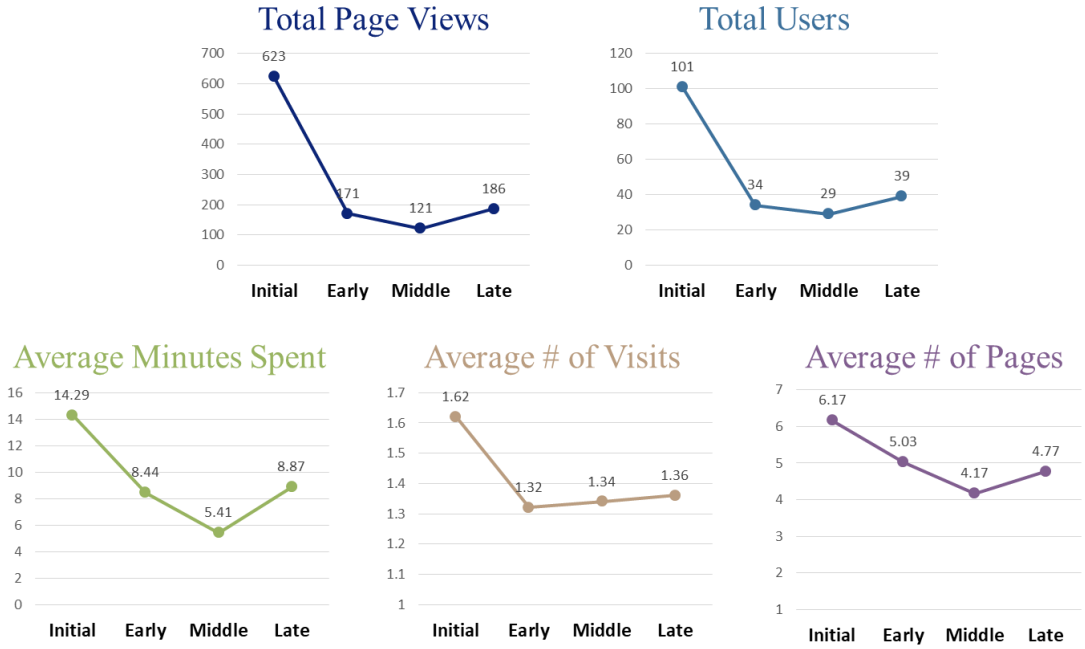


<u>When Participants Used the Exchange ("when"):</u>
To understand trends in participant usage of the Exchange over time, the study period was divided into four roughly equal time periods (**Figure 6, Appendix 1**). Approximately half of all visits to the Exchange occurred in the Initial period (N=101, 49.8%), with the number of users

visiting the site declining during the Early (N=34) and Middle (N=29) period, and a slight increase from the Middle to Late (n=39) period. The average number of page views and average amount of time participants spent on the Exchange followed a similar pattern.

In interviews, clinicians pointed to a variety of reasons for which they engaged with the Exchange throughout the study period. Sixty percent (60%) of interviewed clinicians reported that the bi-weekly emails and bi-monthly newsletters were an essential reminder and prompted them to visit the website. As one participant described, "*[The emails] helped keep the website on my radar."* A small number of clinicians reported they consulted the Exchange when presented with a specific question (13%) or challenging case (9%). A few indicated that their attention waned as the study period went on and as work demands increased; *"Well, initially, when I first started working with it, I would probably spend anywhere from two to three hours a week on it. [But,] it's been ages since I viewed the site."*

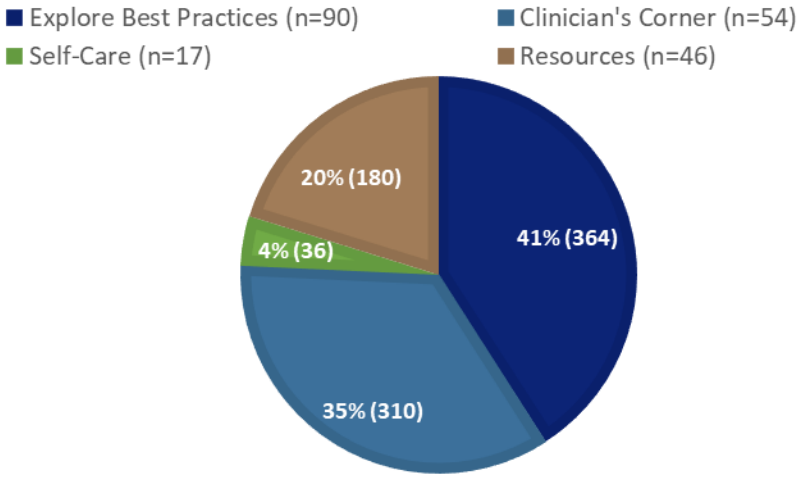
Figure 6. Trends over Time in Participant Access of the PTSD Clinicians Exchange



What Content Participants Used ("what"):

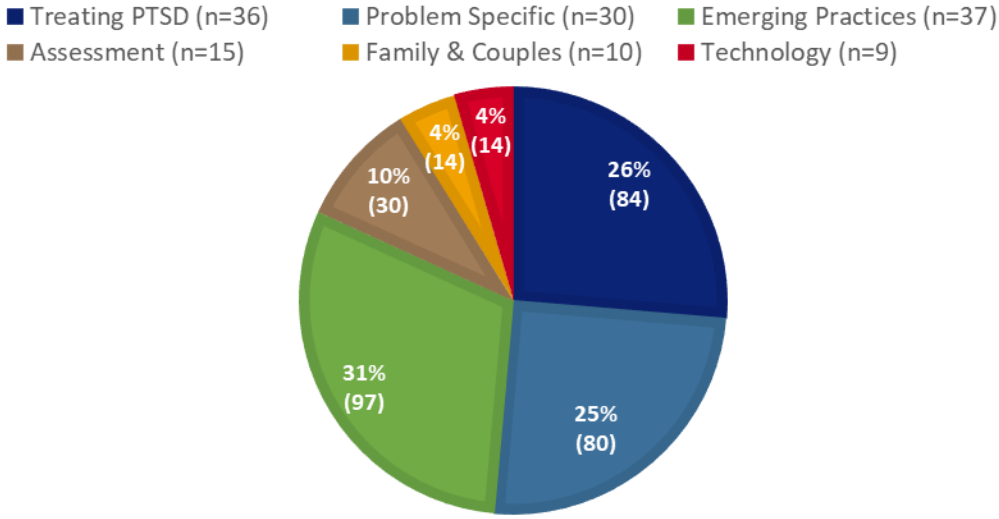
To understand what features and content within the Exchange were most utilized, participant page views were examined (**Appendix 2**). Of the four content areas of the website, "Explore Best Practices" received the most page views (**Figure 7**). However, the four sections were not all the same length. "Explore Best Practices" consists of 35 pages including landing pages, "Clinicians' Corner" is 11 pages, "Self-Care" is only 2 pages, and "Resources" is 9 pages. When calculations account for weighted views according to the number of pages per section, "Explore Best Practices" was viewed less than would be expected if the volume of pages were equal (0.67 times as much as would be expected), whereas "Clinicians' Corner", "Self-Care", and "Resources" were all viewed more than would be expected when equally weighted (1.81, 1.16, and 1.28 times more, respectively).

Figure 7. Page Views by Content Section: %, (n pages viewed)



Within the "Explore Best Practices" section, the most popular categories were "Treating PTSD", "Problem Specific", and "Emerging Practices" (**Figure 8**). The remaining sections each received less than 10% of page views. Due to their small sample size (N<20), these sections were omitted from outcome analyses.

Figure 8. Page Views by Content Section: %, (n pages viewed)



While a primary goal of the Exchange was to provide brief, easily accessible information about each practice, external resources were also provided for further education and training. The number of pages and resources viewed for each practice are presented in **Table 2**.

Table 2. Usage by 26 Individual Practices

Section	Individual Practices	Number of page views (% of total page views)	Number of resources viewed
Treating	Cognitive Processing Therapy	21 (10.29%)	24

PTSD	Stress Inoculation Training	20 (9.8%)	24
	Eye Movement Desensitization and Reprocessing	9 (4.41%)	19
	Prolonged Exposure	5 (2.45%)	12
Problem Specific	Nightmares	17 (8.33%)	9
	Anger	12 (5.88%)	9
	Chronic Pain	11 (5.39%)	9
	Insomnia	11 (5.39%)	8
	Alcohol	2 (0.98%)	0
	Tobacco	2 (0.98%)	3
	Drugs	1 (0.49%)	6
Emerging Practices	Moral Injury	18 (8.82%)	10
	Mindfulness	12 (5.88%)	9
	Motivational Interviewing	11 (5.39%)	10
	Skills Training in Affective and Interpersonal Regulation	10 (4.9%)	15
	Acceptance and Commitment Therapy for PTSD	6 (2.94%)	12
	Meditation	3 (1.47%)	6
	Cognitive-Behavioral Conjoint Therapy for PTSD	2 (0.98%)	5
	Seeking Safety	1 (0.49%)	7
Assessment	Assessing for Trauma Exposure	13 (6.37%)	8
	Evaluating the Effectiveness of Treatment	4 (1.96%)	3
	Monitoring Treatment Progress	0 (0%)	0
Family & Couples	Psychoeducation for Loved Ones	3 (1.47%)	11
	Couples Therapy	2 (0.98%)	11
Technology	Web-Based Interventions	5 (2.45%)	1
	Phone Apps	3 (1.47%)	5

Resources were categorized into eight types. Roughly half (52%) of all participants who accessed the Exchange viewed an external resource. Resources were available two ways: by practice (through each individual practice page), as well as by resource type (through the resource library). Fifty-six (56) participants viewed at least one resource from the practice pages while only 41 viewed a resource from the resource library. However, only 43% of all resource views occurred on practice pages, indicating that participants accessing resources through the library were viewing a larger volume of resources, on average.

The types of resources accessed varied slightly between the two sections, with "Handouts & Worksheets" remaining the most popular resource type regardless of access point (**Table 3**). Resources in the "Treating PTSD" section were the most frequently viewed, receiving roughly a quarter of all resource views (**Table 2**).

Table 3. Resource Usage by Resource Type

Resource type	**N of participants who accessed type of resource**	**N of resources accessed through "Explore Best Practices"**	**N of resources accessed through "Resources"**
Handouts & Worksheets	37	19	19

Resource type	N of participants who accessed type of resource	N of resources accessed through "Explore Best Practices"	N of resources accessed through "Resources"
Websites & Apps	28	13	15
Articles & Books	22	18	4
Trainings	21	8	13
Manuals & Guides	21	9	12
Questionnaires & Screeners	13	7	6
Presentations	12	3	9
Video & Audio	11	2	9

Clinicians' comments from the qualitative interviews offer insight into the ways participants used the Exchange. The most commonly cited use was as a "*one-stop shop*" for *"comprehensive"* and *"credible"* resources for PTSD treatment. This was the case for slightly less than one third of interviewed clinicians. These clinicians indicated they appreciated having reliable, trustworthy and up-to-date information in one location, expressing *"I called it a 'goldmine.' I was very excited. …this was having a PTSD library of everything you could probably want all in one place."* About one in four clinicians interviewed reported using Exchange materials to help clients better understand PTSD and inform them of various treatment options. A small group (10%) felt the Exchange offered a good *"refresher"* and confirmation of their use of evidence-based practices. As one participant described, *"A lot of this was more reinforcing some of the things that I already knew and enhancing and deepening my knowledge base... Keeping me fresh."*

Impact of Engagement on Outcomes

The final objective was to explore the potential dose-response relationship between three measures of engagement and participant attitudes, familiarity, perceived benefit, and referral for these practices. For each outcome variable (difference between baseline and 12-months), linear regression was used to investigate the relationship between the outcome variable and usage metrics, adjusting for potential confounders. Practice setting, professional discipline, and ProQOL score at baseline were associated with outcomes in univariate analyses. These univariate predictors were all excluded in the backward selection in multivariable regression analysis. The final model included only the website usage variables. The number of pages viewed was positively associated with changes from baseline to 12 months in familiarity with practices (p=0.03) and perceived benefit of practices (p=0.02) (**Table 4**).

Table 4. Multivariate Modeling of Change from Baseline to 12-Months: Regression coefficient (SE), p-value

Predictors	Total minutes spent on the site	Number of pages viewed	Number of visits to the site

Attitude toward evidence-based practices (EBPAS total scale)	-0.002 (0.003) P=0.561 (N=77)	-0.006 (0.004) P=0.209 (N=107)	-0.008 (0.021) P=0.692 (N=107)
Average familiarity with practices	-0.002 (0.003) P=0.519 (N=81)	0.011 (0.005) P=0.029 (N=111)	0.039 (0.024) P=0.114 (N=111)
Average perceived benefit of practices	0.0002 (0.002) P=0.943 (N=81)	0.010 (0.004) P=0.016 (N=111)	0.014 (0.021) P=0.506 (N=111)
Number of referrals for practices	-0.024 (0.029) P=0.425 (N=81)	0.044 (0.047) P=0.349 (N=111)	0.154 (0.238) P=0.519 (N=111)

While number of pages viewed was the strongest predictor of change from baseline to 12 months, there were no significant associations between the outcomes and page views for specific practice categories (Emerging Practices, Problem Specific, and Treating PTSD). It is likely a result of small sample sizes (N<30), that the association between each outcome variable and number of pages viewed was not found to be significant using linear regression.

Discussion

This study reports on clinician engagement with a web-based educational resource in the context of a large-scale randomized controlled trial. While a limited number of participants ever used the tool and many engaged with it only briefly, these patterns along with the qualitative interviews identified a number of potential barriers and offer important considerations for designing web based trainings. Despite the low rate of overall use, a subset of clinicians showed more active engagement, and this engagement did predict improvement in outcomes of interest.

In an effort to understand who, how, when, and to what effect the Exchange was utilized, notable differences in use patterns were observed as described in the results. Importantly, the study revealed where clinicians were most likely to spend their limited time and what tools they were most likely to engage with. These patterns of use indicate that clinicians are interested in a wide range of practices and are seeking resources that they can easily integrate into their practice.

Strengths of the study include a large sample size, inclusion of subsamples representing three service delivery sectors, and use of objective measures of site utilization. The iterative, person-centered approach to designing the Exchange is also a strength. Few existing programs have integrated the perspectives of end-users in their design. A 2017 Dartmouth College workshop on innovations in Emerging Technology and Data Analytics for Behavioral Health called for "behavioral health researchers to work iteratively with experts in emerging technology and data analytics" and "to develop new analytical methods that can scale to thousands of individuals and billions of data points".[17]

Another strength of this trial is the multidimensional approach to tracking objective utilization of the intervention. While tracking page views is becoming more common in studies of satisfaction or user experience, few research studies have incorporated links clicked or time spent by individual users, and even fewer have analyzed detailed user-level tracking data to understand whether utilization impacts training objectives and study outcomes.[16,18] The majority of trials

that have incorporated these evaluations of objectively measured engagement and outcomes have been directed toward patients. A systematic review of the impact of adherence to web-based therapies on their effectiveness identified sixty-nine studies that have measured adherence to an online intervention. The majority of these studies used number of logins as their adherence metric. Eighteen studies captured the time participants spent online and five measured number of pages viewed. Importantly, only three studies explored the relationship between website exposure and outcomes.[18]

The primary limitation of these findings is the low adherence rate, with only one third of participants ever accessing the intervention and even smaller sub-groups utilizing specific content areas and resource types. While there was significant improvement in familiarity and perceived benefit with increased exposure to the intervention overall, the limited sample size for engagement in specific areas of the website resulted in insufficient power to evaluate the relationship among these variables.

The measurements of time spent on the Exchange also present limitations. Even within the objective measurements, it is not possible to determine whether a participant was focused on the website or if they multi-tasked or walked away from the computer. Objective time spent is also systematically reduced due to a lack of time stamp data when only a single page was viewed, as well as for the last page viewed during all visits. Time spent viewing external resources also could not be calculated in the measurement of time spent, leading to further underestimation in this variable.

The lack of correlation between self-report and measured time spent warrants further examination. Just over half of all participants who accessed the Exchange viewed external resources. A primary purpose of the Exchange was to link clinicians with information on best practices, and for those who accessed the Exchange, this appears to have been achieved much of the time. It seems likely these participants may not have differentiated between their time on the Exchange and linked resources, leading them to report much greater use than tracking metrics indicated. Another possible explanation is that participants may have included time spent on study surveys and other trial components in their estimations. These measurement limitations may help expect the poor concordance of self-reported site use and the objective measure.

Conclusions

This study demonstrates the importance of measuring multidimensional per-participant website engagement in order to establish the relationship between website engagement and intended outcomes. Beyond understanding the impact of engagement on behavior change, these metrics are also helpful to illuminate the patterns of usage which can inform the development of web-based educational resources. When designing tools to disseminate best practices, it is critical to anticipate and account for how clinicians are likely to use these materials and how they can integrate them into practice.

This novel approach to measuring engagement contributes to the field by providing an easily adopted model for designing, developing and implementing a rigorous approach to measuring participant utilization of web-based interventions. This methodology, as demonstrated in this study on best practices for PTSD, can elicit patterns of usage, trends over time, priority topics

and resources, and the dose-effect of utilizing the tool. These metrics provide meaningful insights that can be directly translated into the strategic design of more impactful programming.

Despite lower than anticipated utilization among trial participants, it is important to recognize that even if only a small subset of clinicians adopt these web-based tools, they still provide a meaningful addition to existing training programs, due to their cost-efficient and easily scalable nature. For instance, the utilization rate seen in this trial, if scaled to the entire VA, would reach approximately 6,500 of over 20,000 VA-employed mental health clinicians. Moreover, if this tool were able to reach 33% of all mental health clinicians in the US, it would impact over 160,000 clinicians.

While clinicians are often mandated to attend trainings in order to maintain accreditation and are encouraged to integrate new evidence-based strategies into their everyday clinical practice, many trainings are in person and/or have limited availability. Online resources, especially when designed to provide practical information and resources that can be easily integrated into daily responsibilities, present an opportunity to broaden the availability of established evidence-based materials and to increase clinician knowledge of these practices.[14,19]

Web-based interventions hold great promise for the dissemination of best practices to clinicians. The current knowledge-base would expand greatly with better insight into how clinicians actually engage with these resources and how this utilization impacts outcomes. This study provides preliminary insight into who accesses these tools, when, in what ways, and with what results. Further research into clinicians' actual utilization of web-based tools and trainings is greatly needed. Findings from this study provide the foundation for which advanced analytics can become standard practice in trials of online interventions.

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Appendix 1. How and When Participants Accessed the PTSD Clinicians Exchange

	N*	Mean (SD)	Median, IQR	Min, Max
Overall (Full Study Period)				
Number of days spent on the site	148	1.89 (1.41)	1 (1, 2)	1, 9
Number of visits to the site	148	2.03 (1.59)	1 (1, 3)	1, 10
Number of pages viewed	148	7.44 (8.04)	4 (2, 10)	1, 41
Number of minutes spent on Page View	113	13.49 (15.85)	6.88 (1.66, 23.61)	0.13, 87.24
Initial (Start date - 90 days)				
Number of days spent on the site	101	1.48 (0.82)	1 (1,2)	1, 5
Number of visits to the site	101	1.62 (0.94)	1 (1,2)	1, 5
Number of pages viewed	101	6.17 (7.07)	4 (2, 8)	1, 33
Number of minutes spent on Page View	70	14.29 (16.68)	7.59 (2.03, 23.57)	0.13, 82.07
Early (91 days – 180 days)				
Number of days spent on the site	34	1.26 (0.62)	1 (1,1)	1, 3
Number of visits to the site	34	1.32 (0.77)	1 (1, 1)	1,4
Number of pages viewed	34	5.03 (6.69)	2.5 (1,4)	1,28
Number of minutes spent on Page View	20	8.44 (11.49)	3.77 (1.33, 10.93)	0.26, 36.9
Middle (181 – 270 days)				
Number of days spent on the site	29	1.21 (0.56)	1 (1, 1)	1, 3
Number of visits to the site	29	1.34 (1.01)	1 (1, 1)	1,6
Number of pages viewed	29	4.17 (5.41)	2 (2, 4)	1, 26
Number of minutes spent on Page View	23	5.41 (9.05)	0.77 (0.33, 8.96)	0.11, 32
Late (> 271 days)				
Number of days spent on the site	39	1.33 (0.77)	1 (1, 1)	1, 4
Number of visits to the site	39	1.36 (0.78)	1 (1, 1)	1, 4
Number of pages viewed	39	4.77 (4.69)	2 (1, 7)	1, 18
Number of minutes spent on Page View	26	8.87 (8.25)	7.1 (2.01, 12,03)	0.42, 27.09
**N indicates total number of participants who viewed the website during the 12-month study period. N is lower for minutes spent, as explained in the methods section.*				

Appendix 2. Usage by 6 Practice Categories

	N	Mean	SD	Median	Q1	Q3	Min	Max
Treating PTSD								
Number of days spent on the site	36	1.22	0.54	1	1	1	1	3
Number of visits to the site	36	1.22	0.54	1	1	1	1	3
Number of pages viewed	36	2.33	2.01	1	1	4	1	8
Number of minutes spent on Page View	13	8.28	15.02	2.95	0.74	8.37	0.11	56.18
Problem Specific								
Number of days spent on the site	30	1.23	0.5	1	1	1	1	3
Number of visits to the site	30	1.27	0.52	1	1	1	1	3
Number of pages viewed	30	2.67	2.6	2	1	3	1	10
Number of minutes spent on Page View	13	6.59	7.32	3.9	0.51	10.46	0.07	23.05
Emerging Practices								
Number of days spent on the site	37	1.3	0.52	1	1	2	1	3
Number of visits to the site	37	1.3	0.52	1	1	2	1	3
Number of pages viewed	37	2.62	1.71	2	1	3	1	8
Number of minutes spent on Page View	24	5.25	8.95	1.49	0.41	7.82	0.13	42.72
Assessment								
Number of days spent on the site	15	1	0	1	1	1	1	1
Number of visits to the site	15	1	0	1	1	1	1	1
Number of pages viewed	15	2	1.2	2	1	2	1	5
Number of minutes spent on Page View	9	3.65	6.14	0.77	0.15	1.33	0.14	15.57
Family & Couples								
Number of days spent on the site	10	1.1	0.32	1	1	1	1	2
Number of visits to the site	10	1.1	0.32	1	1	1	1	2
Number of pages viewed	10	1.4	0.7	1	1	2	1	3
Number of minutes spent on Page View	3	6.19	9.98	0.53	0.32	17.72	0.32	17.72
Technology								
Number of days spent on the site	9	1	0	1	1	1	1	1
Number of visits to the site	9	1	0	1	1	1	1	1
Number of pages viewed	9	1.56	0.53	2	1	2	1	2
Number of minutes spent on Page View	5	0.26	0.24	0.13	0.07	0.49	0.06	0.54

How Effective is a Web-Based Tool for Reducing Behavioral Health Clinician Burnout?

Results from the PTSD Clinicians Exchange

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Abstract

Objective

Burnout is a prevalent issue among behavioral health clinicians treating post-traumatic stress disorder (PTSD) in military populations. Intervention-based strategies have been shown to have some benefit in addressing clinician burnout. One such web-based resource, The PTSD Clinicians Exchange, was designed to disseminate clinical best practices for the treatment of PTSD and facilitate self-care to mitigate burnout. This study seeks to determine whether the PTSD Clinicians Exchange can significantly reduce burnout in a sample of clinicians treating traumatized military populations.

Methods

A total of 605 clinicians from the Department of Veterans Affairs (VA), Department of Defense (DoD), and community were enrolled in a randomized controlled trial designed to test the effectiveness of the PTSD Clinicians Exchange. Clinicians were assessed on demographics, practice patterns, and organizational support using an online survey at baseline, six and 12 months. Additionally, burnout, secondary traumatic stress (STS), and compassion satisfaction (CS) were measured using the Professional Quality of Life (ProQOL) scale.

Results

Participation in the PTSD Clinicians Exchange was not shown to have an effect on burnout at 12 months. In a multivariate stepwise regression model, older age, lower burnout at baseline, lower STS scores, and higher CS scores were significantly associated with lower burnout scores.

Conclusions

The PTSD Clinicians Exchange was not found to mitigate burnout among clinicians, which may be due to the content provided on the website, the way the content was delivered, or participants' limited

utilization of the website. These results can be used to inform future interventions to increase their usability and dissemination.

Introduction

Military populations exposed to combat are at a greater risk for developing post-traumatic stress disorder (PTSD) (1-3). Behavioral health clinicians treating these populations face a number of challenges, including a high prevalence of PTSD among patients, increased caseloads and long hours (4-6). Research has shown that these types of challenges can lead to burnout, a prevalent issue among the broader population of behavioral health clinicians (7). Estimates of clinicians experiencing burnout range from 21% to as high as 67% (8). Symptoms of burnout include feelings of hopelessness and difficulties in dealing with or doing work effectively (9). These symptoms have been found over time to degrade clinicians' physical and mental well-being, which can in turn affect clinicians' personal lives (10), the quality of care provided (11), and the organizations in which they are employed (e.g., greater turnover, reduced productivity, etc.) (8, 12).

Given the consequences of burnout, research has evaluated potential factors that may decrease the risk of clinician burnout. Ballenger-Browning and colleagues (4) found that having more confidants at work was associated with reduced risk of burnout. Additionally, greater transformational leadership, organizational support and specialized clinician training are thought to be protective (13-15). Evidence-based practice (EBP) utilization may also affect burnout by improving clinicians' perceived self-efficacy at treating PTSD (16); however, studies have found conflicting results (16, 17). Finally, compassion satisfaction, characterized by the positive aspect of providing care, has also been found to be protective against burnout (9, 18).

In addition to identifying protective factors, studies have evaluated the effectiveness of burnout interventions (8, 19-22). Most of these interventions consisted of trainings or workshops that were found to have limited effectiveness over time (8, 19). Other studies specifically focused on examining the utility of web-based interventions (21, 22) have reported mixed results. Given the range of

effectiveness among these interventions (19), research into more diverse approaches is needed. Thus, the PTSD Clinicians Exchange was designed with two aims to increase clinician familiarity, perceived benefit, and implementation of clinical best practices for PTSD and to address clinician burnout. The Exchange builds upon previous efforts by utilizing a web-based format and directly linking clinicians with resources to enhance clinician access to specialized training, which has, in turn, been linked to reduced levels of burnout (15). Similar to previous interventions (22) the Exchange also provides clinicians with immediate feedback regarding their current level of burnout and suggests possible self-care strategies to address burnout symptoms. However, unlike previous efforts, the Exchange also targets social support, an important protective factor for burnout (14, 23), by providing clinicians with the opportunity to connect with other colleagues and receive feedback from experts. Given the number of protective factors offered to clinicians through use of the PTSD Clinicians Exchange, this study seeks to determine whether the website was effective at reducing clinician burnout. Secondary to this, levels of burnout across clinician setting will be compared.

Methods

Intervention

A detailed description of the features and content of the PTSD Clinicians Exchange is reported elsewhere (24, 25). Of particular interest to this manuscript, the Self-Care section on the PTSD Clinicians Exchange provides resources aimed at managing stress, burnout and secondary traumatic stress (STS). The Exchange also includes a self-assessment component using the Professional Quality of Life Scale (9). By completing this self-assessment, clinicians can ascertain their current level of burnout, STS, and compassion satisfaction.

Sample

Data were collected as part of the PTSD Provider Registry study, a 12-month randomized control trial of clinicians in the VA, DoD, and community beginning in May 2016 following Stanford University and New England Research Institutes Institutional Review Board (IRB) approval. Of the 1,453 clinicians that responded to recruitment invitations sent via email and posted to online message boards, 792 consented to participate (54.5%). A total of 605 clinicians completed the baseline survey (T_0; 76.4%) and were randomized to either the active group with access to the Exchange or to the newsletter-only control group using a 3:1 randomization scheme. Participants in the active group were also sent bi-weekly email reminders. All participants were surveyed again at six (T_1) and 12 months (T_2). Surveys assessed demographics, burnout, and other covariates (e.g., years of experience treating veterans, compassion satisfaction, STS, practice patterns, and organizational support).

Measures

Burnout, STS, and compassion satisfaction were measured with three 10-item subscales within the Professional Quality of Life (ProQOL) 5 scale (9). This scale is widely used among samples of clinicians to describe the positive and negative effects of working with individuals who have experienced traumatic events (14-16, 22, 26-28). Items were scored on a five-point scale (1=Never to 5=Very Often) and summed. Higher subscale scores indicate greater risk of burnout and STS or higher levels of compassion satisfaction. Cronbach's alpha ranged from 0.88-0.91, 0.81-0.84, and 0.82-0.84 across time points for the compassion satisfaction, burnout, and STS subscales, respectively.

To assess practice patterns, clinicians were asked about the total number of patients treated in the past week and the number of those with PTSD. Clinicians also reported the number of hours over the past week spent doing direct patient care, administrative activities, and total hours worked. The use of evidence-based practices for PTSD was assessed by asking clinicians whether they had ever used

Prolonged Exposure treatment (PE), Cognitive Processing Therapy (CPT), Stress Inoculation Training (SIT), or Eye Movement Desensitization and Reprocessing (EMDR).

Overall attitudes towards EBPs were measured using the Evidence-Based Practices Attitudes Scale (EBPAS) (29). Fifteen items were rated on a 5-point Likert scale (0 = *Not at All* to 4 = *To a Very Great Extent*) and averaged (Cronbach's alpha over time points ranged from 0.82 to 0.84).

Organizational support was measured using one item developed for this study that assessed whether clinicians' primary supervisor was supportive of using "treatments supported by research". The item was scored using a 7-point scale ranging from extremely unsupportive to extremely supportive (e.g., 1-7); higher scores indicated greater support. The additional category of "NA, no primary supervisor" was treated as the highest level of support for this analysis due to the lack of barriers to practice implementation in this situation.

Website tracking metrics were integrated into the Exchange. Each participant was assigned a unique ID to access the website, which was used to determine whether the participants in the active group used the Exchange. Participants' website usage was categorized as having no access (control group), having access and never visiting the site, and having access and visiting the site one or more times. Detailed analyses of website use and study outcomes are reported in Coleman et al. (In press).

Data Analysis

All statistical analyses were completed using SAS version 9.4 (SAS Institute Inc., Cary, NC), and statistical significance was tested at level 0.05. Imputation via one ML iteration (30) was used for the ProQOL scale, EBPAS scale, age, years of experience, number of clients, and hours, all of which had little missing data (range 2-18 missing items from 605 subjects). Descriptive statistics were conducted for all variables of interest. The associations between demographic characteristics and Exchange participation were examined using chi-square tests for categorical variables and *t*-tests or Mann-Whitney U tests for

continuous variables. The associations between burnout and Exchange participation were examined at each time point using t-tests. Analysis of burnout score at T_2 with the variables of interest was examined using unadjusted linear regression models, followed by multivariate analysis using backwards elimination, (step 1 below). A stepwise linear regression model was then constructed, with the first step based on the presence of significant predictors of burnout at T_2 found during the initial analysis above. Further steps added a variety of clinical characteristics. In the last steps, the model examined group assignment, website usage, and use of evidence based practices.

Results

Sample characteristics and pre-training equivalence

Characteristics of the study sample are included in **Table 1.** Most participants were Caucasian (76%) women (69%) who were either psychologists or social workers (76%) with a mean age of 47. Forty-three percent of participants were from the VA, 18% were from the DoD, and 39% were from the community. Participants reported an average of 24 clients per week with 11 of those having a diagnosis of PTSD. They also reported an average of 40 total hours worked per week with 25 of those hours being involved with direct client care and 12 being involved with administrative activities. Most of the sample (84%) reported using at least one of the four EBPs for PTSD listed on the Exchange. No significant differences were found among the active and control groups for demographic or other baseline measures. Among the 605 participants, 379 (63%) completed the six-month assessment, 395 (65%) completed the 12-month assessment and 311 subjects (51%) completed both assessments.

Relationship between burnout and study variables

We examined the trends in burnout score over time among the study conditions (See Figure 1). At baseline, mean scores of burnout for the active and control groups, respectively, were 19.9 (standard deviation (SD) = 5.1) and 20.2 (SD = 5.4); at T_1 burnout scores were 20.7 (SD = 5.5) and 20.5 (SD = 5.4)

and at T_2 were 20.3 (SD = 5.4) and 20.4 (SD = 5.6). No significant differences were found in burnout scores over time by study condition.

Mean baseline burnout scores among the treatment arms were similar (19.9 vs. 20.2). As shown in **Table 2**, unadjusted regression models were conducted to determine which characteristics were predictive of T_2 burnout. Results showed that greater age (β=-0.28, p<0.001), more experience treating mental illness (β=-0.17, p<0.01), more organizational support in using treatment supported by research (β=-0.24, p<0.001) and having a higher T_2 compassion satisfaction score (β=-0.75, p<0.001) were inversely related to T_2 burnout scores**.** On the other hand, having a larger caseload of PTSD clients (β=0.21, p<0.001), more administrative hours (β=0.12, p<0.05), a higher T_0 burnout score (β=0.75, p<0.001), and a higher T_2 STS score (β=0.56, p<0.001) were predictive of having significantly higher T_2 burnout scores. Clinicians in the DoD (β=-0.16, p<0.01) and community (β=-0.34, p<0.001) sectors had significantly lower burnout scores as compared to participants in the VA.

A stepwise linear regression model was developed to further examine the relationship between the sample characteristics and treatment group assignment with burnout. Shown in **Table 3**, T_0 burnout score, T_2 compassion satisfaction score, T_2 STS score, and age were entered into step 1. Each of the variables entered in step 1 were significant predictors of burnout score at T_2. Practice setting, years of experience treating mental illness, hours spent doing administrative work, organizational support using treatment supported by research, number of PTSD clients, and EBPAS scores were entered in steps 2-7, respectively. None of these variables were found to significantly predict burnout score. We entered treatment arm in step 8 and EBP usage in step 9, both of which did not significantly predict T_2 burnout (See **Table 3, Model 1**). Since only a third of those randomized to the active group accessed the website, website usage was entered (See **Table 3, Model 2**) to further investigate the effect of website usage on burnout. Similar to treatment group assignment, website usage was not associated with T_2 burnout.

Discussion

The PTSD Clinicians Exchange is an innovative web resource with a primary goal of increasing familiarity, perceived benefit, and implementation of EBPs for the treatment of PTSD. In addition to providing treatment resources, clinicians were also offered ways to connect with one another via the Clinicians' Corner and self-care resources were provided including ways to self-assess for burnout. While reducing clinician burnout was not the main goal of the Exchange, several features target a number of protective factors that mitigate burnout (4, 16). Although it was anticipated that clinicians' main focus in utilizing the website would be to identify resources for clinical best practices for the treatment of PTSD, we hypothesized that the additional self-care resources would reduce burnout. However, Exchange participation did not significantly reduce burnout over the course of the study, even after accounting for whether clinicians in the Exchange group accessed the website.

Although the Exchange uses a unique approach to address burnout, previous burnout interventions have had varying levels of success so these results are not completely unexpected. The web-based self-care program developed by Shoji et al. (21), whose only aim was to reduce burnout and STS symptoms, was not associated with significant reductions in burnout for the web-only group. However, a mobile app for reducing burnout designed by Wood et al. (22) found significant effects on reducing burnout suggesting that mobile technologies might be a more effective means for motivating busy clinicians to access much needed self-care resources particularly during non-work hours. Adapting these resources for use during non-work hours via an app could have also led to greater utilization of the website since only a third of clinicians ever accessed the Exchange. Although baseline burnout was not found to be associated with web use, in a study of how the Exchange was utilized by participants, lower burnout was found to be predictive of more pages viewed and more visits to the website (24) indicating that burnout could have played a role in how clinicians interacted with the website. Further,

as compared to national norms (9), we may have not seen an effect of the website due to the average level of burnout among clinicians in our sample.

Although the intervention did not reduce burnout, we identified baseline predictors of T_2 burnout that may inform efforts for optimizing future interventions. Results were fairly consistent with previous research, as being younger, having less experience and organizational support, less compassion satisfaction, higher baseline burnout and STS scores, increased caseloads of PTSD patients, and more administrative hours were all associated with higher burnout scores (4, 6, 9, 13, 14, 26, 27, 31). Findings also suggest differences in burnout levels across service sectors, with VA clinicians reporting significantly higher burnout scores as compared to DoD and community clinicians. This finding is surprising given that the VA has a number of targeted self-care resources designed to reduce burnout, which are less available among community clinicians. However, other organizational factors may predispose VA clinicians to burnout that may be less prevalent in other sectors, such as lack of diagnostic diversity in their caseload and administrative mandates that place undue burden on the clinician (32). We also found EBP usage did not reduce burnout, consistent with equivocal research findings (16, 17). These null findings may be due to the large percentage of clinicians in our sample reporting using EBPs for PTSD treatment.

In our multivariate models, we found that the only significant predictors of T_2 burnout across all steps were baseline burnout, T_2 STS score, T_2 compassion satisfaction score and age, suggesting that baseline burnout and other predictors may contribute to the maintenance of burnout over time. Compassion satisfaction at T_2 was also shown to have the largest effect size on burnout score. This confirms a finding from previous research that increasing compassion satisfaction is an effective means of reducing burnout as work is a source of personal gratification rather than fatigue or emotional exhaustion (9, 18).

One noteworthy limitation to this study is the low number of participants in the active intervention group that accessed the Exchange. While this is typical of website engagement when no incentive to participate is offered, it limits the ability to assess whether Exchange features effectively reduced burnout. However, this pattern of website engagement is likely to generalize to how clinicians may use this tool in the real world. Additionally, self-care resources were only a relatively small part of the Exchange overall.

Conclusions

This study found average levels of burnout across clinicians treating traumatized military populations in the VA, DoD, and community sectors and significantly higher levels of burnout among clinicians in the VA as compared to the DoD and community. Although the PTSD Clinicians Exchange did not reduce burnout, it may nevertheless be a valuable tool that could potentially help large numbers of clinicians looking for resources to improve their practice (25). One potential explanation for these findings is that the self-care content provided on the website was not perceived as a relevant resource for mitigating burnout. It may be that content promoting organizational support or work satisfaction would be perceived as more useful by clinicians. Additionally, the results are striking in how few clinicians accessed the website. Given burnout's far-reaching effects from the individual patient to the organization as a whole, organizations should explore ways to engage clinicians in burnout interventions. Findings from the present study indicate that a dissemination tool focused on self-care is unlikely to be utilized by those who need it most. Busy clinicians who are at risk for burnout are unlikely to add additional tasks to their to-do list. Rather, a dissemination tool like an app (22) that can be accessed in a variety of settings outside of work may be more likely to be utilized by busy clinicians. Future research should build on findings by investigating the relative importance of dissemination tools versus intervention content for reducing burnout.

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Table 1. Baseline provider demographics by condition

Characteristic	Registry (n=453)	Control (n=152)
	Mean (SD)	
Age	48.3 (11.4)	46.5 (12.2)
Years treating mental illness	17.5 (10.1)	16.2 (10.0)
Years treating Veterans	8.8 (7.0)	8.0 (6.1)
Number of clients	23.5 (12.3)	25.4 (12.6)
Number of PTSD clients	11.2 (11.4)	11.6 (12.0)
Hours of administrative work	12.3 (7.6)	12.2 (7.3)
Hours doing client care	24.3 (9.1)	24.2 (8.9)
Organizational support	6.2 (1.4)	6.2 (1.2)
Compassion satisfaction score	42.6 (4.9)	42.5 (4.9)
Burnout score	19.9 (5.1)	20.2 (5.4)
Secondary traumatic stress score	18.9 (4.9)	19.0 (5.2)
	Median (Range)	
Evidence Based Practice Attitudes Scale score	4.0 (2.1-5.0)	4.0 (2.8-5.0)
	n (%)	
Practice setting		
VA	197 (43.5)	66 (43.4)
DoD	81 (17.9)	27 (17.8)
Community	175 (38.6)	59 (38.8)
Discipline		
Social Worker	187 (41.3)	58 (38.2)
Psychologist	157 (34.7)	60 (39.5)
Professional mental health counselor	85 (18.8)	28 (18.4)
Medical professional with psychiatry focus	16 (3.5)	5 (3.3)
Other/missing	8 (1.8)	1 (0.7)
Gender		
Female	308 (68.0)	110 (72.4)
Male	140 (31.9)	41 (27.0)
Other	5 (1.1)	1 (0.7)
Race		
Caucasian	339 (74.8)	122 (80.3)
African American	34 (7.5)	13 (8.6)
Hispanic	21 (4.6)	4 (2.6)
Asian	14 (3.1)	3 (2.0)
Mixed	17 (3.8)	8 (5.3)
Other/missing	28 (6.2)	2 (1.3)

Table 2. Univariate predictors of burnout at 12 months

Characteristic	*B*	*SE*	*β*
Age	**-0.13**	**0.02**	**-0.28*** **
Years treating mental illness	**-0.10**	**0.03**	**-0.17** **
Years treating Veterans	-0.07	0.04	-0.08
Number of clients	-0.01	0.02	-0.03
Number of PTSD clients	**0.10**	**0.02**	**0.21*** **
Hours of administrative work	**0.09**	**0.04**	**0.12***
Hours doing client care	-0.03	0.03	-0.05
Organizational support	**-0.89**	**0.19**	**-0.24*** **
Burnout score at baseline	**0.78**	**0.04**	**0.75*** **
Compassion satisfaction score at 12 months	**-0.74**	**0.03**	**-0.75*** **
Secondary traumatic stress score at 12 months	**0.57**	**0.04**	**0.56*** **
Evidence Based Practice Attitudes Scale score	-0.62	0.57	-0.06
Use of evidence-based practices	-0.68	0.77	-0.05
Practice setting			
DoD vs. VA	**-2.43**	**0.78**	**-0.16** **
Community vs. VA	**-3.87**	**0.58**	**-0.34*** **
Discipline			
Social Worker		*Ref*	
Psychologist	0.36	0.64	0.03
Professional mental health counselor	-1.47	0.76	-0.11
Medical professional with psychiatry focus	-1.07	1.86	-0.03
Other/missing	0.69	2.47	0.01
Gender			
Female		*Ref*	
Male	0.52	0.62	0.04
Other/missing gender	-1.40	2.46	-0.03
Race			
Caucasian		*Ref*	
African American	-0.28	1.09	-0.01
Hispanic	-1.69	1.40	-0.06
Asian	3.18	1.95	0.08
Mixed	-0.06	1.54	0.00
Other/missing	-0.159	1.26	-0.07

*p<.05, **p<.01, ***p<.001

Figure 1. Burnout score over time by randomized group assignment

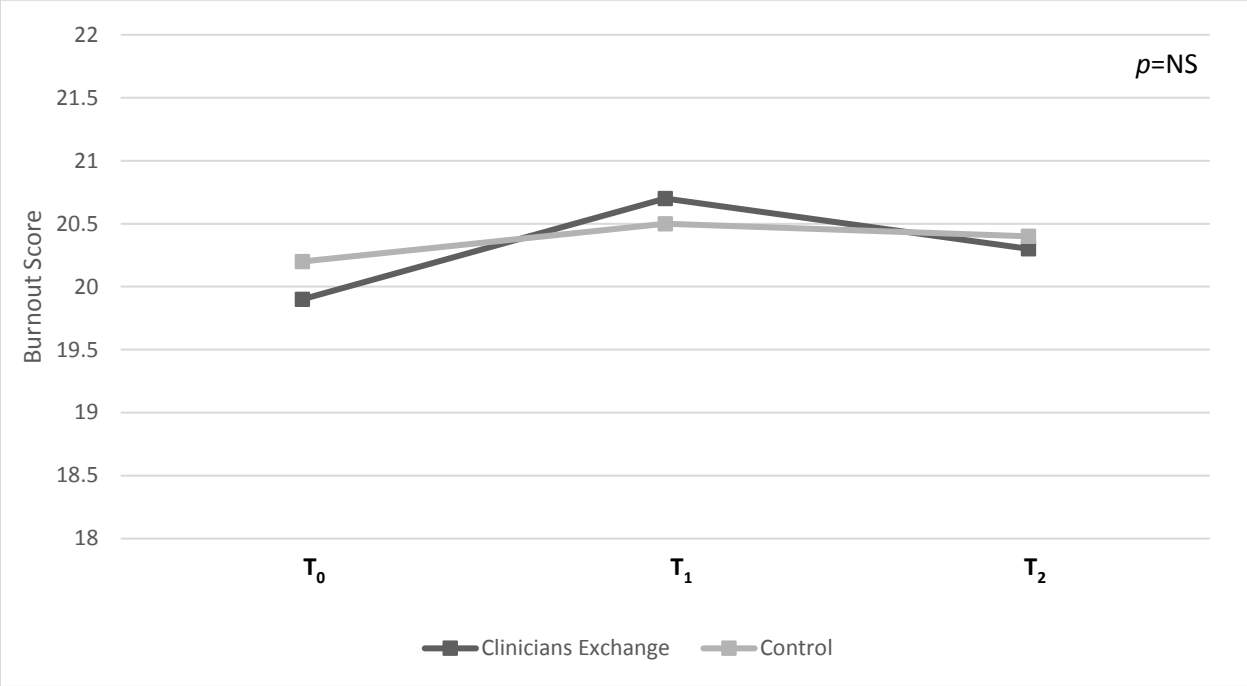

Table 3. Stepwise multiple linear regression models predicting burnout at T_2

		Model 1 Randomization Group				Model 2 Website Usage			
Step	Characteristic	R^2	*B*	*SE*	*β*	R^2	*B*	*SE*	*β*
1	Burnout score at T_0	0.7588	**0.34**	**0.04**	**0.33*** **	0.7588	**0.34**	**0.04**	**0.33*** **
	Compassion satisfaction score at T_2		**-0.43**	**0.03**	**-0.44*** **		**-0.43**	**0.03**	**-0.44*** **
	Secondary traumatic stress score at T_2		**0.27**	**0.03**	**0.26*** **		**0.27**	**0.03**	**0.27*** **
	Age		**-0.04**	**0.02**	**-0.09***		**-0.04**	**0.02**	**-0.09***
2	Practice setting	0.7654				0.7654			
	DoD vs. VA		0.11	0.45	0.01		0.15	0.45	0.01
	Community vs. VA		-0.48	0.43	-0.04		-0.60	0.44	-0.05
3	Years of experience	0.7658	0.01	0.02	0.02	0.7658	0.01	0.02	0.02
4	Hours doing admin work	0.7669	0.03	0.02	0.04	0.7669	0.03	0.02	0.04
5	Organizational support	0.7692	-0.15	0.11	-0.04	0.7692	-0.13	0.11	-0.04
6	Number of clients with PTSD	0.7693	0.00	0.02	0.01	0.7693	0.00	0.02	0.01
7	Evidence-based practice attitudes score	0.7714	0.24	0.31	0.02	0.7714	0.25	0.31	0.02
8	Control vs. Exchange	0.7716	-0.15	0.32	-0.01	-	-	-	-
	Control vs. Exchange use	-	-	-	-	0.7736	0.26	0.38	0.02
	No use vs. Exchange use	-	-	-	-		0.67	0.35	0.06
9	Use of evidence-based practices	0.7738	0.76	0.41	0.05	0.7762	0.83	0.41	0.05

*p<.05, **p<.01, ***p<.001; Note: Only Step 9 results shown.

Risk of Secondary Traumatic Stress in Treating Traumatized Military Populations: Results from the PTSD Clinicians Exchange

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Abstract

Objective: This study examined the relationships between secondary traumatic stress (STS), evidence-based treatment (EBT) delivery factors, and use of a clinician-focused website, the Post-Traumatic Stress Disorder (PTSD) Clinicians Exchange.

Method: A diverse sample of clinicians (N = 605) treating traumatized military populations in Veterans Affairs (VA), Department of Defense (DoD), and community settings were randomized to a newsletter-only control group or the Exchange group. Online surveys were administered at 0-, 6-, and 12-months post-randomization. Regression models examined the association between STS, treatment delivery factors, and website utilization.

Results: Although lower baseline compassion satisfaction (R^2 = .09) and providing care at a VA (R^2 = .02) were associated with greater STS in univariate analyses, only baseline burnout was associated with greater STS at 12 months in multivariate analyses (R^2 = .24). After accounting for burnout, greater trauma caseload was associated with higher STS only in clinicians delivering prolonged exposure therapy (ΔR^2 = .02); attitudes towards EBTs were associated with STS only in clinicians delivering cognitive processing therapy (ΔR^2 = .02-.03). After controlling for burnout, clinicians reported similar STS levels regardless of whether they accessed the website.

Conclusions: Findings from this large, diverse sample of clinicians highlight the risks associated with treating traumatized military populations. Examining differences in the degree to which treatment delivery factors are associated with STS in clinicians delivering different EBTs provides additional insight into promising STS mitigation strategies. Additional research is needed to enhance STS intervention efficacy and clinician engagement.

Keywords: Secondary traumatic stress, posttraumatic stress disorder, military, evidence-based treatment, burnout

Risk of Secondary Traumatic Stress in Treating Traumatized Military Populations: Results from the PTSD Clinicians Exchange

Behavioral health clinicians play an important role in supporting the well-being of traumatized populations. However, clinicians who treat these individuals are themselves at risk of developing posttraumatic stress disorder (PTSD)-like symptoms associated with indirect exposure to trauma. These symptoms have been characterized by a number of terms, including secondary traumatic stress (STS; Figley, 1995), vicarious trauma (McCann & Pearlman, 1990), and compassion fatigue (Figley, 2002; see Elwood, Mott, Lohr, & Galovski, 2011 for a review). In the present study, we refer to the development of PTSD-like symptoms in response to treating traumatized clients as STS. To better understand clinician STS, studies have examined factors associated with treatment delivery and the protective role of clinician resources. The present study builds upon these efforts by evaluating whether STS is associated with specific aspects of providing PTSD treatment and whether an online resource for clinicians providing PTSD treatment, the PTSD Clinicians Exchange, mitigates STS in a large, diverse sample of clinicians treating military populations (Service Members and Veterans).

STS in Clinicians Treating Military Populations

Compared to civilian populations, military populations are approximately five times more likely to meet the diagnostic criteria for PTSD over the course of their lifetime (Rosellini et al., 2015). Clinicians who treat these populations may therefore be more likely to encounter clients with PTSD and bear witness to clients' traumatic experiences, which is associated with greater STS risk (Butler, Carello, & Maguin, 2017; MacRitchie & Leibowitz, 2010). As such, studies have previously examined and documented STS in clinicians who treat Service Members (e.g., Cieslak et al., 2013; Penix, Kim, Wilk, & Adler, 2019; Shoji et al., 2015) and Veterans (Beder,

Postiglione, & Strolin-Goltzman, 2012). The presence of these symptoms is concerning, as STS is in turn associated with impairments in job performance (Follette, Polusny, & Milbeck, 1994; Penix et al., 2019) and greater job turnover (Bride, Radey, & Figley, 2007), both of which have monetary and social consequences for health care systems and workers.

PTSD Treatment Delivery and STS Risk

To better understand the risk associated with treating traumatized clients, studies have examined whether clinician characteristics are associated with STS. Findings suggest demographics, such as female gender identity (Dominguez-Gomez & Rutledge, 2009; Meyers & Cornille, 2002), younger age (Creamer & Liddle, 2005; Hamid & Musa, 2017), and less experience (Avieli, Ben-David, & Levy, 2016; McLean, Wade, & Encel, 2003) are linked to greater STS. Other facets of clinician well-being have also been associated with STS, including burnout and lower compassion satisfaction. Greater burnout symptoms (e.g., emotional exhaustion, feeling disengaged) are associated with greater STS (Avieli et al., 2016; Cieslak et al., 2013; Cieslak et al., 2014; Hamid & Musa, 2017; Penix et al., 2019), although few have examined the directionality of this relationship. To address this gap, Shoji and colleagues (2015) utilized a longitudinal design and found that burnout was a predictor of STS over time. Similarly, less compassion satisfaction (e.g., feeling as though therapeutic work is meaningful and rewarding) is associated with greater STS symptoms (Conrad & Kellar-Guenther, 2006; Craig & Sprang, 2010; Hamid & Musa, 2017), although the directionality of this relationship is unknown.

In addition to examining the relationship between clinician characteristics and STS, studies have examined how clinician-client interactions during treatment are associated with STS. Specifically, greater indirect exposure to client trauma (i.e., hearing clients' traumatic experiences) is associated with greater STS (Butler et al., 2017; MacRitchie & Leibowitz, 2010).

This association suggests that certain therapeutic techniques that prompt clients to write about (e.g., written trauma account) or verbally describe (e.g., imaginal exposure) aspects of their trauma may increase STS risk. Although some findings suggest that using these techniques may increase STS risk (Deighton, Gurris, & Traue, 2007; Penix et al., 2019), others have found that utilizing evidence-based treatments is protective (Craig & Sprang, 2010) or not associated with STS (Cieslak et al., 2013). Specifically, these mixed results may be a function of measurement strategy, as some studies accounted for frequency of providing treatments (Craig & Sprang, 2010; Penix et al., 2019), delivering exposure-based treatments (Cieslak et al., 2013; Penix et al., 2019), and attitudes towards treatments (Deighton et al., 2007), whereas others did not.

To our knowledge, no study has directly compared the degree to which trauma caseload, frequently delivering trauma-focused treatments, and attitudes towards treatments are associated with STS risk. Furthermore, no study has considered whether these potential risk factors are differentially associated with STS depending on the treatments provided. For example, clinicians delivering prolonged exposure treatment (PE; Foa, Rothbaum, Riggs, & Murdock, 1991) or cognitive processing therapy (CPT; Resick & Schnicke, 1992) may more frequently utilize exposure techniques that entail discussing traumatic details associated with STS risk (Butler et al., 2017; MacRitchie & Leibowitz, 2010). Therefore, a high trauma caseload may be a greater risk factor for clinicians using PE or CPT compared to those using other treatments that do not emphasize the discussion of traumatic details, such as eye movement desensitization and reprocessing (EMDR; Shapiro, 1989).

Clinician Resources for STS

To mitigate the risks associated with treating trauma, a number of resources have been developed to target STS in clinicians treating military populations. For example, the Army

Medical Department Center and School developed the Professional Provider Resilience Training (Adams, Camarillo, Lewis, & McNish, 2010) and later the Care Provider Support Program (Pechacek, Bicknell, & Landry, 2011) to address STS and burnout in Army settings. Cieslak and colleagues (2016) developed SupportNet, a web-based training targeting self-efficacy, to increase the accessibility of resources for STS and burnout among clinicians treating Service Members. The Department of Veterans Affairs (VA) developed a Provider Self-Care Toolkit, and free, online STS training courses are available through the National Center for PTSD. Although these interventions are increasingly available in Department of Defense (DoD) and VA settings, these resources are not as widely available to clinicians treating traumatized military populations in community practice settings.

The PTSD Clinicians Exchange, a clinician-focused online resource with the primary goal of providing clinicians with best-in-class resources for 26 evidence-based and emerging practices for the treatment of PTSD, builds upon these interventions in a number of ways. First, the resource was developed for a large population of clinicians treating traumatized military populations in VA, DoD, and community practice settings. Second, the PTSD Clinicians Exchange utilizes an online format to optimize access to and utilization of resources, an important consideration given that many clinicians treating trauma report a lack of time or resources (Gray, Elhai, & Schmidt, 2007) needed to attend in-person trainings. Third, the PTSD Clinicians Exchange includes a range of features that may target mitigating factors. For example, the website provides access to specialized training materials for treating PTSD, and previous research demonstrates that obtaining specialized trauma training is negatively associated with STS (Craig & Sprang, 2010; Handran, 2015). Therefore, obtaining specialized trauma training via the PTSD Clinicians Exchange may be associated with lower STS. Additionally, the website

enables peer support, another factor that is linked to reduced STS (Handran, 2015; Hensel, Ruiz, Finney, & Dewa, 2015), by facilitating access to experts and colleagues. Finally, the website provides resources that promote self-care, which is also associated with fewer STS symptoms (Penix et al., 2019; Von Rueden et al., 2010).

Thus, the present study aims to examine the relationship between STS, PTSD treatment delivery factors, and PTSD Clinicians Exchange participation. We expect that less burnout, higher compassion satisfaction, treating fewer clients with PTSD, less utilization of evidence based treatments (EBTs), and more positive attitudes towards EBTs will be linked to reduced STS after controlling for previously established confounding variables (e.g., clinician demographics). We also explore whether PTSD treatment delivery factors and attitudes towards EBTs are differentially associated with STS in clinicians delivering PE, CPT, and EMDR. Additionally, we hypothesize that PTSD Clinicians Exchange participation will be linked to reduced STS, even after accounting for confounding variables.

Method

Participants

Clinicians were recruited via study fliers and invitational emails through a variety of clinician and professional listservs. Clinicians were eligible to participate if they reported providing psychotherapy to at least one active-duty Service Member or Veteran, treating clients for at least 10 hours per week on average, primarily treating PTSD symptoms for 3 or more hours per week, and having reliable Internet and telephone access. Overall, 1,453 clinicians responded to recruitment materials and 792 (55%) provided their informed consent. Of those clinicians, 605 (76%) were eligible to participate and were randomized to the PTSD Clinicians

Exchange intervention group (n = 453) or the newsletter-only control group (n = 152) using a 3:1 randomization scheme. See Table 1 for demographics for both groups.

Procedure

The present study used data from the randomized controlled trial of the PTSD Clinicians Exchange (Clarke-Walper et al., under review; Coleman et al., under review; Ruzek et al., under review). Data were collected through a protocol approved by Stanford University and New England Research Institutes, Inc. Institutional Review Boards. Clinicians in the intervention group received 12 months of unlimited online access to the PTSD Clinicians Exchange, which entailed access to resources for 26 best practices for treating PTSD in military populations (e.g., PE, CPT, EMDR), interactive engagement with best practices experts and other colleagues, and materials promoting clinician well-being (e.g., self-assessments of clinician well-being, self-care materials). Website features included graphics, videos, handouts, rewards for participating in activities, and didactic content delivered in an easy to navigate format. Clinicians in the intervention group received biweekly emails about the Clinicians Exchange; clinicians in both the intervention and control groups were emailed bimonthly newsletters. Surveys were administered to both groups at 0 (T_0), 6 (T_1), and 12 months (T_2) after initiating study participation.

Measures

Clinician Characteristics. Demographics included gender identity, educational status, age, total years of experience treating patients, years of experience treating military patients, professional discipline, and primary setting. Gender identity was assessed using one item with five response options (*Male, Female, Transgender Female, Transgender Male, Other*). For educational status, clinicians indicated whether they were currently an intern, resident, or fellow.

Professional Quality of Life. Clinician burnout, compassion satisfaction, and STS were assessed using the corresponding Professional Quality of Life Scale (ProQOL) subscale (Stamm, 2010). There were a total of ten items in each subscale, each rated on a 5-point Likert Scale (1 = *Never* to 5 = *Very Often*). Four burnout items were reverse-scored; scores were summed. Cronbach's alpha for the burnout (T_0 = .81; T_1 = .84; T_2 = .82), compassion satisfaction (T_0 = .88; T_1 = .90; T_2 = .91), and STS (T_0 = .82; T_1 = .84; T_2 = .84) subscales across all three time points are comparable to previous estimates for the burnout (.75), compassion satisfaction (.88), and STS subscales (.81), respectively (Stamm, 2010). Missing items were imputed via the method of one maximum likelihood (ML) iteration (Graham, 2012) if there were at most two missing items (out of 10) in that subscale.

Factors Associated with Treatment Delivery. Treatment delivery characteristics included trauma caseload, the degree to which PE, CPT, and EMDR were utilized, and attitudes towards EBTs. Regarding trauma caseload, clinicians reported the number of Service Members or Veterans with PTSD they treated in the past week. For treatment utilization, clinicians who reported at least moderate familiarity with each EBT also reported the percentage of their total patient caseload with whom they used the respective intervention with in the past 90 days. Attitudes towards EBTs was measured using the Evidence-Based Practices Attitudes Scale (EBPAS) (Aarons, 2004), which consists of a total score and four subscales (appeal of evidence-based practices, degree to which one would adopt a practice if it were required, whether one would be open to adopting a new evidence-based practice, and divergence from the evidence-based practice). The fifteen items were rated on a 5-point Likert scale (0 = *Not at All* to 4 = *To a Very Great Extent*); four items were reverse-scored. Items were averaged for the total scale (Cronbach's alpha T_0 = .84; T_1 = .83; T_2 = .82) as well as the requirements (Cronbach's alpha T_0

= .93; T_1 = .92; T_2 = .94), appeal (Cronbach's alpha T_0 = .77; T_1 = .76; T_2 = .80), openness (Cronbach's alpha T_0 = .84; T_1 = .86; T_2 = .86), and divergence (Cronbach's alpha T_0 = .64; T_1 = .65; T_2 = .63) subscales. Missing items were imputed via one maximum likelihood (ML) iteration if there was at most one missing item (out of 3-4) in that subscale.

PTSD Clinicians Exchange Participation. Participation was categorized into the following: No access (i.e., control group); website access but did not utilize the website; and website access and utilized the website one or more times.

Data Analyses

Statistical Analysis System (SAS) Version 9.4 was used to analyze the data, and statistical significance was tested at level 0.05. All regression analyses were conducted with and without logarithmic-transformed scores (due to skew); given a similar pattern of results, untransformed scores are reported for ease of interpretation. The method of imputation via one ML iteration was used for age, years of experience, number of clients, ProQOL subscales, and EBPAS subscales; all measures had little missing data (range 2-18 missing items from 605 subjects). Univariate linear regression analyses were used to determine whether clinician characteristics at baseline (T_0; gender identity, educational status, age, total years of experience treating patients, years of experience treating military patients, professional discipline, primary setting, burnout, and compassion satisfaction) were significantly associated with STS at the 12-month assessment period (T_2). The characteristics that were significantly associated with STS were then included in a backwards selection regression model; those variables independently associated with STS were then included in the following stepwise, multivariate regression models.

The association between treatment delivery variables and STS were separately modeled in clinicians who delivered PE, CPT, and EMDR. Clinicians were categorized as having used PE,

CPT, or EMDR if they reported ever delivering the respective treatment and being at least moderately familiar with the intervention. Clinicians were included in regression models even if they delivered multiple treatments (e.g., provided PE and CPT). For all models, stepwise regression analyses consisted of two steps for predicting STS scores. The first step entailed regressing STS scores on previously identified clinician characteristics significantly associated with STS. The second step entailed the addition of one treatment delivery factor at a time (trauma caseload at T_2, treatment utilization at T_2, and attitudes towards EBTs at T_2).

Finally, a stepwise regression model was used to examine whether engagement in the PTSD Clinicians Exchange by T_2 was associated with STS at T_2. STS scores were first regressed on clinician characteristics significantly associated with STS in prior analyses. Website engagement was then added in the second step of the stepwise regression model.

Results

Table 1 provides demographics and ProQOL scores for clinicians (N = 605).

Clinician Characteristics. To determine which baseline provider characteristics were significantly associated with STS at T_2, each variable was entered into a linear regression model. The following characteristics were not associated with STS: gender identity, age, professional discipline, educational status, total years of experience treating mental illness, total years of experience treating military populations, and the total number of clients treated in the past week (Table 2). However, primary setting was associated with STS, such that clinicians operating in VA settings reported greater STS symptoms than clinicians operating in DoD settings (Table 2). Additionally, greater baseline burnout and less compassion satisfaction were significantly associated with higher STS scores at T_2 (Table 2).

To determine which characteristics should be controlled for in subsequent multivariate analyses, significant variables associated with STS (primary setting, burnout, and compassion satisfaction) were entered into a backwards selection regression model. Only baseline burnout was associated with STS in the final model (R^2 = .24, F(1, 376) = 116.63, β = .49, t = 10.80, p < .001).

Factors Associated with Treatment Delivery. In total, 189 clinicians reported having ever provided PE, 261 CPT, and 94 EMDR at T_2. For each group of clinicians who provided a specific EBT (PE, CPT, and EMDR), each treatment delivery factor was regressed on STS scores after controlling for factors previously identified in the backwards selection model (i.e., burnout). Among clinicians who provided PE, greater baseline burnout and treating more clients with PTSD were significantly associated with higher STS; the degree to which PE was used and attitudes towards EBTs subscales were not (Table 3). For clinicians delivering CPT, greater baseline burnout, lower overall attitudes towards EBTs, less openness to EBTs, and greater divergence from treatment manuals were linked with greater STS; the number of clients with PTSD, degree to which CPT was utilized, and requirements and appeal subscales were not (Table 3). Among clinicians who reported using EMDR, only higher baseline burnout scores were associated with STS; other treatment delivery factors were not (Table 3).

PTSD Clinicians Exchange. Overall, 152 clinicians were randomized to the newsletter-only group, 300 clinicians were randomized to the active group but did not access the PTSD Clinicians Exchange Website, and 148 clinicians were randomized to the active group and accessed the website one or more times; an additional 5 clinicians randomized to the active group could not be classified given that they were not provided with accounts needed to access the website. After controlling for clinician characteristics previously identified in the backwards

selection model (i.e., burnout), clinicians with access to the website who used the PTSD Clinicians Exchange reported similar STS levels (at T_2) as clinicians in the control group (β = -.05, t = -.95, p = .34) and clinicians with access to the website who did not use the PTSD Clinicians Exchange (β = .02, t = .31, p = .76).

Discussion

This study documented STS symptoms among a representative sample of clinicians treating military populations using a commonly used, reliable, and validated measure (Stamm, 2010). Although other studies have documented STS in clinicians treating military populations, this study is the first to directly compare STS levels among clinicians in three major sectors – the VA, DoD, and community – who treat traumatized Service Members and Veterans. Consistent with previous studies, the average STS score was relatively low (e.g., Cieslak et al., 2013; Kintzle, Yarvis, & Bride, 2013; Penix et al., 2019) although the average STS and burnout scores were higher than average scores from one community sample that also used the ProQOL (Craig & Sprang, 2010). Additionally, results from univariate analyses suggest that VA clinicians may be particularly at risk for STS compared to DoD and community clinicians. However, this difference was no longer statistically significant after accounting for burnout, suggesting that clinicians at the VA experience higher burnout and clinician burnout better explains the presence of STS symptoms than practice setting.

In addition, the present study found that greater burnout and less compassion satisfaction at baseline were significantly associated with higher STS levels at the 12-month assessment period. These findings are consistent with previous cross-sectional studies (Avieli et al., 2016; Cieslak et al., 2013; Cieslak et al., 2014; Hamid & Musa, 2017; Penix et al., 2019) and one longitudinal study (Shoji et al., 2015) that found a link between burnout and STS. Previous cross-sectional

studies have also found an association between compassion satisfaction and STS (e.g., Conrad & Kellar-Guenther, 2006; Craig & Sprang, 2010; Hamid & Musa, 2017). Although compassion satisfaction was associated with STS in the present study's univariate analyses, this association was no longer significant after accounting for burnout. Taken together, findings from the present study suggest that clinicians and their supervisors should monitor clinician burnout, as this may be an important indicator of STS risk.

Factors Associated with Treatment Delivery

Trauma Caseload. Greater trauma caseload was associated with STS in clinicians providing PE; trauma caseload was not associated with STS in clinicians delivering CPT or EMDR. This finding may reflect the greater emphasis on discussing traumatic experiences and trauma narrative techniques in PE (Foa et al., 1991) compared to CPT (Resick & Schnicke, 1992) and EMDR (Shapiro, 1989), as hearing these traumatic details (Butler et al., 2017; MacRitchie & Leibowitz, 2010) and providing trauma narrative techniques (Penix et al., 2019) have been associated with greater STS risk. Moreover, clinicians delivering CPT often omit exposure-based techniques when providing this treatment to Service Members (Wilk et al., 2013), and clients do not directly discuss traumatic experiences when using EMDR (Shapiro, 1989). Taken together, these findings highlight managing trauma caseload as one strategy for mitigating symptoms among clinicians who provide PE and experience STS symptoms. Future research should evaluate the potential utility of this approach.

EBT Use. Although trauma caseload was associated with STS in clinicians delivering PE, the degree to which clinicians utilized each EBT was not associated with STS in clinicians providing PE, CPT, or EMDR. These findings are similar to those of Cieslak and colleagues (2013), who found no association between the degree to which EBTs for PTSD (PE and CPT)

were utilized and STS. However, these findings are not consistent with studies that used other measurement strategies. For example, one study found that utilizing EBTs was a protective factor for STS (Craig & Sprang, 2010), but this study did not include PE or CPT in the operationalization of EBT use. Another study found that frequently utilizing trauma narrative techniques was a risk factor for STS (Penix et al., 2019), although it is unclear whether findings from this sample of deployed behavioral health staff generalize to other populations.

Given these mixed results, the precise relationship between utilizing EBTs for PTSD and STS risk remains unclear. To address this gap, future studies should consider using previous measurement strategies when examining the relationships between utilizing evidence-based treatment packages (e.g., PE, CPT, EMDR; Cieslak et al., 2013) and individual treatment techniques (e.g., trauma narrative techniques, in-vivo exposure; Penix et al., 2019) and STS. Elucidating these relationships is an important consideration given previous trauma-focused EBT dissemination efforts (Karlin et al., 2010; Ruzek & Rosen, 2009), and that STS symptoms have been associated with reduced quality of patient care (Follette et al., 1994; Penix et al., 2019).

Attitudes Towards EBTs. Although attitudes towards EBTs were associated with STS symptoms in clinicians providing CPT, attitudes towards EBTs were not associated with STS in clinicians providing PE or EMDR. Among clinicians utilizing CPT, greater overall attitudes towards EBTs, more openness to new EBTs, and less divergence from EBTs were associated with less STS symptoms.

However, it is unknown why overall attitudes, openness, and divergence were associated with STS only in clinicians who delivered CPT. In terms of overall attitudes and openness to EBTs, one possibility is that clinicians with positive attitudes believe that EBTs are more effective, which may in turn mitigate STS risk. Regarding the association between divergence

and STS, less divergence from the PE manual has been associated with a greater sense of professional efficacy in VA clinicians (Garcia et al., 2015), and this sense of professional efficacy may in turn be a protective factor for STS. Alternatively, clinicians experiencing STS symptoms may be reluctant to use emotionally demanding exposure techniques, and previous research indicates clinicians often omit exposure techniques included in the CPT manual (Wilk et al., 2013). Nevertheless, additional research is needed to further study the relationship between attitudes towards EBTs, STS, and potential underlying factors. In addition, studies may evaluate whether modifying attitudes towards EBTs in clinicians delivering CPT mitigates STS risk.

PTSD Clinicians Exchange

Similar levels of STS were found among clinicians in the newsletter-only control group, the PTSD Clinicians Exchange group that did not use the website, and the PTSD Clinicians Exchange group that utilized the website. This pattern of results held even after accounting for burnout and examining whether website use was differentially associated with STS in clinicians providing PE, CPT, and EMDR.

These null findings may have occurred for a number of reasons. First, website utilization was defined as whether clinicians accessed the website one or more times. This broad operationalization does not account for the degree to which clinicians engaged in the website, and it is possible that other aspects of website engagement (e.g., frequency of accessing the webpage; total time spent on the website; number of pages accessed) may be associated with reduced STS. In addition, this broad operationalization does not account for whether clinicians engaged in website features that may mitigate STS, including features that facilitate social support (Handran, 2015; Hensel et al., 2015), promote self-care (Penix et al., 2019; Von Rueden et al., 2010), and provide specialized trauma training (Craig & Sprang, 2010; Handran, 2015).

Next, the present intervention targeted mitigating factors that the clinician had direct control over (e.g., self-care, training). Although this approach was consistent with the PTSD Clinicians Exchange's broader goal of increasing clinician familiarity with, attitudes towards, and utilization of EBTs for PTSD, there are other external factors outside of this scope that are also associated with STS risk. These factors include perceived peer support (Ortlepp & Friedman, 2002), adequate supervision (Ewer, Teesson, Sannibale, Roche, & Mills, 2015), health-promoting leadership behaviors (Penix et al., 2019), and organizational support (Handran, 2015). To more comprehensively address STS in the workplace, future intervention efforts may target other audiences that contribute to these external factors (e.g., colleagues, leadership). For example, instead of developing interventions that focus on the clinician's own development of STS symptoms, interventions may focus on how clinicians may help other colleagues with STS (e.g., providing support, recommending self-care). STS interventions may also target clinic leadership. Training objectives may include providing education on STS, identifying risk and protective factors for STS, utilizing health-promoting leadership behaviors (e.g., fostering self-care engagement), encouraging more active supervision, and fostering peer and team support.

Limitations

The present study had a number of limitations. Many clinicians randomized to the PTSD Clinicians Exchange group did not utilize the website, although our operationalization of website use accounted for this discrepancy and our analytic approach was sufficient (Austin & Steyerberg, 2015). Challenges associated with clinician engagement in STS interventions have been also noted elsewhere (Cieslak et al., 2016). Future research may therefore examine predictors of STS intervention use and evaluate potential strategies to enhance engagement and retention. Additionally, the present study relied on self-report of STS and effect sizes were small.

Further, utilizing the ProQOL, a measure that encompasses both STS and burnout symptoms, may result in a larger estimate of the shared variance between the two constructs (Cieslak et al., 2014). However, this measure is well-validated, reliable, and has been studied in many populations and samples (Stamm, 2010). Moreover, the other commonly used measure of STS, the Secondary Traumatic Stress Scale (Bride, Robinson, Yegidis, & Figley, 2004), has not been updated to reflect the new diagnostic criteria for PTSD in the *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (American Psychiatric Association, 2013); thus, the use of the ProQOL to assess STS symptoms was appropriate in the present study.

Conclusions

Despite these limitations, the present study examined STS, treatment delivery factors, and the utility of the PTSD Clinicians Exchange in a large, diverse sample of clinicians treating military populations in three service sectors. Future studies should further examine the unique risks associated with treating trauma in VA settings. Additionally, longitudinal studies should investigate the utility of greater burnout symptoms and lower compassion fatigue as warning signs of STS. The finding that different treatment delivery factors were uniquely associated with STS depending on the EBT provided (PE, CPT, or EMDR) underscores the need to better understand the relationship between utilizing EBTs and STS risk. Addressing this gap may provide insight into new intervention strategies for clinicians treating traumatized military populations (e.g., reducing trauma caseload in clinicians with STS delivering PE; modifying attitudes towards EBTs in clinicians delivering CPT). Finally, future studies may enhance the efficacy of alternative STS interventions by evaluating strategies to enhance clinician use of and retention in STS interventions. Moreover, extending STS intervention efforts to colleagues and clinic leadership may improve the reach of STS interventions efforts.

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Table 1

Provider characteristics

	Registry		Control	
Characteristic	*n*	(%)	*n*	(%)
Gender identity				
Male	140	(30.9)	41	(27.0)
Female	308	(68.0)	110	(72.4)
Other, including missing responses	5	(1.1)	1	(.6)
Primary setting				
Veterans Affairs (VA)	197	(43.5)	66	(43.4)
Department of Defense (DoD)	81	(17.9)	27	(17.8)
Community-based practice	175	(38.6)	59	(38.8)
Professional discipline				
Social worker	187	(41.3)	58	(38.2)
Psychologist, doctorate-level	157	(34.7)	60	(39.5)
Professional mental health counselor	85	(18.8)	28	(18.4)
Medical professional with psychiatry focus	16	(3.5)	5	(3.3)
Other, including missing responses	8	(1.8)	1	(.7)
Education status				
Intern, resident, or fellow	15	(3.4)	9	(6.0)
Non-intern, resident, or fellow	428	(96.6)	140	(94.0)
	M	(*SD*)	*M*	(*SD*)
Age	48.2	(11.5)	46.5	(12.3)
Years of experience treating mental illness	17.5	(10.1)	16.2	(10.0)
Years of experience treating military populations	8.8	(7.1)	8.0	(6.1)
Number of clients treated in past week	23.4	(12.3)	25.5	(12.7)
Number of clients treated with PTSD in past week	11.2	(11.4)	11.8	(12.1)
Compassion satisfaction (T_2)	42.5	(5.5)	41.8	(5.7)
Burnout (T_2)	20.3	(5.4)	20.4	(5.6)
Secondary traumatic stress (T_2)	18.9	(5.5)	18.3	(5.0)

Note. Valid percentages were reported to account for missing participant responses.

Table 2

Univariate correlates of secondary traumatic stress (STS)

Variable	*B*	*SE*	*β*	R^2
Gender identity[1]				.005
Male	.78	.61	.07	
Other	1.50	2.42	.03	
Age	-.01	.02	-.02	.000
Primary setting[2]				.023
Community	-.81	.60	-.07	
Department of Defense	-2.35	.80	-.16*	
Specialty[3]				.017
Psychologist, doctorate-level	-1.16	.63	-.10	
Professional mental health counselor	-.34	.75	-.03	
Medical professional with psychiatry focus	-2.94	1.83	-.08	
Other, including missing discipline	2.12	2.43	.05	
Education status[4]				.002
Trainee (e.g., resident, intern)	-1.26	1.72	-.04	
Missing education status	1.07	2.21	.03	
Experience treating mental illness (years)	-.01	.03	-.02	.000
Experience treating military populations (years)	.00	.04	.00	.000
Number of clients treated (past week)	.00	.02	.01	.000
Burnout	.49	.05	.49**	.237
Compassion satisfaction	-.32	.05	-.31**	.094

Note. B refers to the unstandardized regression coefficient, SE the standard error, and *β* the standardized regression coefficient. Each provider characteristic was regressed on secondary traumatic stress (STS) scores using linear regression models.
* $p < .01$; ** $p < .001$
[1]Gender identity was coded such that clinicians who identified as female comprised the reference group.
[2]Primary setting was coded so that clinicians who operate in the Department of Veterans Affairs were the reference group.
[3]For discipline, the reference group consisted of social workers.
[4]Education status was coded such that non-trainees were the reference group.

Table 3

Relationship between secondary traumatic stress (STS; primary outcome), clinician characteristics, and factors associated with providing Prolonged Exposure Therapy (PE), Cognitive Processing Therapy (CPT), and Eye Movement Desensitization and Reprocessing (EMDR)

		Clinicians Delivering PE (n = 189)				Clinicians Delivering CPT (n = 261)				Clinicians Delivering EMDR (n = 94)			
Variable	Step	*B*	*SE*	ß	ΔR^2	*B*	*SE*	ß	ΔR^2	*B*	*SE*	ß	ΔR^2
Burnout	1	.46	.06	.49***	.244	.44	.06	.43***	.187	.53	.08	.55***	.306
Burnout	2	.42	.06	.45***		.43	.06	.42***		.51	.09	.53***	
Number of clients with PTSD	2	.07	.03	.16*	.024	.03	.02	.07	.004	.03	.04	.06	.004
Percentage of total caseload clinician used each EBT with	2	.01	.01	.03	.001	.00	.01	-.03	.004	.02	.01	.13	.016
Attitudes towards EBTs													
Total score	2	.02	.72	.00	-.004	-1.78	.62	-.16**	.023	.98	.91	.09	.009
Requirements subscale	2	.12	.28	.03	-.003	-.12	.26	-.03	-.002	.54	.35	.13	.017
Appeal subscale	2	.54	.58	.06	.000	-.88	.52	-.10	.006	.91	.82	.10	.009
Openness subscale	2	-.19	.47	-.03	.000	-1.14	.43	-.15**	.018	.12	.63	.02	.000
Divergence subscale	2	.48	.53	.06	.000	1.42	.46	.17**	.027	.19	.65	.02	.001

Note. *B* refers to the unstandardized regression coefficient, SE the standard error, and *β* the standardized regression coefficient. For each stepwise, multivariate regression model of secondary traumatic stress (STS) symptoms, clinician characteristics previously identified as predictors of STS using a backwards selection model (i.e., burnout) were entered in Step 1; one treatment delivery factor at a time (e.g., number of clients with PTSD, EBT use, attitudes towards EBTs variables) was entered in Step 2. In other words, seven models with two predictor variables (burnout, one treatment delivery factor) were conducted for each EBT. Only burnout results from Step 2 of the number of clients with PTSD model are reported for brevity given a similar pattern of results for each model.
* $p < .05$; ** $p < .01$; ** $p < .001$