Tailored strategies to increase the use of an evidence-based psychotherapy for posttraumatic stress disorder: A stepped-wedge randomized trial in military clinics

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ABSTRACT

Clinician training is often not sufficient to increase the adoption of evidence-based psychotherapies (EBPs). To address organizational barriers that may limit use of EBPs, a tailored implementation strategy—Targeted Assessment and Context-Tailored Implementation of Change Strategies (TACTICS)—was developed. TACTICS involved external facilitation (appointing a local implementation team and external coach, conducting need assessment interviews, creating site-specific implementation plans, and weekly coaching for the site champion) augmented with a planning rubric and resources for making operational changes. The effect of adding TACTICS after clinician training was evaluated in a cluster-randomized stepped-wedge trial across eight military treatment facilities. Psychotherapists (n = 212) received training in prolonged exposure (PE) therapy. TACTICS was subsequently introduced with timing randomized by site. PE utilization was measured via natural language processing of notes from 26,429 psychotherapy encounters across 3459 patients. After accounting for time effects, TACTICS increased PE use compared to training alone (OR = 1.05–2.21, p < .03). Nonetheless, overall use of PE declined over time (OR = 0.067–0.316, p < .001). In post-hoc analyses, declining use of PE over time was strongly associated with a decreasing supply of psychotherapy appointments per patient (r = .98). These findings suggest that local implementation support improves EBP adoption beyond training alone. However, lasting use may require broader system supports such as adequate staffing and policies that encourage use of EBPs.

1. Introduction

Approximately 6 % of U.S. adults and 7 % of military veterans develop posttraumatic stress disorder (PTSD) following a potentially traumatic event (Goldstein, et al., 2016; Smith et al., 2016). Rates are higher among those deployed to military conflicts, with up to 20 % of Iraq and Afghanistan veterans affected (Campbell et al., 2021; Judkins et al., 2020). PTSD has been associated with functional impairment and an increased risk of additional psychiatric and medical conditions (Greene et al., 2016; Kessler et al., 2005).

Several psychotherapies for PTSD with strong research supporting their effectiveness (Lewis et al., 2020) are recommended as first-line treatments in the Department of Defense (DoD) and Veterans Affairs (VA) practice guidelines (Management of Posttraumatic Stress Disorder and Acute Stress Disorder Work Group, 2024). These evidence-based psychotherapies (EBPs) are prolonged exposure (PE; Foa et al., 2019), cognitive processing therapy (CPT; Resick et al., 2024), and eye movement desensitization and reprocessing (EMDR; Shapiro, 2018). However, implementation of EBPs is often limited by patient unawareness, insufficient provider training, and/or organizational barriers to providing weekly manualized therapies (Ackland et al., 2023; Racz et al., 2024; Rosen et al., 2016; Stirman et al., 2016).

Several frameworks have been developed to understand factors that predict or explain successful implementation of new health care practices. The Integrated Promoting Action on Research Implementation in Health Services framework (IPARIHS; Harvey & Kitson, 2015), an extension of the prior Promoting Action on Research Implementation in Health Services framework (Kitson et al., 1998) posits that successful implementation of a new practice is a function of: a) features of the *innovation* being implemented, b) aspects of the micro, meso, and macro-level *contexts* in which it is being implemented; c) the types of *facilitation* used to support its deployment, and d) characteristics of the *recipients* adopting the innovation (Duan et al., 2022; Harvey & Kitson, 2015). The Consolidated Framework for Implementation Research (CFIR; Damschroder et al., 2009) is another widely used implementation framework. CFIR includes similar constructs such as characteristics of the innovation, inner and outer context, implementation processes, and individuals. This manuscript uses the I-PARIHS terms.

Efforts to implement EBPs in the VA and military systems have primarily focused on clinician training (Ackland et al., 2023; Center for Deployment Psychology, 2015). In the Military Health System (MHS), PE and CPT training typically includes a 2-day workshop and optional case consultation, with few providers attending the latter (The Center for Deployment Psychology, 2024). Over 70 % of behavioral health providers in military treatment facilities (MTFs) report EBP training (Hepner et al., 2017). Yet fewer than half of service members diagnosed with PTSD initiate these therapies, and even fewer complete an adequate dose, suggesting additional challenges that training does not address (Hepner et al., 2018). In I-PARIHS terms, provider training targets recipients to build their skills, self-efficacy, and positive beliefs about EBPs (Ackland et al., 2023, Borah et al., 2013). However, training does not address contextual factors at the clinic (micro), facility (meso), or health system (macro) level that influence EBP implementation (Ackland et al., 2023; Rosen et al., 2016).

Prior research has found that leadership support, group norms, referral processes, and clinic workflows are important clinic (micro) level factors that facilitate use of EBPs (Rosen et al., 2016, Sayer et al., 2017, Stirman et al., 2016). MTFs are variable in whether their leadership and group norms support EBP use. Moreover, many MTFs have contextual challenges that impede routine use of EBPs, including high workload, difficulties in scheduling weekly appointments, and inconsistent patient education processes (Borah et al., 2013; McLean et al., 2024a).

External facilitation is an implementation strategy that has been used to address contextual barriers to use of evidence-based mental health practices (Kirchner et al., 2014; Sayer et al., 2021). This strategy involves a needs assessment, a planning stage, and then having an implementation coach (external facilitator) work with the local team and a local champion (internal facilitator) to identify barriers, develop an implementation plan, and support the site in carrying out that plan. This approach leverages the internal champion's relationships and understanding of local needs with the external facilitator's direction on implementation processes (Connolly et al., 2020).

An important aspect of external facilitation is tailoring the plan to target critical deficits and leverage existing strengths (Powell et al., 2017; Stetler et al., 2006). However, the process for selecting proximal targets for change (what needs to change) and strategies for effecting those changes (how to change) often rely on either expert judgement or time-intensive methods that are not readily scalable (Lewis et al., 2018; Bartholomew et al., 2001). To systematically link barriers to change targets, we developed Targeted Assessment and Context-Tailored Implementation of Change Strategies (TACTICS), a variant of external facilitation (Cook et al., 2025). TACTICS combines facilitation with a rubric that matches identified barriers to corresponding change targets and implementation resources for enacting those changes (Center for Deployment Psychology, 2024). Drawing on prior efforts in military treatment facilities (MTFs), the Center for Deployment Psychology (CDP) identified common barriers and proximal targets for change that could address those barriers (Center for Deployment Psychology, 2015). This was later expanded with change strategies identified by a VA expert consensus panel (Waltz et al., 2015). The final rubric includes 143 actionable changes addressing 17 barriers, supported by a toolkit of resources and templates to guide implementation (Cook et al., 2025; Center for Deployment Psychology, 2024).

This study responded to a DoD call for research on strategies to increase use of an (unspecified) EBP in MTFs. When the study was funded, military leadership selected PE as the innovation to be implemented. Features of PE that aid its adoption are well-established efficacy (relative advantage) and a straightforward rationale (clarity; see McLean & Foa, 2024). Other features of PE may impede its adoption. Because PE involves patients approaching feared thoughts and stimuli, some providers misperceive exposure to be potentially harmful (Racz et al., 2024). Moreover, PE's 90-minute format does not fit conventional 60-minute appointment slots.

The study tested whether adding TACTICS to standard PE training (PE-T) increased PE use compared to PE-T alone. PE-T replicated the usual MHS training model and was available both before and during TACTICS. Our first hypothesis was that TACTICS would increase the reach of PE and of EBPs for PTSD more generally, as overcoming barriers that limit use of PE might also facilitate use of other EBPs. Our primary outcome was the proportion of PTSD psychotherapy sessions that had encounter note text indicative of PE. Our secondary outcome was the proportion of PTSD psychotherapy sessions that had encounter note text indicative of any EBP for PTSD (PE, CPT, and/or EMDR). We predicted that both reach indicators would increase after the addition of TACTICS to PE-T.

Our second hypothesis was that TACTICS would improve average outcomes among all service members receiving psychotherapy for PTSD. We predicted that their mean reductions in PTSD symptoms, as assessed with the PTSD Checklist for DSM-5 (PCL-5, Weathers et al., 2013), would be greater during the TACTICS period than during the preceding PE-T period. Additional exploratory analyses compared the PE-T and TACTICS periods in terms of the proportion of PTSD psychotherapy patients who had one or more PE sessions, the number of PE sessions completed, and average number of days between sessions. Days between sessions is a key fidelity metric, as PE was designed to be delivered in weekly or more frequent sessions (McLean & Foa, 2024; Sayer et al., 2024).

2. Method

2.1. Study population

Study sites were military treatment facilities (MTFs) participating in an implementation trial to increase delivery of an EBP for PTSD (Rosen et al., 2020). Inclusion criteria required sites to: (1) have one or more outpatient behavioral health clinics, (2) treat at least 25 new PTSD cases annually, (3) have a minimum of eight behavioral health providers, and (4) not be involved in another PTSD treatment trial. Multiple clinics at one installation were treated as a single site. Sites were identified via the study team's military network and Defense Health Agency (DHA) contacts and were recruited from November 2017 to February 2019. Four Army, three Air Force, and one Navy site enrolled; one Army site withdrew due to leadership changes. Data were collected from April 2018 to January 2022, comprising 26,429 psychotherapy sessions from 3459 patients (see Table 1).

2.2. Study design

The study used a cluster-randomized, stepped-wedge design (Hemming et al., 2015; Simon et al., 2025) to test whether adding TACTICS after PE-T increased PE delivery compared to PE-T alone (see Fig. 1). Sites were randomized into three cohorts, each receiving TACTICS at different intervals post-PE-T. Step 0 was a baseline period before sites participated in the study. In Step 1 (Jan–May 2019), all sites received PE training. TACTICS was implemented in Steps 2–4 across cohorts. Step 5 was a follow-up period. Steps 2–4 were intended to be five months each, but Step 2 was extended to nine months due to COVID-19 disruptions.

Stepped-wedge designs are commonly used in implementation trials

Table 1

Characteristics of Patients Receiving 45–90 min Psychotherapy for PTSD at Participating Sites During Each Study Phase.

	Total	Intervention Condition		
		Baseline	Prolonged Exposure Training	TACTICS
(*n*)	(3459)	(1157)	(1728)	(1570)
Age	*n* (%)	*n* (%)	*n* (%)	*n* (%)
< 20	34 (1.0 %)	7 (0.6 %)	18 (1.0 %)	17 (1.1 %)
20–24	486 (14.1 %)	126 (10.9 %)	253 (14.6 %)	229 (14.6 %)
25–29	494 (14.3 %)	163 (14.1 %)	243 (14.1 %)	217 (13.8 %)
30–34	487 (14.1 %)	152 (13.1 %)	250 (14.5 %)	208 (13.2 %)
35–39	814 (23.5 %)	277 (23.9 %)	431 (24.9 %)	368 (23.4 %)
40–49	962 (27.8 %)	365 (31.5 %)	436 (25.2 %)	451 (28.7 %)
50–59	171 (4.9 %)	63 (5.4 %)	90 (5.2 %)	77 (4.9 %)
≥ 60	11 (0.3 %)	4 (0.3 %)	7 (0.4 %)	3 (0.2 %)
Sex				
Men	2419 (69.9 %)	830 (71.7 %)	1204 (69.7 %)	1069 (68.1 %)
Women	1040 (30.1 %)	327 (28.3 %)	524 (30.3 %)	501 (31.9 %)
Race and ethnicity				
Hispanic	650 (18.8 %)	228 (19.7 %)	341 (19.7 %)	288 (18.3 %)
Non-Hispanic White	1096 (31.7 %)	365 (31.5 %)	545 (31.5 %)	487 (31.0 %)
Non-Hispanic African American	641 (18.5 %)	224 (19.4 %)	345 (20.0 %)	268 (17.1 %)
Asian or Pacific Islander	83 (2.4 %)	24 (2.1 %)	41 (2.4 %)	42 (2.7 %)
Western Hemisphere Indian	11 (0.3 %)	5 (0.4 %)	6 (0.3 %)	3 (0.2 %)
Other	486 (14.1 %)	140 (12.1 %)	205 (11.9 %)	273 (17.4 %)
Unknown	492 (14.2 %)	171 (14.8 %)	245 (14.2 %)	209 (13.3 %)
Co-occurring Diagnoses				
Alcohol use disorder	277 (8.0 %)	92 (8.0 %)	171 (9.9 %)	129 (8.2 %)
Drug use disorder	32 (0.9 %)	10 (0.9 %)	21 (1.2 %)	10 (0.6 %)
Psychotic disorder	4 (0.1 %)	0 (0.0 %)	3 (0.2 %)	3 (0.2 %)
Manic/bipolar disorder	28 (0.8 %)	15 (1.3 %)	15 (0.9 %)	9 (0.6 %)
Mood disorder	742 (21.5 %)	266 (23.0 %)	391 (22.6 %)	347 (22.1 %)
Anxiety disorder or OCD	267 (7.7 %)	95 (8.2 %)	154 (8.9 %)	116 (7.4 %)
Adjustment or stress-related	192 (5.6 %)	51 (4.4 %)	112 (6.5 %)	94 (6.0 %)
Psychotropic Medications	(3459)	(1157)	(1728)	(1570)
Antidepressant	2723 (78.7 %)	1026 (88.7 %)	1473 (85.2 %)	1110 (70.7 %)
Antipsychotic	484 (14.0 %)	208 (18.0 %)	291 (16.8 %)	189 (12.0 %)
Anxiolytic	1760 (50.9 %)	682 (58.9 %)	969 (56.1 %)	722 (46.0 %)
Anticonvulsant	1406 (40.6 %)	567 (49.0 %)	808 (46.8 %)	575 (36.6 %)
No psychotropic medication	563 (16.3 %)	77 (6.7 %)	14 (10.1 %)	382 (24.3 %)
Instillation Service Branch				

Table 1 (*continued*)

| | Total | Intervention Condition | | |
		Baseline	Prolonged Exposure Training	TACTICS
Army	2476 (71.6 %)	852 (73.6 %)	1216 (70.4 %)	1152 (73.4 %)
Air Force	699 (20.2 %)	241 (20.8 %)	310 (17.9 %)	322 (20.5 %)
Navy	284 (8.2 %)	64 (5.5 %)	202 (11.7 %)	96 (6.1 %)

Note: PTSD = posttraumatic stress disorder; TACTICS = Targeted Assessment and Context-Tailored Implementation of Change Strategies; OCD = obsessive-compulsive disorder.

Intervention condition = Phase when patients' first psychotherapy appointment occurred. Some patients who began psychotherapy in one phase also received psychotherapy during subsequent phases.

when randomization is by group rather than individual and when a parallel-group or wait-list control design is not feasible or ethical (Simon et al., 2025, Varghese et al., 2025). Several factors informed choosing a stepped-wedge rather than wait-list control design. We were limited in how many sites we could recruit. A stepped wedge design is more statistically efficient than a wait-list design because it leverages both within- and between-cluster comparisons. This enabled us to achieve adequate power with fewer sites. Our limited number of external facilitators constrained how many sites we could work with at any one time. The stepped-wedge design enabled us to provide facilitation to one third of our sites at a time, rather than to half the sites in a wait-list design. Finally, by capturing potential time-varying effects and system-level adaptations, stepped-wedge structures may generate policy-relevant evidence that might be obscured in a parallel two-arm trial (Simon et al., 2025).

2.3. Procedures

Study procedures were approved by the Institutional Review Boards of Stanford University, the University of Texas Health Sciences Center at
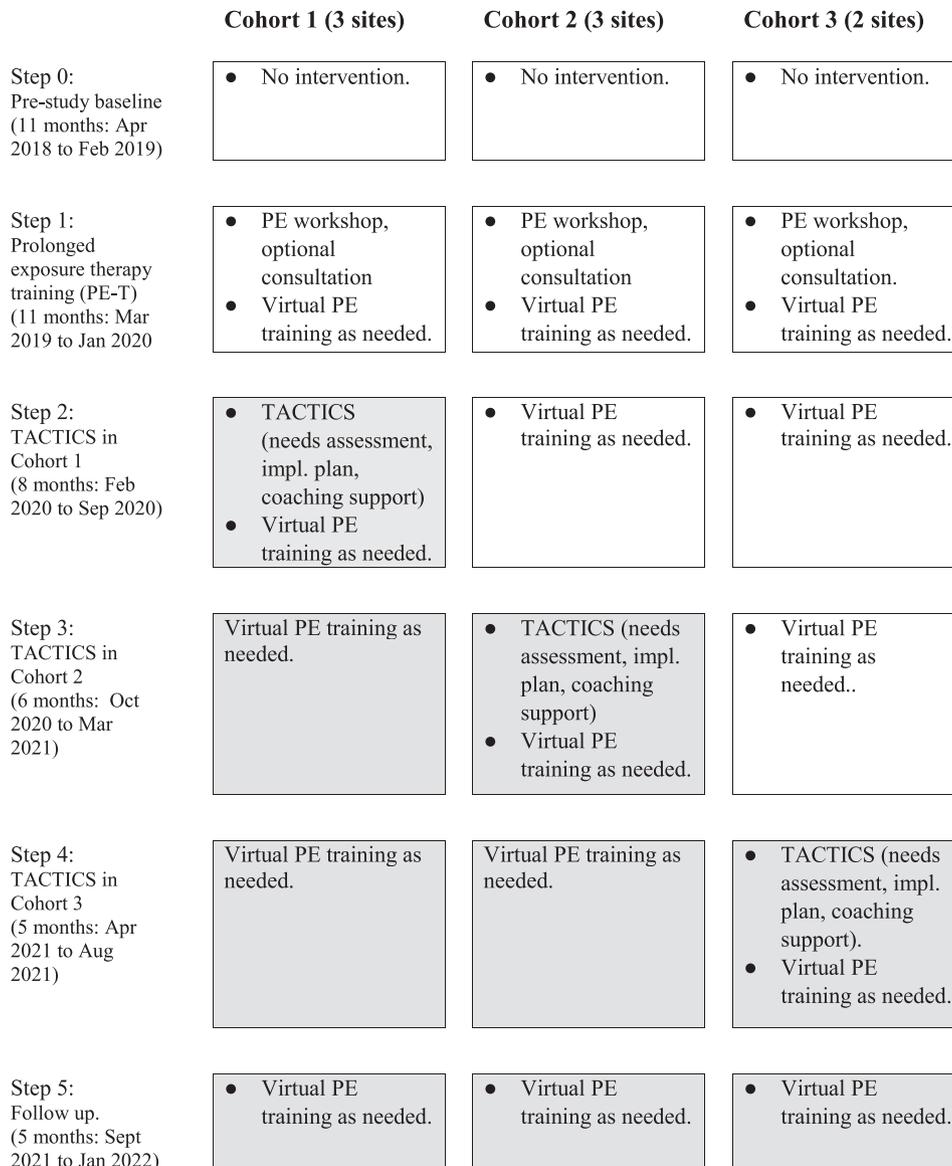

Fig. 1. Study Flow TACTICS = Targeted Assessment and Content-Tailored Implementation of Change Strategies. Shaded cells indicate time periods in each cohort after onset of TACTICS implementation support.

San Antonio, National Development and Research Institutes IRB-USA, Regional Health Command Central, and the David Grant Medical Center, with oversight of regulatory reviews and approvals by the U.S. Army Medical Research and Development Command Office of Human Research Oversight. With a waiver of HIPAA authorization and an approved Data Sharing Agreement, patient demographic, clinical, and encounter note text data were extracted by the DHA Program Executive Office, Defense Healthcare Management System, and fully deidentified before being shared with the study team for analysis. All data were transferred using a secure file transfer protocol.

One challenge in cluster-randomized trials is differentiating research activities that require consent from administrative and clinical changes (often implemented for the work unit as a whole) that are considered process improvement activities and do not require consent (Nix et al., 2021). The IRB determined that participation in PE training and engagement in the TACTICS implementation process were process improvement or operational activities and not research. Staff surveys and analyses of patients' electronic health records were determined to be human subjects research. These required voluntary informed consent (for staff surveys) or a HIPPA waiver (for analyses of patients' electronic health records). See the protocol paper for additional details (Rosen et al., 2020).

The primary outcome—whether a PTSD session included PE—was measured using natural language processing (NLP) of 45- to 90-minute psychotherapy notes (Maguen et al., 2018). Notes from AHLTA electronic medical record system were centrally extracted; Notes from the MHS GENESIS medical record system were manually collected by credentialed collaborators. Clinical notes were analyzed using Apache cTAKES v4.0.0, which annotates contextual elements such as negation and uncertainty. Final decision rules, validated against 200 human-coded notes, yielded sensitivity of 0.957 and specificity of 0.852. Similar NLP methods identified sessions involving CPT (sensitivity = 0.920; specificity = 0.865) and EMDR (sensitivity = 0.931; specificity = 0.859).

For symptom improvement, PCL-5 (Weathers et al., 2013) scores were extracted from the Behavioral Health Data Portal and session notes. Demographic data, comorbid diagnoses, and psychiatric prescriptions were also extracted from electronic health records.

2.4. PE training as usual

All sites received standard PE training during PE-T and TACTICS phases. Initially, providers attended a 2-day in-person training with optional weekly consultation. Staff who joined after the initial training received equivalent online training and optional consultation (Mallonee et al., 2018).

2.5. TACTICS

The TACTICS intervention aimed at implementing a specific practice (PE), used both internal and external facilitators, based plans on pre-implementation assessments at each site, and included planning, education, and quality improvement actions (Duan et al., 2022). The core components of TACTICS are detailed below.

2.5.1. TACTICS team and coach

The TACTICS team included four study team members who among them had expertise in PE, military behavioral health, and implementation science. One team member served as the site's TACTICS coach, providing weekly external facilitation.

2.5.2. Local implementation team

Each site appointed a local champion to lead implementation and to form an implementation team, which typically included clinic leaders and providers.

2.5.3. Needs assessment

The TACTICS team conducted semi-structured interviews with 8–10 staff per site, including leaders, providers, and administrative staff, to identify barriers and facilitators to PE delivery. Sites also received computer code to generate electronic health record (EHR) reports on diagnoses, therapy formats, and appointment patterns which were reviewed to inform implementation planning.

2.5.4. Implementation plan

Based on the needs assessment findings and EHR data, the TACTICS team identified barriers and used the TACTICS Rubric to develop a tailored implementation plan. The draft plan identified strengths and primary barriers detailed recommended actions for addressing the barriers, and identified relevant TACTICS implementation toolkit items (e. g., tools for PE education, group therapy expansion, etc.). The draft plan was reviewed with the site champion and leadership and revised with their input before the start of the coaching calls.

2.5.5. Coaching calls

Weekly coaching calls with the site champion began 3–4 weeks post-assessment and continued for 20 weeks. Coaches supported implementation of the site's plan, addressed emerging barriers, and shared relevant toolkit materials for enacting specific changes. Study leads reviewed coaching progress weekly to ensure fidelity. Feedback from site personnel informed toolkit refinement.

2.6. Analysis plan

Sites were in the PE-T condition from initial PE training until TACTICS began, and in the TACTICS condition thereafter. Primary analyses compared outcomes between PE-T and TACTICS phases; secondary analyses included a pre-study baseline (defined as April 2018 to the start of PE training).

2.6.1. Regression models

As is common in stepped-wedge trials, logistic generalized linear mixed models (GLMMs) were used to estimate the odds of receiving PE or any EBP during sessions. Models included fixed effects (study step, TACTICS exposure, number of prior psychotherapy sessions) and random effects for patients nested within clinics. Analyses were conducted in SAS PROC GLIMMIX to enable estimation of both fixed effects (the relationship between predictors and the binary outcome) and random effects (accounting for the nonindependence of repeated measures across clinics and individuals).

2.6.2. Secondary analyses

Secondary patient-level analyses examined PTSD patients' treatment courses over the first 5 months following intake. To allow 5 months for follow-up, patients with intake during Step 5 were excluded. Analyses compared patients with intakes during the baseline, PE-T, and TACTICS phases on: (1) the proportion receiving any EBP, (2) the proportion receiving PE, (3) mean number of PE sessions, and (4) mean days between PE sessions. Chi-square tests were used to compare proportions; *t*-tests were used to compare means.

3. Results

3.1. PE training

A total of 212 providers received training in PE, either through in-person workshops (n = 117, 55 %) or live virtual video workshops (n = 95, 45 %). The number of people trained in PE corresponds to 74 % of the 287 licensed providers who delivered any psychotherapy in participating sites during the study period. However, this percentage is an overestimate of the reach of training, as some workshop attendees were interns not included in the denominator of providers. One site

provided consultation locally but did not keep records of attendance. Among the other seven sites where consultation was provided centrally, 28 % (55/199) of the providers trained in PE attended at least one case consultation session.

3.2. TACTICS execution

Needs assessment interviews and presentation of the preliminary implementation plan were conducted in person for Cohort 1 but done virtually in Cohorts 2 and 3 after onset of the COVID-19 pandemic. Six sites fully implemented nearly all (mean = 38.4 out of 39) of the core elements of the TACTICS protocol. Two sites fully implemented 33 and 27 elements of the protocol, respectively, and partially implemented the other elements. Examples of partial implementation included the site champion expressing less than wholehearted support for the use of PE, less strong support for PE from clinic leadership, or some coaching calls lacking one or more of the intended elements (e.g., a call not reporting progress on the implementation plan). At six sites, the local champion completed at least 90 % of the planned coaching calls. At two sites, increased workload prevented the local champion from attending more than 12 or 13 of the 20 planned coaching calls.

Sites' tailored implementation plans addressed multiple barriers to use of PE (McLean et al., 2024a). These included actions to increase providers' skills and confidence in delivering PE (7/8 sites), better education of patients about PE (5/8 sites), referring patients to PE-trained providers (7/8 sites), scheduling of 90-minute PE appointments (6/8 sites), and increasing available staff time for weekly therapy (8/8 sites).

Efforts to enhance provider skill and confidence in delivering PE primarily focused on participation in workshops and consultation. Most sites successfully facilitated provider attendance at PE training workshops. Attendance in consultation varied widely across the seven sites that had attendance data. At three sites, fewer than 10 % of providers trained in PE attended consultation. At two sites, 50 % and 77 % PE-trained providers got some consultation but they respectively attended an average of only 2.3 and 4.0 sessions. Two sites provided protected time for consultation. At those sites, 50 % and 69 % of the PE-trained providers attended consultation and they completed an average of 19.1 and 16.0 sessions.

Plans to improve patient education about PE involved the dissemination of informational materials by providers or initiation of group psychoeducation sessions about PTSD treatment options. Sites had some success distributing standardized educational materials through providers, in waiting areas, and at one facility, via an educational website. Sites had little success in launching educational groups due to COVID-related distancing restrictions, insufficient behavioral health technician (BHT) support, and at one site, too few new PTSD cases to justify group psychoeducation.

Nearly all sites sought to route PTSD patients to PE-trained providers; however, these efforts were constrained by limited staffing and increased workload. New PTSD cases were usually identified during intake, and the default was for patients to be treated by whomever did their intake. Transferring cases to another PE-trained provider after intake proved difficult, as patients often resisted being transferred and other providers often lacked openings in their schedules. Some sites also encountered barriers in reserving 90-minute appointment slots in provider schedules.

At most sites, the foremost focus of the implementation plan was freeing up staff time for EBPs. Six sites planned to expand the use of group therapy, but due to COVID-19-related distancing restrictions, only two sites successfully launched any new group programs during the study period. Four sites aimed to reduce caseloads by diverting mild cases to alternative care settings. Diverting cases to civilian networks (at sites that allowed this) was more successful than diverting patients to other on-base resources, which were often understaffed themselves. Of two sites that planned to task-share some clinical functions with BHTs, one successfully integrated BHTs into its group therapy programs; the

other site had too few BHTs available.

3.3. Use of PE

Encounter note content indicating use of PE was present in 11.3 % of all PTSD psychotherapy sessions during the pre-study baseline, 11.1 % of sessions during the PE-T condition, and 12.9 % of sessions during TACTICS (see Fig. 2). However, these descriptive results do not control for potential history (time) effects. Regression analyses assessed the effect of study condition (TACTICS vs. PE-T) on the probability of a PTSD psychotherapy session involving PE, controlling for step (time period), the patients' number of prior psychotherapy sessions, and random effects for clinic and patient (see Table 2, Model 1). Odds of using PE were 1.52 times higher (CI = 1.05 – 2.21, p = 0.027) during TACTICS relative to PE-T alone. There was also a significant effect for step, with lower use of PE in the final time period, Step 5, than in Step 1 (OR = 0.17, CI =.079 −.370, p < .001).

Use of PE by site, step, and condition (PE-T vs. TACTICS) is shown in Fig. 3. In Step 1, when all sites initially received PE-T, use of PE increased dramatically in two sites yet remained stable or declined in other sites. During Steps 2 and (especially) 3, mean use of PE was higher in the TACTICS sites than in the PE-T sites. After all sites started TACTICS in Step 4, use of PE declined by Step 5.

Similar results were observed when comparing PE use in TACTICS vs. PE-T and pre-study baseline (See Table 2, Model 2). Odds of using PE were 1.56 times higher (CI = 1.08–2.24, p = .017) for sites in TACTICS relative to PE-T and baseline combined, and PE use again declined significantly during Step 5.

3.4. Use of any EBP for PTSD

Encounter note text indicative of either PE, CPT, or EMDR was found in 37.1 % of PTSD psychotherapy sessions during TACTICS, a higher proportion than during PE-T (33.4 %) but fewer than during the baseline (41.4 %; see Fig. 2). Regression analyses predicting odds of a psychotherapy session having therapy note text indicative of any EBP for PTSD are shown in Table 3. Controlling for step, the likelihood of a session involving an EBP was significantly higher (OR = 1.28, CI = 1.02 – 1.62, p = .035) in TACTICS relative to PE-T only (see Table 3, Model 1). The model also showed an overall decline in EBP use over time. The odds of a session being an EBP were lower in Steps 2 and 3 (OR = 0.80 and 0.84) than in Step 1, and these odds declined further (OR = 0.58 and 0.55) in steps 4 and 5.

Results were similar when comparing TACTICS to the baseline and
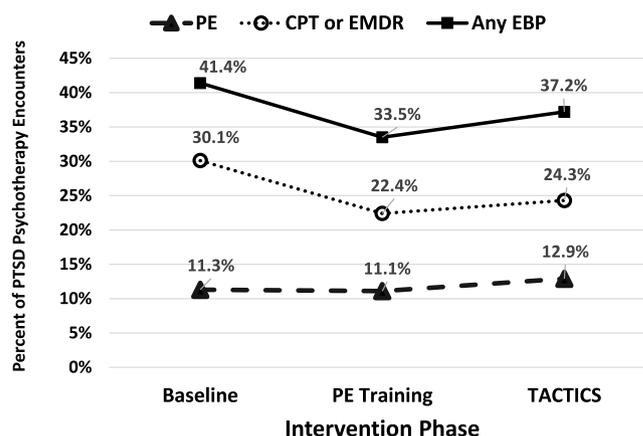
Fig. 2. Proportion of Psychotherapy Encounters for PTSD Involving Prolonged Exposure and Other Evidence-Based Psychotherapies, by Intervention Phase PE = prolonged exposure therapy; CPT = cognitive processing therapy; EMDR = eye movement desensitization and reprocessing; EBP = evidence-based psychotherapy; any EBP = PE, CPT, or EMDR.

Table 2
Logistic Regression Models Predicting Psychotherapy Sessions Using Prolonged Exposure.

Variable	Model 1: TACTICS vs. PE Training[a]				Model 2: TACTICS vs. PE Training/Baseline[b]			
	OR	CI	t	p	OR	CI	t	p
TACTICS (reference = PE-T)	1.52	(1.048–2.212)	2.21	.027	–	–	–	–
TACTICS (reference = baseline or PE-T)	–	–	–	–	1.56	(1.083–2.245)	2.39	.017
Step								
Step 1	–	–	–	–	1.19	(.923–1.534)	1.34	.179
Step 2	0.89	(.618–1.272)	−0.65	.514	1.07	(.709–1.606)	0.31	.756
Step 3	0.83	(.521–1.337)	−0.75	.452	1.02	(.623–1.676)	0.09	.932
Step 4	0.76	(.428–1.334)	−0.97	.335	0.91	(.509–1.608)	−0.34	.734
Step 5	0.15	(.067 −.316)	−4.87	.000	0.17	(.079 −.370)	−4.49	.000
Sessions	0.96	(.951 −.977)	−5.26	.000	0.96	(.955 −.973)	−7.98	.000

Note: TACTICS = after onset of Targeted Assessment and Context Tailored Implementation of Change Strategies intervention. PE = prolonged exposure therapy. PE-T = after onset of prolonged exposure training and before onset of TACTICS. Step = time period. Session = number of prior psychotherapy sessions patient received. Patient and clinic are included as random effects in both models.
[a] Model 1 AIC = 8056.55, *df* = 17,505. Step 1 is reference category for Step.
[b] Model 2 AIC = 10899.93. *df* = 22,959. Step 0 is reference category for Step.
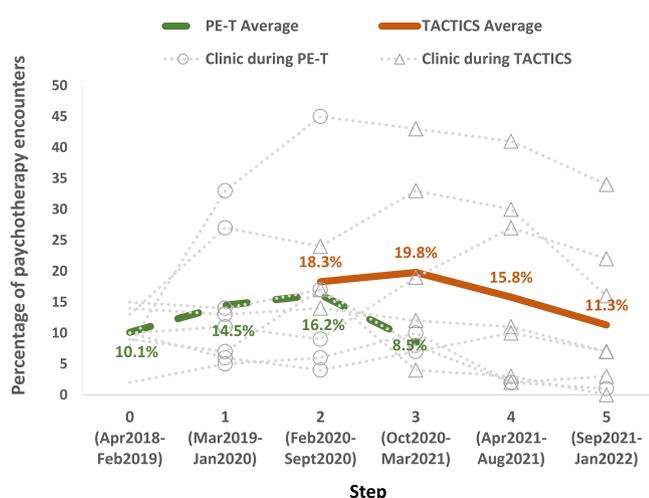
Fig. 3. Proportion of PTSD Psychotherapy Sessions Involving PE by Site, Step, and Condition **Note:** Step indicates time period in the stepped-wedge design. Open circles indicate sites in prolonged exposure training (PE-T) condition; open triangles indicate sites in TACTICS condition. Dotted green line indicates mean for sites in PE-T condition. Brown line indicates mean for sites in TACTICS condition.

PE-T conditions combined (see Table 3, Model 2). The odds of a session being an EBP were higher during TACTICS (OR = 1.31, CI = 1.04–1.64, *p* = .021). EBP use declined over time, with lower odds of EBP use in Steps 1–5 (OR = 0.83–0.46) than in the pre-study baseline period. Of 7354 psychotherapy notes with analyzable text that did *not* reference PE, CPT, or EMDR, 69 % mentioned other cognitive behavioral techniques (e.g., dialectical behavioral therapy, "CBT", acceptance and commitment therapy), 18 % referenced supportive or non-CBT techniques, and 13 % did not provide enough details to identify an approach.

3.5. Patient-level reach of EBPs

The proportion of PTSD psychotherapy patients with any encounter notes indicative of PE in their first 5 months of psychotherapy did not differ among patients treated in the baseline (17.8 %, *n* = 206), PE-T (17.7 %, *n* = 219) and TACTICS periods (18.4 %, *n* = 155; chi-square (2 *df*) = 0.16, *p* = .922). More patients had note content indicative of any EBP (PE, CPT, or EMDR) during the baseline (53.4 %, *n* = 618) than during PE-T (45.1 %, *n* = 558) and TACTICS (48.1 %, *n* = 406; chi-square (2 *df*) = 16.76, *p* < .001). The proportion of patients with notes indicative of any EBP for PTSD did not differ between PE-T and TACTICS (chi-square (1 *df*) = 1.81, *p* = .179).

Among service members who initiated PE, the mean number of PE sessions completed was similar for those who began treatment during the baseline (mean = 6.96, *SD* = 4.48), PE-T (mean = 6.86, *SD* = 4.28), or TACTICS phases (mean = 7.28, *SD* = 4.13); *F* (2, 539 = 0.43, *p* = .653). The mean number of days between PE sessions did not differ between those who began psychotherapy during the baseline (mean =

Table 3
Logistic Regression Models Predicting Psychotherapy Session Using Any EBP for PTSD.

Variable	Model 1: TACTICS vs. PE Training[a]				Model 2: TACTICS vs. Baseline/PE Training[b]			
	OR	CI	t	p	OR	CI	t	p
TACTICS (ref = PE-T)	1.28	(1.018–1.618)	2.11	.035	–	–	–	–
TACTICS (ref = baseline/PE-T)	–	–	–	–	1.31	(1.042–1.639)	2.3	.021
Step								
Step 1	–	–	–	–	0.83	(.717 −.970)	−2.35	.019
Step 2	0.80	(.642–0.990)	−2.05	.040	0.66	(.516 −.838)	−3.39	.000
Step 3	0.84	(.635–1.111)	−1.22	.222	0.70	(.520–0.934)	−2.41	.016
Step 4	0.58	(.416 −.822)	−3.09	.002	0.49	(.345 −.687)	−4.10	.000
Step 5	0.55	(.375 −.820)	−2.95	.000	0.46	(.313 −.682)	−3.88	.000
Sessions	0.98	(.972 −.988)	−4.83	.000	0.98	(.972 −.988)	−4.83	.000

EBP for PTSD = Evidence-based psychotherapy for posttraumatic stress disorder, i.e., prolonged exposure, cognitive processing therapy, or eye movement desensitization and reprocessing). TACTICS = after onset of Targeted Assessment and Context Tailored Implementation of Change Strategies intervention. PE-T = after onset of prolonged exposure training and before onset of TACTICS. Step = Time period. Session = number of prior psychotherapy sessions patient received. Patient and clinic are included as random effects in both models.
[a] Model 1 AIC = 18087.65, *df* = 17,505. Step 1 is reference category for Step.
[b] Model 2 AIC = 24503.74, *df* = 22,959. Step 0 is reference category for Step. Patient and clinic are included as random effects.

21.19, *SD* = 16.53), PE-T (mean = 20.10, *SD* = 17.58), or TACTICS (mean = 18.83, *SD* = 13.09); *F* (2, 506 = 0.85, *p* = .429). All these patient-level comparisons did not control for step.

3.6. PTSD symptom improvement

Among service members who received psychotherapy for PTSD and had two or more PCL-5 scores recorded during that episode of care (*n* = 2410), the mean improvement in PCL-5 scores between their first and last assessment was 2.63 points (*SD* = 18.26). Patients who completed more psychotherapy sessions tended to show greater symptom reduction (*b* per session = 0.198, *p* < .001). Mean changes in PCL scores did not differ by study phase (*F* (2, 2407 *df*) = 0.33, *p* = .717), and a planned comparison showed no difference in improvement between patients treated during TACTICS and during PE-T (*t* (1573 df) = 0.77, *p* = .439).

3.7. Post-hoc analyses of history effects on use of PE

Although regression models showed that TACTICS increased the use of PE relative to PE-T, this effect was overshadowed by a steep decline in EBP use over time. This decline began prior to the COVID-19 pandemic (between Step 0 and Step 1) and continued after the pandemic began in Step 2. A series of post-hoc analyses were conducted to explore contextual factors that might explain this time effect. One factor considered was telephone encounters, which increased sharply during the pandemic (Gilder et al., 2023; Rosen et al., 2021). Although PE has been proven effective via video, its effectiveness via phone has not been established. A second factor examined was the use of group therapy. Many sites planned to expand group therapy to free up staff time for EBPs for PTSD, but COVID distancing restrictions limited use of groups. A third set of factors involved clinic workload and changes in the timing and dose of psychotherapy. Several sites reported increased workload and delays in care with some staff temporarily reassigned to pandemic-related duties and with difficulty filling vacant positions. Prior analyses of data from these sites confirmed that reduced treatment capacity (fewer psychotherapy appointments per patient per quarter) was associated with more days between psychotherapy sessions and fewer patients completing three or more sessions in 90 days (McLean et al., 2024c). All these potential factors changed significantly over time

(see Table 4).

We next assessed how mean values of these variables during each step correlated with regression estimates (odd ratios) for the effect of each step on the use of PE or any EBP for PTSD. Step effects on use of PE were highly correlated with the supply of psychotherapy per patient-quarter (*r* = .98, *p* < .01) and negatively correlated with mean days between psychotherapy sessions (*r* = -.88, *p* < .05) and the proportion of patients receiving fewer than three sessions (*r* = -.94, *p* < .01) during each step (see Table 4). Step effects on use of any EBP for PTSD were correlated with mean days between psychotherapy sessions (*r* = -.90, *p* = .01) and negatively associated with the proportion of psychotherapy patients receiving fewer than three sessions (*r* = -.78, *p* < .05) in each step. Step effects on use of PE or any EBP for PTSD were not significantly correlated with the proportions of PTSD psychotherapy sessions conducted via telephone, via video, or via group therapy.

4. Discussion

This was the first study to assess and attempt to remediate local barriers to EBP provision in MTFs. Our first hypothesis was confirmed: TACTICS increased the use of PE (1.5 times higher odds) and overall use of EBPs for PTSD (1.3 times higher odds) compared to PE-T alone. Yet, in practical terms, TACTICS only slowed an ongoing decline in EBP use. After TACTICS, the proportion of patients initiating PE (18.4 %) was similar to the pre-study baseline (17.8 %), and the proportion initiating any EBP (48.1 %) was lower than at baseline (53.4 %).

Contrary to our second hypothesis, TACTICS did not improve mean symptom reductions among all patients receiving psychotherapy for PTSD. As EBP reach did not increase over time, this outcome is not surprising. Moreover, most providers delivering PE attended few or no case consultation sessions, which have been shown to improve clinical outcomes (McLean et al., 2024b). Although the average number of PE sessions (7) exceeded the threshold for clinical improvement (Holder et al., 2020), they occurred less frequently than recommended – 19–20 days apart – which is linked to poorer outcomes (Sayer et al., 2024).

We had assumed local contexts would be highly variable, but barriers were more consistent across sites than expected. Sites could only partially address barriers identified in their implementation plans. Champions reported improvements in training access, patient education, and diverting mild cases to community care, but struggled to

Table 4
Treatment Delivery Factors by Time Period (Steps 0–5).

	Step 0	Step 1	Step 2	Step 3	Step 4	Step 5	Test of Change Over Time	Correlation with Step Effect on PE	Correlation with Step Effect on any EBP
COVID Pandemic	No	No	Yes	Yes	Yes	Yes	–	–	–
	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	Mean (*SD*)	*F* (127 *df*)	*r*	*r*
Encounters per patient-quarter	2.46 (0.22)	2.56 (0.20)	2.62 (0.35)	2.48 (0.34)	2.27 (0.24)	1.68 (0.44)	23.81**	.98**	.64
Days between sessions[a]	16.28 (2.96)	17.52 (1.90)	18.00 (4.49)	18.68 (3.58)	20.96 (4.04)	23.95 (5.19)	11.10**	−.88**	−.90**
	%	%	%	%	%	%	c^2	*r*	*r*
Group therapy	15.4	17.4	7.5	5.3	9.4	8.5	5127.34 (5 df)	.25	.62
PTSD Psychotherapy modality							3797.51** (10 df)		
In person	100.0	100.0	75.7	82.9	90.0	91.9		−.04	.45
Telephone	0.0	0.0	16.5	11.6	6.2	3.5		.16	−.36
Video	0.0	0.0	7.8	5.5	3.8	4.6		−.21	−.63

PE = prolonged exposure. Any EBP = prolonged exposure, cognitive processing therapy or eye movement desensitization and reprocessing. Encounters per patient-quarter = total psychotherapy encounters (for all disorders) per quarter divided by the number of unique patients. Days between sessions = mean days between psychotherapy sessions (for any disorder) within an episode of care. PTSD psychotherapy modality = proportions of psychotherapy visits for a PTSD diagnosis that were conducted in-person, by telephone, and via video. Correlation with step effect on PE = association between treatment delivery variable and regression estimates for effect of each step on use of PE(see Table 2, Model 2). Correlation with step effect on any EBP = association between treatment delivery variable and regression estimates for the effects of each step on use of any EBP for PTSD (see Table 3, Model 2).
# *p* < .10; * *p* < .05; ** *p* < .01

expand group therapy, which declined during the pandemic.

A major reason for limited gains in EBP reach was TACTICS's inability to address the core barrier at most sites: inadequate behavioral health staff time for weekly psychotherapy, a prerequisite for delivering EBPs (McLean et al., 2024a). As appointment availability declined, intervals between sessions increased and EBP delivery decreased. While several qualitative studies have reported workload as a barrier to EBP implementation (Ackland et al., 2023), this is one of the first studies to quantitatively confirm a negative association between workload and use of EBPs. Two studies conducted in VA clinics had similar findings. One found that lower reach of EBPs for depression in clinics with higher patient volume (Ackland et al., 2025). Another found lower staff ratings of EBP sustainability in clinics with greater workload (Mohr et al., 2018).

In the MHS, two qualitative studies conducted prior to the COVID-19 pandemic had identified insufficient provider time and scheduling difficulties as barriers to engaging service members in effective mental health care (Borah et al., 2013; Tanielian et al., 2016), Staffing challenges likely worsened during the pandemic. A 2024 GAO report found that 43 % of authorized civil service behavioral health positions in MTFs were vacant as of January 2023 (United States Government Accountability Office, 2024).

The COVID-19 pandemic was an important confound in our study as it co-occurred with the onset of TACTICS. The pandemic had long-lasting effects in disrupting care delivery, introducing competing demands, and increasing staff stress (Crocker et al., 2023). More implementation changes might have occurred absent these constraints. Our plans to survey staff on changes in implementation climate and attitudes about EBPs were hindered by our inability to recruit staff participants in-person during the pandemic. Moreover, the 5-month facilitation period in this trial may have been too brief to implement and embed complex changes, especially at a time when clinics were managing other challenges.

Health care system policies are another important macro-level influence on EBP use (Duan et al., 2022; Stirman et al., 2016). DHA currently has no policies to monitor, incentivize, or mandate EBP use. We elsewhere outlined policy recommendations that could promote EBP use, including protecting provider time for EBP consultation, considering patient preferences and provider training in case assignments; we also suggested ways to use staff time more efficiently (McLean et al., 2023). Since study completion, DHA has initiated reforms to reduce wait times by routing mild cases to primary care, increasing group therapy, and delegating tasks to BHTs (McCoy, 2023). Researchers are also developing more efficient psychotherapies that involve fewer sessions (Sloan & Marx, 2024; Funderburk et al., 2020). These efforts can better utilize limited staff time—but without adequate staffing and supportive policies, local EBP implementation efforts will likely fall short.

Our findings highlight several important areas for future research. One is the need for scalable methods to monitor the use of EBPs for both research and quality improvement (e.g., audit and feedback). Psychotherapy content and quality cannot be determined from psychotherapy billing codes alone. The DoD provides an electronic checklist where providers are encouraged to self-report the psychotherapy approaches used in every session, but the validity of those data has not been determined and the data were missing for 58 % of the encounters in our dataset. Other health systems face similar challenges in monitoring the use of EBPs. By extending natural language processing of psychotherapy notes, an approach pioneered by VA researchers, to a different health system, we further confirmed the potential for generating indicators of psychotherapy approach from existing health records. Recent advances in HIPAA-compliant AI large language models can accelerate the development of scalable tools for assessing psychotherapy quality from text in electronic health records.

Our experience deploying TACTICS suggests a need for continued refinement of rubrics and tools to aid implementation planning. Our TACTICS toolkit was useful for identifying what to change, but we had to rely on expert judgement in selecting strategies to enact those changes (how to change). A rubric has been developed to match Expert Recommendations for Implementing Change (ERIC) implementation strategies to CFIR barriers; however, it was based on expert consensus (Waltz et al., 2019). More empirical research is needed to validate and refine paradigms for matching implementation strategies to contextual conditions (Yakovchenko et al., 2023).

We also need ways of determining when micro/meso level facilitation may be unnecessary for success, when facilitation is likely to be helpful, and when local facilitation is probably insufficient to produce change (Duan et al., 2022). Some of our study sites expanded their use of PE after training alone, others improved after getting implementation support, and other sites never improved. More predictive research and better synthesis of results across studies are needed to develop generalizable indicators of when micro or meso level strategies are likely to be effective vs. when system (macro) level efforts are needed to effect change (Duan et al., 2022). Another promising area of research is using sequential, multiple assignment randomized trials (SMART) designs to titrate the level of implementation support based on initial indicators of implementation progress (Johnson et al., 2025 ; Smith et al., 2022).

5. Conclusion

Military treatment facilities face multiple organizational barriers to delivering EBPs for PTSD. Local implementation strategies like external facilitation can improve adoption beyond training alone. However, lasting use may require broader system supports such as adequate staffing and policies that encourage use of EBPs.

Disclaimer

The views expressed in this article are those of the authors and do not necessarily reflect the position of the U.S Department of Veterans Affairs, U.S. Department of Defense, Uniformed Services University of the Health Sciences, Henry M. Jackson Foundation for the Advancement of Military Medicine, Brooke Army Medical Center, U.S. Army Medical Department, Defense Health Agency, U.S. Army Office of the Surgeon General, Department of the Army, Department of the Air Force, Department of the Navy, or the U.S. government.

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Data availability

Data will be made available on request

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