

Randomized controlled trial of a brief Internet-based intervention for families of Veterans with posttraumatic stress disorder

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Abstract—Veterans with posttraumatic stress disorder (PTSD) and their families require resources to cope with postdeployment readjustment. Responding to this need, the current study examined a brief Internet-based intervention that provided Veterans' families with psychoeducation on postdeployment readjustment. Participants were 103 dyads of Veterans with probable PTSD and a designated family member/partner. Dyads were randomized to an intervention group, in which the family member completed the intervention, or to a control group with no intervention. Each member of the dyad completed surveys at baseline and 2 mo follow-up. Family member surveys focused on perceived empowerment, efficacy to provide support, and communication (perceived criticism and reactivity to criticism). Veteran surveys assessed perceived family support and communication. Results showed that Veterans in the intervention group reported decreases in reactivity to criticism but also decreased perceived family support. No significant differences were observed in outcomes reported by family members. This preliminary study provides an early understanding of this novel outreach program, as well as the challenges inherent with a very brief intervention. Future research can build on the current study by more closely evaluating the communication changes that occur with this form of intervention and whether greater intervention intensity is needed.

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Key words: family communication, family support, intervention, OEF, OIF, outreach program, postdeployment, psychoeducation, PTSD, resources.

Abbreviations: ANOVA = analysis of variance, OEF = Operation Enduring Freedom, OIF = Operation Iraqi Freedom, PCL = PTSD Checklist, PTSD = posttraumatic stress disorder, VA = Department of Veterans Affairs, VISN3 = Veterans Integrated Service Network 3.

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INTRODUCTION

Studies have increasingly recognized the critical role that family conflict plays in shaping the severity and course of posttraumatic stress disorder (PTSD) among servicemembers returning from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF). Servicemembers who report family problems, either before or after a deployment, are at greater risk for PTSD [1]. Also, PTSD symptoms have been found to have a negative effect on readjustment, leading to difficulties with reestablishing bonds, familial roles, and household routines [2–3]. Altogether, research highlights the importance of a postdeployment environment in which family members are able to adequately understand, communicate with, and support servicemembers experiencing PTSD and other postdeployment sequelae. Interventions that can enhance this capacity among families have the potential to improve the mental health of returning OIF/OEF servicemembers.

The postdeployment period is characterized by the returning servicemember's readjustment to the home front as well as by families adapting to changes in the behavior of their returning loved one [4]. During this period, servicemembers may display symptoms of PTSD, such as poor sleep, irritability, and hypervigilance. Postdeployment may also be associated with risk-taking behaviors such as aggressive driving that were adaptive in a combat deployment but are maladaptive in a civilian context [4–5]. Families who are welcoming back their servicemembers and observe these changes need to understand these behaviors in order to provide servicemembers with support. From the servicemembers' perspective, the readjustment challenges include feeling like a guest in one's home or finding their children not responding warmly to them, difficulties that are more likely among servicemembers with PTSD [2]. Families who manage these challenges in a way that helps servicemembers maintain a sense of support are more likely to ameliorate the course of PTSD symptoms [6]. Clearly, interventions that can improve families' capacity to cope with these issues are needed.

Saltzman et al. outlined several interventions targeted to improve a family's capacity to cope with the demands of these postdeployment issues [7]. Among these is psychoeducation that improves the family's understanding of readjustment stress and PTSD. With an adequate understanding of common postdeployment

complications, family members are in a better position to adaptively attribute the cause of their loved ones' difficulties. With this, they can provide the necessary support by conveying understanding and adjusting expectations [7–8].

Another mechanism to be targeted by interventions focuses on communication processes in families of returning servicemembers [7]. Adaptive communication is needed to work through postdeployment challenges. There is evidence that communication in families of returning servicemembers can be characterized by extremes ranging from avoidance [9] to overly charged communication that includes problematic displays of anger [2,10]. Adaptive communication techniques have long been used in couples and family therapies [11–12]. Interventions that can assist families to communicate their feelings, while also providing skills to prevent escalation of conflictual material into arguments, can enhance their capacity to work through the challenges of the postdeployment period.

Internet-based interventions have a potentially strong role to play in helping military families understand and cope with postdeployment. Health information-seeking on the Internet is widespread in the general population. An estimated 87 percent of American adults now use the Internet [13], and 72 percent sought health information on the Internet in a 1 yr period [14]. A survey in the Veteran population reported that most respondents have Internet access and are willing to obtain health-related information online [15]. Such information-seeking has been linked to intention to initiate mental health services [16]. Given these trends, there is a need for Internet-based programs to disseminate information to military families about PTSD and postdeployment complications. While there are several face-to-face interventions for families and couples burgeoning within the Department of Veterans Affairs (VA) and the Department of Defense [e.g., 17–19], an Internet-based program would help reach those not yet engaged with these services and those who are seeking health information online.

The evidence base for Internet-based self-help interventions has been growing. Meta-analyses of such interventions report mean effect sizes in the medium range [20–21]. Particularly relevant to assisting returning servicemembers is an Internet-based intervention recently piloted to target combat-related mental distress [22]. In an uncontrolled design, participants receiving the intervention showed decreases in depression and anxiety

symptoms. A common element of many Internet-based interventions is their duration, often spanning a period of 6 wk or more. These interventions have the advantage of improving access given their availability on the Internet. However, because of these interventions' longer duration, individuals not yet ready to fully engage in such interventions may be deterred. Thus, there remains a need for brief, Internet-based interventions for users who are engaged in Internet-based information-seeking, particularly for families of returning servicemembers.

Responding to this need, VA provided funding to develop a brief (1 h) Internet-based intervention (Family of Heroes) designed to help family members better communicate with returning Veterans with probable PTSD. By being publicly available online and short in duration, the intervention is accessible to a larger pool of users who may or may not be involved with formal services. A previous evaluation of the Family of Heroes program, based on a convenience sample, showed that family members who completed the 1 h training reported greater perceived efficacy to accomplish tasks targeted by the training relative to a control group who did not receive the intervention [23]. The authors of that study also reported that family members who received the intervention were more likely, relative to the control group, to report that their Veteran sought subsequent mental health care. However, no tests of statistical significance were reported for this comparison. The current study builds on the initial evaluation [23] by assessing a broader range of outcomes, including family empowerment and communication, employing a longer follow-up period, and examining the effect of the intervention on both the Veteran and a family member. We hypothesized that family members receiving the intervention would, relative to those randomized to the control group, report greater increases in their perceived efficacy to carry out the tasks targeted by the intervention along with enhanced family empowerment. We also hypothesized that Veterans of family members who received the intervention would report greater increases in perceived family support than those in the control group. Finally, we hypothesized that Veterans and family members in the intervention group would report greater decreases in perceived criticism as well as reactivity to criticism during their conversations.

METHODS

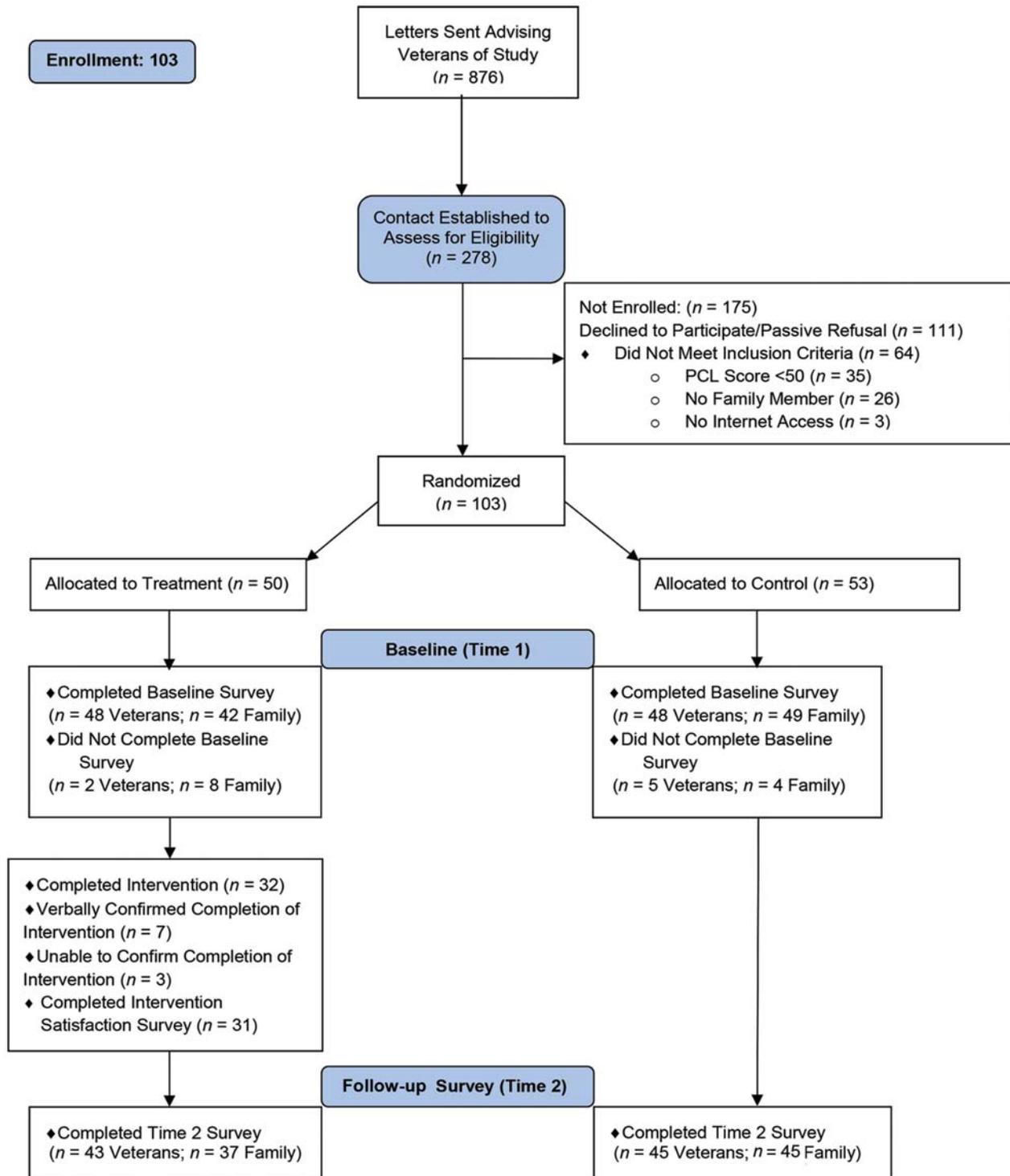
Participants

Participants were organized by family-based dyads, each having an OIF/OEF Veteran with probable PTSD along with a family member or partner designated by the Veteran. Inclusion criteria were (1) Veteran of OIF/OEF, (2) positive screen on the PTSD Checklist (PCL) (≥ 50), (3) availability of a family member to participate who has contact with the Veteran three or more times per week, and (4) access to a computer with connection to the Internet. Study recruitment occurred between September 2011 and March 2013.

Procedure

The **Figure** summarizes the recruitment flow for the study. Using VA administrative data for fiscal years 2009 and 2010, we identified a pool of Veterans who either screened positive for PTSD or had a PTSD diagnosis assigned during a nonstudy visit in the VA New Jersey Health Care System. Letters introducing the study were mailed to 876 Veterans. After mailing an informational letter to the candidate, telephone contact was attempted to explain the study and assess for eligibility. Telephone contact was established with 278 Veterans and could not be established with 598 Veterans because of returned letters (52) an inability to establish phone contact (546). Interested Veterans who met our inclusion criteria and provided verbal consent then designated a family member or partner to participate in the study. The PCL [24] was administered by telephone to determine whether the participant had probable PTSD (PCL score ≥ 50). Telephone contact was then established with the family member, the study was explained, and verbal informed consent was obtained from the family member. A total of 175 Veterans were not enrolled for reasons described in the **Figure**, and 103 dyads were enrolled into the study. All study procedures were approved by the VA New Jersey Institutional Review Board, and the study was granted a waiver for signed informed consent.

Participating dyads were then randomly assigned to the intervention or control group (no intervention/assessment only). Randomization was conducted using a blocking factor of PCL severity and a factor of Veteran involvement in mental health treatment within the previous 6 mo. All measures were completed separately by each member of the dyad via online survey. For family members in the intervention group, completion of baseline

**Figure.**

Participant flow through the study. PCL = Posttraumatic Stress Disorder Checklist.

measures directed them to the Family of Heroes Web site to complete the 1 h intervention. Upon completing the intervention, family members were immediately directed to a postintervention online survey, which assessed intervention satisfaction. Each member of the dyad was separately invited to complete the online follow-up survey 2 mo after baseline. Veterans and family members each received \$25 for baseline surveys and \$35 for 2 mo follow-up surveys. Also, each member of the dyad received a \$10 bonus at each time point for completing the survey by the specified due date.

Intervention

The Family of Heroes intervention was developed with input from VA clinicians, Veterans, and family members of Veterans. It was designed to be brief (1 h) and accessible from computers in users' homes to anyone within the Veterans Integrated Service Network 3 (VISN3) catchment area (areas of New York and New Jersey). The training uses avatar characters that present psychoeducation and engage in simulated conversations concerning postdeployment stress and mental health treatment. The psychoeducation element discusses common symptoms and challenges that can arise during the postdeployment period. The intervention also offers the user a different way to interpret Veterans' behaviors. For example, Veteran isolative behaviors are reframed as possibly wanting to avoid PTSD triggers, rather than the Veteran not wanting to be with family members.

Via three conversation scenarios, the intervention encourages family members to have conversations about key issues that arise during postdeployment. The scenarios provide psychoeducation and allow the user to engage in a simulated conversation by selecting the statements that the avatar family member communicates to his or her Veteran. A key aim of the simulated conversations is to help the family member choose statements that convey curiosity about the Veteran's perspective and empathy and soften the tone of the conversation. This occurs repeatedly throughout the conversation as the scene plays out. A visual meter provides continuous feedback on conversational tone, allowing users to see whether their selected statement escalated or de-escalated the conversation. Each conversational scenario focused on one of three themes: (1) de-escalating an argument, (2) renegotiating household responsibilities, and (3) encouraging VA mental health treatment-seeking. During these scenarios, instruction and practice were provided for communication skills that help

de-escalate and soften the tone of communication. At the end of the training, various links were listed to local Veterans' resources (e.g., Veteran Crisis Line) and information for seeking treatment at the local VA.

Measures

As noted previously, the PCL was administered by telephone at baseline. The PCL is widely used for assessing PTSD symptom severity and has 17 items scored 1 to 5, yielding a score of 17 to 85, with higher scores indicating greater symptoms. The cutoff of 50 for probable PTSD is commonly used in studies with servicemember populations [25]. Family members randomized to the intervention completed a satisfaction survey after completing the training. They provided Likert ratings on the training with respect to overall rating of the course, as well as ratings on the degree to which (1) other Veteran family members should take the course and (2) the simulated conversations were realistic.

The following measures were completed by family members at baseline and 2 mo follow-up. Family empowerment was assessed with the 12-item family subscale from the Family Empowerment Scale [26]. Each item was rated from 1 (not true at all) to 5 (very true), resulting in a sum score of 12 to 60, with higher scores indicating greater empowerment. This subscale has been shown to be sensitive to change in a study examining a family intervention [27]. Family members' perceived efficacy to carry out tasks targeted by the intervention was assessed with a 7-item measure, adapted from the initial Family of Heroes study [23]. Sample tasks included recognizing warning signs of postdeployment stress, motivating the Veteran to seek help, and conducting challenging conversations. Perceived ability to perform each task was rated 1 (low) to 4 (very high), yielding a sum score of 7 to 28, with higher scores indicating greater perceived efficacy.

Veterans completed the following measures at baseline and 2 mo follow-up. Perceived family support was assessed using the family subscale of the Multidimensional Scale for Perceived Social Support [28]. This subscale had four items rated 1 (very strongly disagree) to 7 (very strongly agree), yielding a score of 4 to 28, with higher scores indicating greater perceived support. The Multidimensional Scale for Perceived Social Support, including the perceived social support subscale, has been found to negatively correlate with PTSD in Veteran populations [29] and to be sensitive to change with family

intervention [30]. Veteran mental health service use during the 2 mo prior to the study was assessed via Veteran self-report for non-VA care and via electronic medical record extraction for VA care.

Veterans and family members each also completed the Perceived Criticism Scale [31–33]. The scale consists of ratings of perceived criticism and reactivity to criticism. For perceived criticism ratings, Veterans completed the following two items: (1) “How critical do you think you are of your family member?” and (2) “How critical do you think your family member is of you?” For reactivity to criticism, Veterans completed the following two items: (1) “When your family member criticizes you, how upset do you get?” and (2) “When you criticize your family member, how upset does he/she get?” Family members also completed these items, but with wording keyed to focus on “your Veteran.” For perceived criticism and reactivity to criticism, items were rated 1 to 10 and were summed to generate a score ranging from 2 to 20, with higher scores indicating greater perceived problems.

Analyses

To assess the comparability of the sample at baseline, participants in the intervention and control conditions were compared on demographic characteristics (sex, age, education, employment status, race/ethnicity, marital status, and relationship between members of the dyad [e.g., spouses, parent/child]) as well as the baseline measures described previously. For these analyses, linear variables were examined with analyses of variance (ANOVAs), and categorical variables were examined with chi-square tests for proportions. Analyses of intervention effects used an intent-to-treat approach, analyzing all cases regardless of whether the participant was lost to follow-up. All outcomes were examined using mixed models, repeated-measures ANOVA. Random effects were specified by subject, with the condition-by-time estimates as the fixed effect of interest.

RESULTS

As shown in the **Figure**, 50 dyads were randomized into the intervention group and 53 into the control group. Completion rates for the follow-up survey were greater than 75 percent for Veterans and family members in both conditions. For the intervention group, family member access to the intervention was confirmed electronically

($n = 32$) or verbally ($n = 7$), indicating that 78 percent received the intervention.

Table 1 summarizes the demographic characteristics of the Veterans and family member participants. The sample was racially/ethnically diverse, and it is notable that the vast majority of family member participants were either married or living as married. No significant differences between the study conditions emerged on distributions for any of these variables.

A total of 31 family members from the treatment condition completed the postintervention satisfaction survey. The overall ratings for the course were 36.4 percent excellent, 57.6 percent very good, and 6.1 percent good (the numbers add to 100.1 due to rounding). Also, 54.5 percent strongly agreed and 45.5 percent agreed that other families of Veterans should take this course. In

Table 1.

Sample characteristics for Veterans and their designated family member/partner.

Characteristic	Veteran <i>n</i> (%)	Family Member/ Partner <i>n</i> (%)
Female	18 (18.8)	78 (85.7)
Age (yr)		
<29	31 (32.3)	32 (35.2)
30–36	35 (36.5)	22 (24.2)
≥37	30 (31.3)	37 (40.7)
Education		
High School or Less	13 (13.5)	25 (27.8)
Some College	47 (49.0)	23 (25.6)
College Graduate or Higher	36 (37.5)	42 (46.7)
Employment Status		
Full-Time	51 (53.1)	48 (53.3)
Part-Time	10 (10.4)	10 (11.1)
Looking for Work/Disabled/Other	35 (36.5)	32 (35.6)
Race/Ethnicity		
White	50 (52.1)	57 (63.3)
Black	10 (10.4)	11 (12.2)
Hispanic/Latino	30 (31.3)	20 (22.2)
American Indian	1 (1.0)	2 (2.2)
Asian	3 (3.1)	—
Marital Status		
Married/Living As	58 (60.4)	56 (73.0)
Never Married	24 (25.0)	17 (22.0)
Divorced/Separated	14 (14.6)	4 (5.0)
Relationship to Veteran		
Spouse/Partner	65 (67.7)	—
Son/Daughter	14 (14.6)	—
Parent	3 (3.1)	—
Other	13 (13.5)	—
Had Mental Health Visit in Previous 2 mo*	40 (42.1)	—
Deployments		
Previous Deployments (<i>n</i>)	1.49 ± 0.96	—
Time Since Last Deployment (mo)	63.65 ± 30.32	—

Note: Study conditions did not significantly differ on any of these characteristics.

*Includes Department of Veterans Affairs (VA) and non-VA care.

terms of whether the simulated conversations were realistic, 42.4 percent strongly agreed, 45.5 percent agreed, and 12.1 percent disagreed that this was the case.

Table 2 summarizes outcomes relating to communication processes, as reported by the family members and the Veterans. Veterans' report of reactivity to criticism showed a significant time-by-condition effect. Whereas Veterans in the control condition showed no change on this variable, those in the intervention condition showed a decrease of 1.8 points in terms of how they and their family members became upset in response to criticism. No significant effects were observed for ratings of perceived criticism (Veteran or family member report) or reactivity to criticism as reported by the family member.

The reactivity to criticism items reported by the Veteran include one item probing how upset the Veteran becomes in response to criticism and one item on how upset the family member becomes in response to criticism. We conducted post hoc analyses, separately with each of these items, to evaluate whether the Veteran is reporting changes in his or her own reactivity to criticism, the family member's reactivity, or both. These analyses showed a significant time-by-condition interaction for Veteran's report of family member's reactivity ($p = 0.02$), but not for Veteran's own reactivity ($p = 0.18$). Veterans in the intervention condition reported a 1.0 point decrease in their family members' reactivity to criticism, with relatively no change for those in the control group.

Table 3 summarizes outcomes for family perceived efficacy for accomplishing the tasks targeted by the intervention and family empowerment as well as Veterans' ratings of perceived family support. While no condition-by-time effect was observed on the family-perceived efficacy measure, a trend toward significance was observed for family empowerment, indicating a trend for intervention group family members to report increases in family empowerment. Veterans' report of perceived family support showed a significant time-by-condition effect. However, that effect was counter to our second hypothesis, showing that Veterans in the Family of Heroes condition were more likely to report a decrease in perceived family support.

DISCUSSION

The current study examined a novel approach that targeted the families of Veterans with probable PTSD via a fully automated, interactive Internet-based intervention of 1 h duration. While the overall pattern of results on the effectiveness of this intervention is mixed, it nevertheless provides an early understanding of this model of intervention. Feasibility for this intervention seemed favorable given the completion rates and the satisfaction ratings.

Table 2.
Summary of outcomes pertaining to communication processes.

Group	Control		Intervention		<i>p</i> -Value*
	Mean ± SE	95% CI	Mean ± SE	95% CI	
Veteran (N = 96)					
Perceived Criticism					
Time 1	12.5 ± 0.6	11.3–13.7	12.3 ± 0.6	11.1–13.4	0.49
Time 2	12.4 ± 0.6	11.2–13.6	12.8 ± 0.6	11.6–13.6	
Reactivity to Criticism					
Time 1	13.7 ± 0.6	12.5–14.9	13.9 ± 0.6	12.7–15.1	0.03
Time 2	13.9 ± 0.6	12.7–15.1	12.1 ± 0.6	10.9–13.4	
Family Member/Partner (N = 91)					
Perceived Criticism					
Time 1	9.4 ± 0.7	8.1–10.8	9.1 ± 0.7	7.7–10.5	0.82
Time 2	9.7 ± 0.7	8.3–11.0	9.6 ± 0.8	8.1–11.1	
Reactivity to Criticism					
Time 1	10.6 ± 0.7	9.1–12.0	11.2 ± 0.8	9.6–12.7	0.73
Time 2	11.0 ± 0.7	9.5–12.5	11.3 ± 0.8	9.6–12.9	

*Reflects the test for the time by condition interaction.

CI = confidence interval, SE = standard error.

Table 3.

Summary of outcomes providing assistance and support to Veteran.

Group	Control		Intervention		<i>p</i> -Value*
	Mean ± SE	95% CI	Mean ± SE	95% CI	
Family Member/Partner (N = 91)					
Perceived Efficacy					
Time 1	19.5 ± 0.8	18.0–21.0	18.6 ± 0.8	17.0–20.3	0.54
Time 2	19.6 ± 0.8	18.0–21.1	19.5 ± 0.9	17.8–21.2	
Family Empowerment					
Time 1	43.2 ± 1.2	40.9–45.6	43.3 ± 1.3	40.7–45.8	0.07
Time 2	43.5 ± 1.2	41.1–45.9	46.1 ± 1.3	43.4–48.7	
Veteran (N = 96)					
Perceived Family Support					
Time 1	16.3 ± 0.8	14.7–17.9	18.4 ± 0.8	16.8–20.1	0.04
Time 2	17.5 ± 0.8	15.8–19.1	17.6 ± 0.9	15.9–19.3	

*Reflects the test for the time by condition interaction.

CI = confidence interval, SE = standard error.

Based on the skills targeted by the conversational vignettes, it is encouraging that Veterans in the intervention group reported a significant reduction in their family members' reactivity to criticism. This finding shows that a brief, Internet-based intervention for Veterans' family members can lead to behavioral changes that are observable by Veterans who did not themselves participate in the intervention. This is an important outcome for improving postdeployment communication [15], and it is notable that this effect was detectable at 2 mo follow-up. This finding suggests that the intervention may help shape dyadic communication to be less reactive and more adaptive. Family members' level of criticism is a well-established predictor of clinical outcomes in a variety of mental disorders [34]. Among individuals with bipolar illness, in which family support also predicts illness trajectory, research has found that feeling upset in response to criticism is an even stronger risk factor for relapse than the level of criticism itself [32]. Because poor family communication has been identified as a major obstacle to Veterans' readjustment [35], this finding, detectable even 2 mo postintervention, is important and merits additional investigation for this model of intervention.

That the same outcome did not emerge as significant when reported by family members likely reflects the fact that these measures are capturing respondents' perceptions of communication, which can certainly differ within dyads [31,33]. It is notable that the current improvements are reported by the Veterans, as they are presumably in a position to observe the softer communication approaches that the intervention targets for the family members. This

is consistent with our post hoc analyses showing that Veterans' report of decreased reactivity reflected family members' reactivity (the recipients of the training) more than it did their own reactivity. Ultimately, one would desire reduced reactivity to criticism as reported by both family members and Veterans.

On the other hand, findings showing decreased perceived family support among Veterans in the intervention group are concerning given that perceived social support has been recognized as a key variable in shaping the course of PTSD symptoms [36]. While we cannot explain this finding within the scope of the present study, we can offer some potential interpretative considerations. We note that results of decreased perceived family support are somewhat contradictory given that Veterans in the intervention group observed decreased reactivity to criticism in their family members. Decreased family support also seems inconsistent with the fact that no differences between groups were observed in perceived criticism. Given the complexity of interpersonal relationships, it may be that when the family members became less reactive, this may have been perceived by the Veteran as withdrawal or distancing, leading to the paradoxical outcome of decreased perceived support. On the other hand, the communication skills introduced in Family of Heroes were originally developed in an intervention involving several sessions [37]. These skills are generally thought to require a great deal of practice, and without additional support or guidance, it is possible that some communication components were difficult for families to implement during conversations. Thus, it is not clear whether more

nuanced changes occurred within dyads that were difficult to assess with our design. For this reason, future research—perhaps through direct observation—is needed to better evaluate the communication changes.

The intervention also provided family members with information on postdeployment stress and simulated practice on conversational strategies. We hypothesized that providing such critical information would improve family members' empowerment and efficacy as well as Veterans' perceived family support. The intervention's trend toward significance for family empowerment was encouraging, but this requires confirmation with future studies employing larger sample sizes.

In contrast with an earlier evaluation of Family of Heroes, current results showed no significant effects on family members' perceived efficacy to carry out the specific tasks to support their Veterans. However, the earlier study assessed this measure 1 mo postintervention [21], while our study examined it at 2 mo postintervention. Also, the two studies' sampling strategies varied: while this study approached family members indirectly (i.e., through Veterans who consented to the study), Albright et al. recruited family members directly (i.e., via online advertisements) [23]. The earlier recruitment approach likely generated a cohort more initially motivated for the intervention.

The current study provides an early assessment of the model of intervention used by Family of Heroes (i.e., brief Internet-based intervention for families), and a number of considerations are proposed for future research. First, it is important to note that the current study was limited by a small sample size, given that a 1 h self-help intervention is likely to produce small effects on outcomes. Given this, it is notable that a reduction in reactivity to criticism was detectable at 2 mo, but future studies may improve the evaluation of effects with a larger sample size. A second consideration for future research pertains to potential refinements for Family of Heroes or similar models of intervention. Research has demonstrated that Internet-based self-help interventions can produce meaningful clinical effects that are detectable after a follow-up period of several months [20–21]. A review of those interventions shows some differences with the Family of Heroes intervention. Many such interventions involve several modules occurring over several sessions or weeks, which contrast with the current intervention's 1 h duration. Also, Internet-based interventions that have received empirical support tend to include a

therapist-support component, such as limited email or telephone support. Meta-analyses have shown that these therapist-support elements tend to produce greater effect sizes for Internet-based interventions [20–21]. These features serve as considerations for enhancing the effect of interventions like Family of Heroes.

As a fourth consideration, future studies can build on the current study's findings by examining different outcomes that may expand our understanding of this brief Internet-based intervention focusing on families. Our study was limited in observing how interaction patterns were changed within the dyads as a result of the intervention. Future research on family interventions can generate important information by directly observing interactions and either analyzing qualitatively or using objective observation coding tools (e.g., Humbad et al. [38]). In addition, measures that assess caregiver knowledge of PTSD and ways of coping with caregiving may be of particular utility [30]. Moreover, a key question for future studies pertains to effects on initiating mental health service use. While our study did collect data on mental health service use, we were not able to appropriately analyze rates of initiating care during the study period because of a sizable percentage of the sample (i.e., 42%) that had received services in the 2 mo prior to the study. This is an important limitation of our study because it constrained our ability to test the intervention's effect on treatment initiation. If Family of Heroes is shown in future research to help initiate treatment-seeking, it would be a notable finding, showing value as a linkage intervention.

CONCLUSIONS

In summary, the current study provides an early understanding of a brief model of intervention for Veterans' families. Results showed that the intervention produced a reduction in Veterans' report on the level of reactivity to criticism in the dyad, along with a trend for improved family empowerment. If the current results relating to family empowerment and reactivity to criticism are confirmed in future studies, it would indicate that a low-intensity, self-guided intervention can achieve potentially beneficial effects on families of returning servicemembers experiencing postdeployment reactions. This is particularly notable given that this intervention is publicly available and therefore has the potential for a

very high level of uptake among Veterans' families. However, during a time when telehealth interventions are rapidly growing, the current findings pertaining to decreased perceived family support (as well as the null findings) raise cautions about the effect of low-dose interventions. Thus, the current study points to critical questions that can help guide future intervention development, research design, and ultimately health policy. What were some of the actual changes in communication patterns that occurred among recipients in this intervention? Would an increased intervention dose (e.g., more sessions, therapist support) enhance outcomes? Can the intervention lead to initiation of mental health treatment? Future research, with designs that address these questions, is critical for guiding ongoing efforts to reach and assist Veterans and their families with online interventions.

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