

Using an Avatar-Based Simulation to Train Families to Motivate Veterans with Post-Deployment Stress to Seek Help at the VA

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Abstract

Objective: This study examines the effectiveness of “Family of Heroes,” an online avatar-based post-deployment stress and resiliency training simulation, in increasing families’ engagement in motivating their veterans who exhibit signs of post-deployment stress, including post-traumatic stress disorder (PTSD), traumatic brain injury (TBI), depression, and suicide ideation, to seek help at the Veterans Administration (VA).

Materials and Methods: Participants were randomly assigned to an experimental group ($n=50$) that completed the online training and pre- and post-intervention and 1-month follow-up surveys or a control group ($n=44$) who only completed a pre-test and a 1-month follow-up survey.

Results: The experimental group exhibited significantly greater changes in its preparedness and likelihood to recognize signs of post-deployment stress and in approaching their veteran to discuss their concern and motivate them to seek help at the VA. This group also reported significant change in actual behavior in terms of discussing their concern with their veteran (79 percent approached to discuss vs. 56 percent for the control group). Finally, seven (22 percent) of the veterans who were approached by the experimental group started to receive mental health treatment (five at the VA). All seven were previously diagnosed with PTSD and/or depression but never before started treatment at the VA.

Conclusion: Results strongly suggest that “Family of Heroes” is an effective tool to engage families in taking an active role in motivating their veterans who exhibit signs of post-deployment stress to seek help at the VA. Results also suggest that the training can increase the actual number of veterans experiencing post-deployment stress who begin to receive treatment at the VA.

Introduction

RECENT DATA GATHERED on veterans of the U.S. Armed Forces has demonstrated an increased risk for post-deployment stress reactions, such as post-traumatic stress disorder (PTSD), substance abuse, depression, suicide, and functional impairments including interpersonal conflict and homelessness.¹ In a Department of Defense-sponsored study, The RAND Corporation found that approximately one-third of previously deployed military personnel and veterans showed symptoms of PTSD, traumatic brain injury (TBI), and/or major depression.^{1(pxxi)} Furthermore, despite representing 12.7 percent of the general population, veterans account for approximately 20 percent of suicides per year in the United States (roughly 6,000–6,400 veterans).^{2,3} However,

many of those at-risk veterans do not seek help. Studies have shown that about half (53 percent) of those who meet the criteria for PTSD or major depression seek treatment from a mental health provider or primary care physician.^{1(p 251)}

Beyond its effects on the individual, post-deployment stress in veterans is likely to impact veterans’ relationships with family members and also the well-being of those family members.⁴ For example, two common symptoms of PTSD—numbing and anger—have been linked to increased marital dissatisfaction and interpersonal conflict among spouses of veterans with PTSD.^{5,6} Male veterans with PTSD are more likely to become physically or verbally abusive towards their partners or children than male veterans without PTSD,⁷ and divorces occur at a higher rate for those with PTSD than for those without the symptoms.⁸ Finally, family members of

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veterans with PTSD have been found to experience mental health problems such as secondary traumatization as a result of their veterans' psychological distress.⁹

Despite the potential for negative family interactions of veterans suffering from post-deployment stress, research suggests that effective social support acts as a buffer, greatly reducing the severity and impact of symptoms.^{5(p 247),6(p 845),10} However, family members and friends often report difficulty supporting veterans and interacting positively with them,^{4(p 483),6(p 841)} likely a function of the aforementioned negative relationship dynamics that are also associated with post-deployment stress. Several researchers have mentioned the potential for training programs to help families better understand and cope with veterans' post-deployment stress, although there has been little systematic research to evaluate the effectiveness of such programs.^{11,12} Several face-to-face training programs, which aim to equip non-veteran-related users with suicide prevention skills, have been shown to increase participants' self-efficacy at identifying and referring at-risk individuals.¹³⁻¹⁵

Another important component in improving veterans' ability to cope with post-deployment stress is the receipt of treatment from a mental health service provider, such as the Veterans Administration (VA). Preliminary evidence suggests that rates of suicide are lower among veterans 18-29 years of age who use VA healthcare services when compared with their veteran peers who do not, which translates to approximately 250 lives saved per year.^{16(p 1)} Although many veterans do receive treatment from the VA for mental health problems,¹⁶ there are numerous barriers to receiving treatment that are likely impeding others suffering from post-deployment stress from obtaining professional aid.¹⁷ Families

can play a key role in helping veterans overcome these barriers and get the help they deserve.¹⁸

Based on these ideas, the purpose of the present study was to examine the effectiveness of "Family of Heroes," an online post-deployment stress and resiliency training simulation for families, partners, and friends of veterans, in impacting their preparedness, likelihood, and actual behaviors in terms of recognizing when their veteran is at risk for post-deployment stress, approaching him or her to discuss their concern, and motivating the veteran to seek help at the VA. Based on social cognitive theory, preparedness acts as a belief variable that influences one's self-efficacy, which, in turn, influences their ability to complete a task.¹⁹ The study also examined changes in (1) self-efficacy, as studies show that when individuals' self-efficacy increases through training, positive behavioral changes also occur,²⁰ and (2) mean-efficacy, which examines an individual's belief in the utility of the training tool, a measure that can also act as a mediator of behavioral change.²¹

Description of training program

"Family of Heroes," created by Kognito Interactive (New York, NY) in collaboration with the Department of Veterans Affairs of NY/NJ (VISN 3), is a 1-hour online post-deployment stress and resiliency training simulation designed for families of returning veterans. The goal of the simulation is to prepare family members to support their veterans' and their families' transition to post-deployment life.

In the simulation (see Fig. 1), users enter a virtual environment and first learn what to expect when their veteran returns, common signs of post-deployment stress, what to do in case of a mental-health emergency, and what counseling



FIG. 1. Snapshot of a virtual role-playing conversation in "Family of Heroes."

services are available at the local VA. They then engage in three practice conversations with emotionally responsive veteran avatars that exhibit signs of post-deployment stress such as PTSD, TBI, depression, and thoughts of suicide. Each practice conversation is structured as a mini-game where the user assumes a role of a family member and needs to utilize effective conversation tactics to achieve a specific goal. Tactics were drawn from several intervention models, including motivational interviewing. In the first conversation, the user assumes the role of a veteran’s wife and needs to de-escalate an argument with her husband, who is experiencing PTSD/mild TBI. In the second conversation, the user assumes the role of a veteran’s husband and needs to re-negotiate family responsibilities with his wife, who is having difficulty re-acclimating to civilian life. In the third conversation, the user assumes the role of a veteran’s mother and needs to motivate her son, who is exhibiting signs of depression and suicidal ideation, to seek treatment at the VA.

Users communicate with the veteran avatars via a menu-driven system where they select dialogue options that represent conversation tactics, either effective or ineffective. Once they choose a dialogue, they first hear their avatar performs the selected dialogue, and then they observe the verbal and non-verbal responses of the veteran avatar. Dialogue options available to users in each turn depend on their cumulative prior conversation decisions and how they

impacted the veteran avatar emotional state. Users receive ongoing performance feedback and can either win or lose the challenge depending on their decisions. The goal is that in this process, users would gain an understanding of effective and ineffective conversation tactics that can be used in real-life situations.

Subjects and Methods

Participants

Ninety-four participants from 27 states in the United States were recruited from online advertisements. Criteria for selection included (1) a family member, partner, or friend who is a veteran, (2) the veteran must have returned from his or her last deployment within the past 4 years, and (3) the veteran must not have been currently receiving mental health treatment at the VA at the time of training. Demographic information for the participants and their veterans is listed in Table 1.

Procedures

Participants were randomly assigned to either an experimental ($n=50$) or control ($n=44$). After agreeing to an informed consent, both groups completed pre-surveys (baseline), after which the experimental group participants completed the

TABLE 1. CHARACTERISTICS OF STUDY PARTICIPANTS AND THEIR VETERANS

Demographics of participants	Control (n=44)		Experimental (n=50)	
	Participant	Veteran	Participant	Veteran
Sex (%)				
Female	72.7	2.3	62	8
Male	27.3	97.7	36	92
Transgender	0	0	2	0
Age range (years)	21–66	20–62	22–54	21–53
Mean age (years)	39	33	36	31
Race/ethnicity				
White non-Hispanic	59.1%	52.3%	72%	72%
Hispanic	6.8%	9.1%	8%	10%
American Indian/Alaska Native	2.3%	0%	0%	0%
Asian non-Hispanic	4.5%	4.5%	4%	4%
Black non-Hispanic	27.3%	34.1%	16%	14%
Relationship to veteran (%)				
Spouse/partner	36.4		38	
Son/daughter	18.2		28	
Mother/father	6.8		10	
Brother/sister	31.8		14	
Immediate family	18.2		18	
Friend	11.4		16	
Average time since veteran’s return (months)	10.6		10.8	
Veterans previously diagnosed with disorder during or after military service (%)				
Depression	23.0%		21.4%	
PTSD	28.7%		20.2%	
TBI or mTBI	1.1%		4.8%	
Anxiety	28.7%		22.6%	
Substance abuse	10.3%		15.5%	
Other	0.0%		1.2%	
Not applicable	8.0%		14.3%	

mTBI, mild traumatic brain injury; PTSD, post-traumatic stress disorder; TBI, traumatic brain injury.

1-hour training, immediately followed by a post-training survey. A longitudinal follow-up survey was completed by all participants 1 month later.

Participants were provided with \$50 or \$25 (experimental and control groups, respectively). Participants were not aware of the compensation of the other group. All surveys were conducted online at a computer of the participant's choosing, and data were stored on a secure server.

Measures

The training evaluation model of Kirkpatrick²² suggests four levels of assessment: Reaction (participants' opinion of the training), learning (measures of knowledge and skills gained by participants), behavior (whether participants applied learned skills and knowledge in real life), and results (impact on larger outcome such as on organizational productivity). "Family of Heroes" was evaluated using the first three training criteria.

Reaction criteria. Several questions were used to assess participants' reaction to the training program. Participants were asked to give their overall rating of the course (rated on a 4-point Likert scale) and whether or not they would recommend it to other family members and friends of veterans. They were also asked specific mean-efficacy questions about how useful, easy to use, based on scenarios relevant to them and their veteran, and helpful in getting timely help for their veterans they considered the training to be (rated on a 5-point Likert scale). Mean-efficacy questions were included in both the post-intervention and follow-up surveys of the experimental group. The other questions were only included in the post-test of the experimental group.

Learning criteria. Learning criteria were assessed via three variables: (1) Preparedness to recognize when their veteran's behavior or appearance is a sign of post-deployment stress, (2) preparedness to approach their veteran to discuss their concern and motivate him or her to seek help for post-deployment stress at the VA, and (3) self-efficacy in motivating their veteran to seek help at the VA. The first variable was measured by asking participants how prepared they were to "recognize when your veteran's behavior or appearance is a sign of post-deployment stress." The second variable was composed of three items that asked participants to rate their preparedness (1) to "approach your veteran and discuss your concerns, if he/she is showing signs of post-deployment stress," (2) to "motivate your veteran to seek help at a VA hospital or Vet center, if he/she is showing signs of post-deployment stress," and (3) to "refer your veteran for help at a VA hospital or Vet Center, if he/she is showing signs of post-deployment stress." Self-efficacy was measured with two items: "I feel confident in my ability to have conversations with my veteran about concerns I have about his/her post-deployment stress" and "I feel confident in my ability to assist my veteran in seeking help at a VA hospital or a Vet Center." Responses to all three scales were set on a 4-point Likert scale. Scales with multiple items were averaged to create the composite variables. Coefficient α values were acceptable (0.80 for variable 2; 0.74 for variable 3). Learning criteria were assessed

in the pre-test of the control group, the post-test of the experimental group, and the 1-month follow-up surveys of both groups.

Behavioral criteria. Behavioral criteria were assessed with two variables. The first variable, "likelihood to approach the veteran and mention the VA as a helpful resource" (behavioral intentions), was measured by two questions: "As a result of this course, how likely are you to approach your veteran and discuss your concern if he/she begins to or is showing signs of post-deployment stress?" and "As a result of this course, if you speak to your veteran about your concern regarding their post-deployment stress, how likely are you to mention the VA as a resource that can assist them?" The questions for the control group were identical except that they did not contain the "as a result of this course" stem. These questions were rated on a 4-point Likert scale ranging from not likely to very likely.

Actual behavioral change was measured via three questions, which were assessed separately in analyses. The first asked, "In the past month (for the control group; or 'since taking the training' for the experimental group), have you approached your veteran to discuss your concerns about their post-deployment stress?" Response options were "yes," "no," or "not relevant since I'm not concerned about my veteran's post-deployment stress." A follow-up question for those indicating yes asked, "Did you mention the VA as a resource that can assist them?" Actual behavioral criteria were assessed in the pre-survey and the 1-month follow-up survey for both the experimental and control groups. Finally, treatment-seeking behavior by the veteran was assessed by asking participants whether their veteran had started to receive mental health treatment since they took the training (experimental group) or completed the pre-test (control group).

Results

Analyses

Learning criteria and likelihood of behavioral intention variables were analyzed in three ways. First, a repeated-measures analysis of variance was conducted with the experimental group only to determine the change in dependent variables across the three time points. In cases of an overall significant F , HSD post hoc tests were conducted to determine the nature of the differences. These post hoc tests automatically adjust α to account for the Type I error. Second, to assess change across time for both groups, a mixed-methods analysis of variance with the time variable as the within-subjects factor and the condition (experimental or control group) as the between-subjects factor was conducted. Significant differences were determined by examining the significance of the time by condition interaction term, and the interaction was graphed based on means in order to determine the nature of the interaction. Because the nature of these analyses involved computing an interaction term, it was not possible to test them multivariately; thus each was assessed uniquely. No adjustments were made to α , as the type II error rate for detecting interaction effects is already quite high.²³ Analyses concerning reaction criteria were descriptive in nature, based on means, standard deviations, and percentages. Analyses concerning the actual behavioral reactions were conducted using an independent-sample t test,

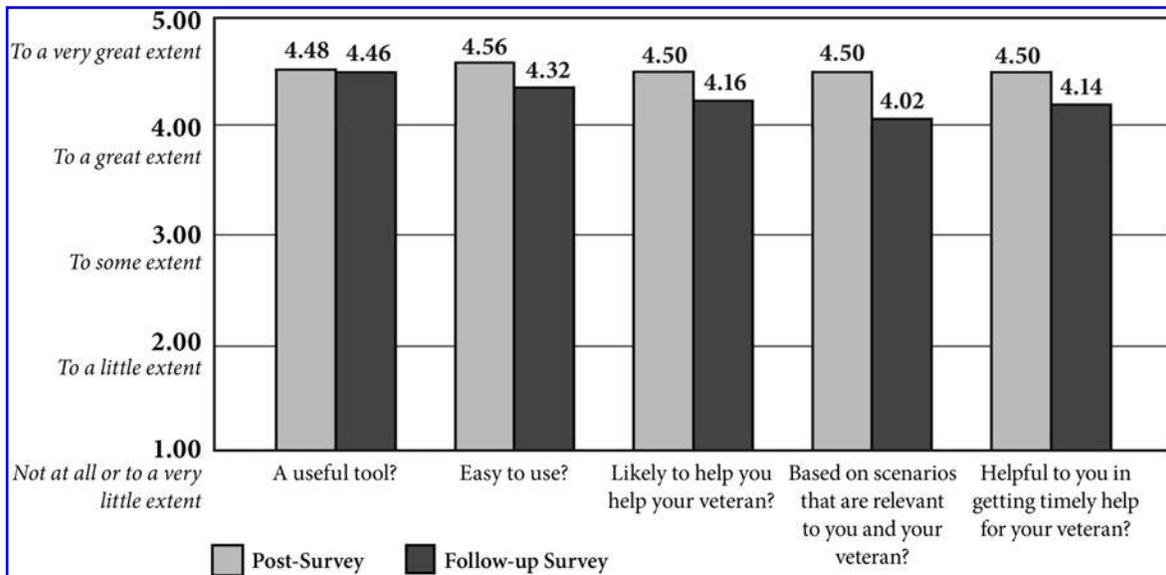


FIG. 2. Mean efficacy questions (experimental group only).

comparing the mean follow-up tests scores of both groups. These analyses were adjusted for Type I error using the Bonferroni correction. Results were interpreted significant based on an α level set at 0.05.

Reactions criteria

The means for the mean-efficacy reactions criteria in the post and follow-up surveys are illustrated in Figure 2. Overall, the results suggest that participants perceived the training as useful, easy to use, based on scenarios relevant to them and their veteran, and helpful in helping them get timely help for their veteran. The mean overall rating for the course was 3.66 (SD=0.52) out of the possible 4.0 at post-test.

Additionally, 70 percent of participants rated the training as “excellent,” 28 percent rated it as “very good,” 98 percent said the simulated conversations helped them be better prepared for similar conversations in real life, and 100 percent said they would recommend the training to family or friends of veterans.

Learning criteria

Results show that the changes in all learning criteria variables from pre-test to follow-up were significantly greater for the experimental group as compared with the control group. The variables include (1) preparedness to recognize signs of post-deployment stress [$F(1,92)=4.09, P<0.05$], (2) preparedness to

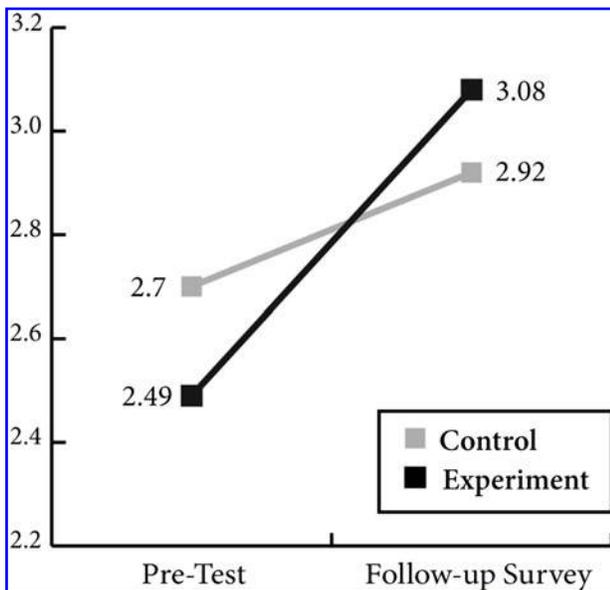


FIG. 3. Changes in preparedness of study participants to discuss concern with their veteran and motivate him or her to seek help at the Veterans Administration.

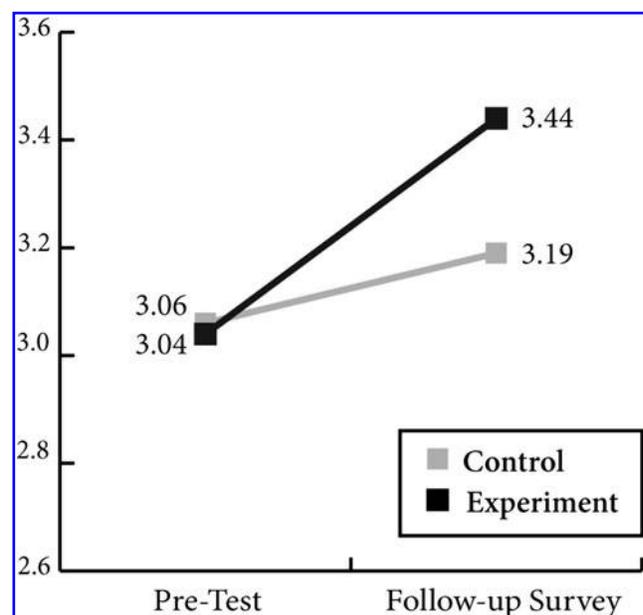


FIG. 4. Changes in self-efficacy in motivating the veteran to seek help at the Veterans Administration.

TABLE 2. CHANGES IN THE EXPERIMENTAL GROUP AT THE THREE MEASUREMENT TIMES

	Pre	Post	Follow-up
Preparedness to recognize signs of post-deployment stress	2.54 (0.89)	3.26 (0.83)	3.08 (0.75)
Preparedness to discuss concern with veteran and motivate him or her to seek help at the VA	2.49 (0.94)	3.41 (0.63)	3.08 (0.70)
Self-efficacy in motivating veteran to seek help at VA	3.04 (0.60)	3.67 (0.44)	3.44 (0.53)
Likelihood to approach veteran to discuss concerns	3.00 (0.86)	3.66 (0.52)	3.58 (0.70)
Likelihood to mention VA as a helpful resource	3.10 (1.01)	3.56 (0.61)	3.54 (0.71)

Data are mean (SD) values.
VA, Veterans Administration.

discuss concern with veterans and motivate them to seek help at the VA [$F(1,92)=4.55, P<0.05$], and (3) self-efficacy in motivating veterans to seek help at the VA [$F(1,92)=4.25, P<0.05$]. Results are illustrated in Figures 3 and 4.

In addition, the experimental group experienced significant changes in all three time measurements: $F(1,49)=13.07, P<0.05$; $F(1,49)=24.55, P<0.05$; and $F(1,49)=25.53, P<0.05$ for variables 1, 2, and 3, respectively. The means for each measurement are listed in Table 2. Post hoc tests conducted for each variable also revealed that all three measurement points were significantly different from each other (post- vs. pre-test and follow-up vs. pre-test).

Behavioral criteria

Behavioral intention. Results show that the changes in the two behavioral intention variables from pre-test to follow-up were significantly greater for the experimental group as compared with the control group. The variables include (1) likelihood to approach the veteran and discuss concern [$F(1,92)=10.77, P<0.05$] and (2) likelihood to mention the VA as a helpful resource [$F(1,92)=4.20, P<0.05$]. Results are illustrated in Figures 5 and 6.

In addition, the experimental group experienced significant changes in all three time measurements: $F(1,49)=21.41,$

$P<0.05$; and $F(1,49)=7.54, P<0.05$ for both variables 1 and 2, respectively. The means for each measurement are listed in Table 2. Post hoc tests conducted for each variable also revealed that all three measurement points were significantly different from each other (post- vs. pre-test and follow-up vs. pre-test).

Behavioral change. There were also significant differences in follow-up scores as to whether or not the participants had approached the veteran to discuss concerns about post-deployment stress, such that significantly more people in the experimental group approached their veteran than in the control group [$t(80)=2.63, P<0.025$]. In addition, among only those participants in each group who indicated that they did approach their veteran ($n=24$ for control, $n=32$ for experimental), there were significant differences in whether or not they had mentioned the VA as a resource, such that those in the experimental group mentioned the VA more [$t(54)=2.85, P<0.025$]. From a percentage standpoint, 100 percent of those in the experimental group mentioned the VA compared with 79 percent of the control group (see Table 3).

Treatment seeking. The study found that seven of the 32 veterans (22 percent) who were approached by participants in

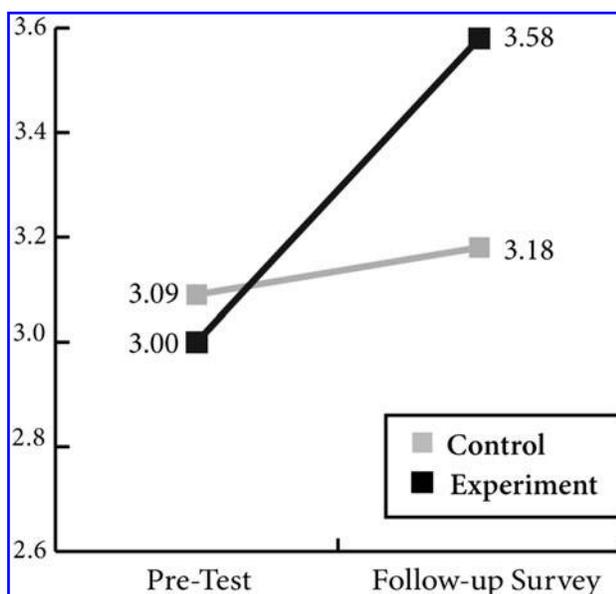


FIG. 5. Changes in likelihood of family members to approach their veteran and discuss concern.

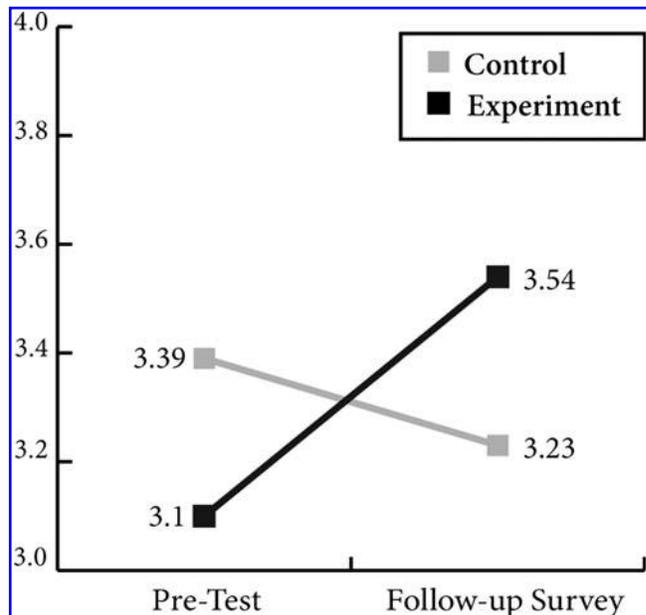


FIG. 6. Changes in likelihood to mention the VA as a help resource.

TABLE 3. ACTUAL BEHAVIOR OF EXPERIMENTAL AND CONTROL GROUPS IN TERMS OF APPROACHING THEIR VETERAN TO DISCUSS THEIR CONCERN AT 1-MONTH FOLLOW-UP

Group, question	Yes	No	Not relevant (not concerned)
Experimental (n=50) As a result of this training, have you approached your veteran to discuss your concern?	32	7	11
Control (n=44) In the past month, have you approached your veteran to discuss your concern?	24	19	1

the experimental group after they completed the training started to receive mental health treatment within the 1-month study period (five at the VA). According to their family members, all seven were previously diagnosed with PTSD and/or depression but did not receive treatment at the VA or contact the VA before the study began. None of the other veterans in the experimental group started treatment. In comparison, only three of the 24 (12 percent) who were approached by participants in the control group to discuss their concern during the study period started treatment, all at the VA. Although we cannot establish direct causation between the two measurements, this finding suggests that completing the training had a substantial impact on the likelihood that participants would get their veteran to seek help and begin treatment at the VA.

Discussion

Family members, friends, and partners of returning veterans can play an important role in connecting veterans to support services at the VA. This population is concerned about their veterans and motivated to help them but reports low levels of preparedness in how to best approach their veteran to discuss their concern and knowledge of support services available for veterans.

The results of the study strongly suggest the following:

“Family of Heroes” is an effective tool to increase the preparedness of family members to recognize when their veterans exhibit signs of post-deployment stress.

The training is an effective tool in increasing the self-efficacy and preparedness of family members to approach their veterans to discuss their concern and motivate them to seek help at the VA.

The training is an effective tool to increase the number of family members who approach their veterans to discuss their concerns and mention the VA as a helpful resource.

The training can have a substantial impact on the number of veterans, previously diagnosed with PTSD and/or depression, who begin to receive mental health treatment at the VA.

The training provides an engaging and realistic learning environment that includes relevant practice engaging in simulated conversations with life-like avatars exhibiting signs of post-deployment stress and can assist in preparing families for similar conversations in real life.

Limitations

There are several limitations to consider in understanding and applying the findings of this study. First, there is a possibility of a self-selection bias as participants volunteered to participate in the study in response to a recruitment ad; thus their motivation, concern, and other possible variables may not completely represent the general population of interest. Second, the follow-up surveys were administered 1 month after the experimental group completed the training and the control group completed the pre-test survey. To further address the sustainability of learning and outcome measures, it would be helpful to administer additional follow-up surveys. Therefore, we plan to survey participants at 6 months post-intervention. Third, future studies need to validate the scales created for this study. Finally, in future studies, we want to directly assess the impact of the training on measures of resiliency, which has been shown to mediate positive behavioral change in response to traumatic events. The current study only assessed one component of resiliency: Self-efficacy.

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Author Disclosure Statement

G.A. and R.G. are members of Kognito Interactive. F.M. and S.A. are employees of Kognito Interactive. K.S. has received a consulting fee for analyzing the data and co-writing the manuscript.

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