

Feasibility of a Web-based Gatekeeper Training: Implications for Suicide Prevention

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Web-based training programs have advantages such as increased scheduling flexibility and decreased training costs. Yet the feasibility of applying them to injury prevention programs such as suicide prevention gatekeeper training has not been empirically verified. Two studies were conducted to assess the feasibility and effectiveness of a web-based version of the Question, Persuade, and Refer (QPR) gatekeeper training program. Results of Study 1 revealed that participants in a web-based training demonstrated significant gains in knowledge of suicide prevention, self-efficacy for suicide prevention, and behavioral intentions to engage in suicide prevention, as compared to those in a control group. Results of Study 2 further showed that the web-based training may be as effective as the face-to-face QPR training across pre- (T1) and post training (T2); however, knowledge, self-efficacy, and behavioral intentions in both groups generally declined from T2 to 6-months after the training. Overall, these results provide initial evidence to support the feasibility of adopting web-based media to deliver gatekeeper training. Moreover, the present findings suggest the need to understand how to maintain gatekeepers' knowledge, confidence, motivation, and skills after training.

According to the World Health Organization (WHO, 2011), self-inflicted injury (i.e., suicide) ranks in the top three leading causes of death among people between 15 and 44 years of age in some countries, and is the second leading cause of death among

people between 10 and 24 years of age worldwide. These data clearly indicate that suicide is a significant public health challenge, and there is a pressing need to develop effective and efficient approaches to prevent suicide.

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In an attempt to reduce the number of suicide attempts and deaths, researchers and practitioners developed a number of effective strategies. One of the most widely implemented strategies, gatekeeper training, is designed to train people (i.e., gatekeepers) from certain social and professional groups who are in frequent contact with suicidal individuals to identify those at risk for suicide and refer those in need to the appropriate mental health services (Brown, Wyman, Brinales, & Gibbons, 2007). In spite of increased popularity and well-intended use of gatekeeper training programs, conclusive evidence about their utility in enhancing early identification and referral of individuals at risk for suicide remains elusive (Wyman et al., 2008).

In particular, one theory-driven gatekeeper training program, known as Question, Persuade, and Refer (QPR; Quinnett, 2007), has been widely implemented. QPR training is typically conducted in a face-to-face classroom setting for 1 to 2 hours and involves listening to an instructor, watching videos, and engaging in discussion and role-plays with other trainees. The goals of QPR are to increase knowledge of suicidal warning signs, increase self-efficacy to intervene, and assume the gatekeeper role (asks about suicide, encourages help seeking, and identifies resources for help). Past research has demonstrated the effectiveness of QPR training in improving trainee knowledge, awareness, attitudes, and self-reported gatekeeper behaviors (Wyman et al., 2008) and skills (e.g., active listening) observed in a role play setting (Cross, Matthieu, Cerel, & Knox, 2007; Cross, Matthieu, Lezine, & Knox, 2010).

Recently, a web-based QPR training was developed to serve as an alternative option to training gatekeepers who may not be able to attend a face-to-face training. Presumed advantages for the web-based QPR training include saving gatekeepers' time and money, allowing gatekeepers to determine the pace of the training, and eliminating biases associated with trainers. However, evaluative evidence about the

web-based QPR training has not been available.

According to the training literature, there is little differential effectiveness between web-based trainings and face-to-face trainings in terms of knowledge acquisition and trainee preference (Sitzmann, Kraiger, Stewart, & Wisher, 2006), and much of the past research has lacked a theoretical foundation to guide the investigation of the reasons why differences would appear (Bates, Holton, & Seyler, 1996; Montazemi & Wang, 1995). Kraiger (2008) argued that social interactions are the conduit through which learning and understanding occur. While face-to-face trainings are inherently social, Kraiger suspected that the anonymity afforded by the web-based training format may also allow for social interaction if the trainee lacks self-efficacy. In the context of face-to-face QPR training, some trainees may be hesitant to fully engage in the training because of the sensitivity associated with the issue of suicide. Some trainees may engage in limited social interactions with other trainees. However, there is no sufficient rationale yet to hypothesize whether web-based training is superior to face-to-face training or not.

With initial evidence supporting the effectiveness of face-to-face QPR training (e.g., Cross et al., 2007, 2010; Wyman et al., 2008), it is important to first determine whether the web-based QPR training is feasible to implement in practice to provide suicide prevention training. Second, if the web-based QPR training is effective, would the effects be comparable to those observed in the face-to-face QPR training program? Consequently, two sequential studies were conducted to (1) examine the feasibility of implementing the web-based QPR training and evaluate the effectiveness of the web-based QPR training versus a control condition (Study 1), and (2) demonstrate the effects of the web-based QPR training compared to the face-to-face QPR training as the benchmark (Study 2). Because of the lack of sufficient evidence to hypothesize differential effects between

web-based training and face-to-face training as described earlier, Study 2 posits the following research question: Is the web-based QPR training comparable to the face-to-face QPR training?

STUDY 1

METHOD

Participants

Salvation Army-Australia volunteers were recruited by Salvation Army-Australia to participate in the current study. Salvation Army volunteers were targeted because the likelihood of these volunteers coming into contact with the public is much greater than the general population. A total of 158 Salvation Army volunteers were invited to participate, of which 107 participated in the study (68% response rate). The majority of participants were female (72.0%). The question about participants' age was not asked, although they were all adults (i.e., over the age of 18).

Procedure

Each participant was sent a brief introductory e-mail by the research team explaining the purpose of the study and the need for their assistance. Participants receiving the initial e-mail were asked to click on a hyperlink embedded in the e-mail if they consented to participate. The pretest-posttest control group design was employed in this study. Specifically, each participant was asked to complete an online pretraining survey immediately prior to the training. After completion of the pretraining survey, all 107 participants were randomly assigned to one of two groups: a training group or a control group, with 56 individuals in the training group, and 51 in the control group. Participants in the training group attended the web-based QPR training (with the same content as the face-to-face training), which they completed at

their own pace. Upon finishing the training, participants completed an online posttraining survey. In contrast, participants in the control group read an online 10-page article entitled "The History of Suicide Prevention" as the control activity, completed the posttraining survey, and then attended the same web-based QPR training. The 10-page article was reviewed by two researchers who were independent from this study, and both of them agreed that the article contained information that was unrelated to the training as well as the measures described in the subsequent section.

Measures

Reactions. After completing the web-based QPR training, participants of the training group responded to two items to assess their reactions to the training. Reactions are an important outcome to demonstrate feasibility, because trainees are more likely to utilize what they learned in training if they have positive reactions to the training experience (Alliger, Tannenbaum, Bennett, Traver, & Shotland, 1997). The two items were, "Do you believe this training will help you in helping someone who is suicidal?" and "I would recommend this training program to other people." Both items had a yes/no response format. Internal consistency of the scale could not be computed due to zero variance of both items, because all participants had positive reactions to the web-based QPR training.

Knowledge about Suicide and Suicide Prevention. Pretraining and posttraining knowledge were assessed with 15 multiple-choice questions modified from Wyman et al. (2008). Examples of this content include knowing the leading risk factors for suicide, epidemiology of suicide, warning signs, how to intervene with a suicidal individual, and how to refer a suicidal individual to appropriate services. For instance, participants were asked "If you intercept a suspected suicidal communication (clue, warning sign, suspicious statement or threat), which of the following questions should be

avoided: (1) You're not thinking of killing yourself, are you? (2) Are you thinking about suicide? (3) Are you feeling so bad you'd like to go to sleep and never wake up? And (4) Have you ever wished you were dead?"

An item difficulty index that informs the level of difficulty was calculated for each item. This index informs the level of difficulty of a test question, which ranges from 0 to 1, with 0 indicating that 0% of respondents answer the question correctly (i.e., extremely difficult) and 1 indicating that 100% of respondents answer the question correctly (i.e., extremely easy). This index plays an important role in determining if a test question is too easy or too difficult. In general, questions that are too easy or too difficult would lose its ability to distinguish people who have or have not learned the materials in the training program.

Item difficulty indexes of the pretest ranged from 0.34 to 1.0 with an average of 0.73 for the QPR training group, and from 0.29 to 1.0 with an average of 0.72 for the control group. At the posttest, item difficulty indexes ranged from 0.63 to 1.0 with an average of 0.88 for the training group, and from 0.36 to 1.0 with an average of 0.75 for the control group. An overall test score of suicide prevention knowledge was the sum of all the items that were answered correctly by each participant.

Self-efficacy for Suicide Prevention. A three-item scale, used in both pretest and posttest, was adapted from Cigularov, Chen, Thurber, and Stallones (2008) to assess participants' confidence of helping or finding help for a potentially suicidal individual (Thompson, Eggert, Randell, & Pike, 2001). The scale was reduced to two items based on results of item analyses. Response categories ranged from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The items were, "I feel confident in my ability to help a suicidal person" and "I don't feel competent to help a suicidal person" (reverse scored). Coefficients alpha for this scale at pretest and posttest were 0.85 and 0.71, respectively, for the training group, and 0.87 and 0.80, respectively, for the control group.

Behavioral Intention to Engage in Suicide Prevention. Behavioral intention to ask a potentially suicidal individual if he or she is thinking of suicide, a proxy indicator for actual behavior, was measured by a two-item scale at both pretest and posttest. Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) and meta-analytic findings (e.g., Albarracín, Johnson, Fishbein, & Muellerleile, 2001) support the notion that behavioral intentions are indicative of one's readiness to perform certain behaviors. Response categories of the items ranged from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The items were, "If someone I knew was showing signs of suicide, I would directly raise the question of suicide with them" (Tierney, 1994) and "If a person's words and/or behavior suggest the possibility of suicide, I would ask the person directly if he/she is thinking about suicide" (Cigularov et al., 2008).

Coefficients alpha at pretest and posttest for the training group were 0.81 and 0.37, respectively, and 0.93 and 0.85, respectively, for the control group. While the 0.37 value appears low for the training group at posttest, this is likely due to the fact that there is smaller variation in the participants' responses after the training. Specifically, the variance at posttest for the training group was 0.79 while the variance for the control group was 2.97. In contrast, the variance at pretest was 3.22 and 2.99 for the training and control groups, respectively.

Past Suicide Prevention Behaviors. As part of the pretraining survey, participants were asked about their previous experience engaging in three different suicide prevention behaviors. That these items would be statistically controlled should mean differences between both groups be found. These three items were adapted from Wyman et al. (2008) and included "How many times in the last 6 months have you thought a person's behavior might indicate he/she was considering suicide?" (identifying behavior, $\bar{x} = 1.90$); "How many times in the last 6 months have you asked a person whether he/she was considering suicide?" (question-

ing behavior, $\bar{x} = 1.35$); and “In the last 6 months, how many people did you personally refer to appropriate professional services because you were concerned that they might be suicidal?” (referring behavior, $\bar{x} = 1.08$). These items were not combined into a scale because they assess different types of suicide prevention behavior.

RESULTS AND DISCUSSION

The means and standard deviations for knowledge, self-efficacy, and behavioral intentions of the QPR training group and control group at pretest and posttest are presented in Table 1. Before investigating the effects of training, we conducted a series of t tests to examine mean differences between the groups on pretests for knowledge, self-efficacy, behavioral intention, and the three past suicide prevention behaviors. No significant results were found on any pretest measure.

A series of ANOVAs were then conducted to test the effects of group (training vs. control), time (pretest vs. posttest), and the group-by-time interaction on the outcome variables of knowledge about suicide

and suicide prevention, self-efficacy for suicide prevention, and behavioral intentions to engage in suicide prevention. Subsequent comparisons were conducted if omnibus F tests were significant, and the Bonferroni procedure was applied to maintain familywise Type I error rate at 0.05 throughout the following analyses. For knowledge, a significant effect was found for time, $F(1, 103) = 62.92, p = .00$; group, $F(1, 103) = 11.28, p = .00$; and time-by-group interaction, $F(1, 103) = 39.75, p = .00$. Subsequent t -tests (based on familywise $\alpha = .02$) showed that posttest knowledge scores of the training group were significantly higher than pretest knowledge scores of the training group, $t(55) = 9.68, p = .00$, and posttest knowledge scores of the control group, $t(103) = 5.73, p = .00$. Furthermore, posttest knowledge scores of the control group were not significantly different from pretest knowledge scores of the control group, $t(48) = 1.23, p = .22$.

Similarly, for self-efficacy, a significant effect was found for time, $F(1, 104) = 67.83, p = .00$; group, $F(1, 104) = 9.28, p = .00$; and time-by-group interaction, $F(1, 104) = 24.86, p = .00$. Subsequent t -tests (based on familywise $\alpha = .02$) demonstrated

TABLE 1

Descriptives, Effect Sizes, and F-test Statistics of Training Outcomes for the Web-Based Training and Control Groups

Variable											<i>d</i> ^a
	Control					QPR Training					
	Pretest			Posttest		Pretest			Posttest		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Knowledge ^b	49	10.94	1.57	11.18	1.73	56	11.00	1.79	13.14	1.76	1.13
Self-efficacy ^c	50	6.82	1.86	7.36	1.63	56	6.80	1.78	9.00	1.11	1.20
Behavior intentions ^d	50	8.10	1.73	8.18	1.72	56	8.05	1.79	9.61	0.89	1.07

QPR, Question, Persuade, and Refer.

^aCohen's d effect size estimate for standardized mean difference between control and training groups at posttest.

^bTime factor, $F(1, 103) = 62.92, p = .00$; group factor, $F(1, 103) = 11.28, p = .00$; and time-by-group interaction, $F(1, 103) = 39.75, p = .00$.

^cTime factor, $F(1, 104) = 67.83, p = .00$; group factor, $F(1, 104) = 9.28, p = .00$; and time-by-group interaction, $F(1, 104) = 24.86, p = .00$.

^dTime factor, $F(1, 104) = 31.94, p = .00$; group factor, $F(1, 104) = 6.59, p = .01$; time-by-group interaction, $F(1, 104) = 25.99, p = .00$.

that posttest self-efficacy scores of the training group were significantly higher than posttest self-efficacy scores of the control group, $t(104) = 6.12$, $p = .00$, and pretest self-efficacy scores of the training group, $t(55) = 8.20$, $p = .00$. However, posttest self-efficacy scores of the control group were unexpectedly higher than pretest self-efficacy scores of the control group, $t(49) = 2.94$, $p = .01$.

Finally, for behavioral intentions to engage in suicide prevention, a significant effect was found for time, $F(1, 104) = 31.94$, $p = .00$; group, $F(1, 104) = 6.59$, $p = .01$; and time-by-group interaction, $F(1, 104) = 25.99$, $p = .00$. Again, follow-up t -tests (based on familywise $\alpha = .02$) indicated that the training group's posttest intention scores were significantly higher than the control group's posttest intention scores, $t(104) = 5.45$, $p = .00$, and the training group's pretest intention scores, $t(55) = 7.34$, $p = .00$. Control group posttest intention scores were not different from control group pretest intention scores, $t(49) = 0.41$, $p = .68$.

These results provide preliminary evidence for the effectiveness of the web-based QPR training in improving knowledge about suicide and suicide prevention, self-efficacy for suicide prevention, and behavioral intentions to engage in suicide prevention. The training group showed significantly larger gains on all of the outcomes in contrast to the control group. However, there was an unexpected pretest-posttest increase in self-efficacy in the control group, indicating that the control group participants felt more confident in their capability to intervene with a suicidal individual at posttest compared to pretest. It is possible that answering the pretest measures and/or reading the assigned article sensitized these participants to the subject of suicide prevention and increased their confidence levels at posttest. It is important to note though that pretest-posttest improvement in self-efficacy of the control group was significantly smaller than the improvement reported by the training

group. Overall, the findings, in conjunction with unanimously positive reactions to the training, provide initial support for the feasibility of offering web-based QPR training and for its effectiveness in enhancing knowledge, self-efficacy, and behavioral intentions related to suicide prevention. Extending from Study 1, we proceeded to examine whether the effects of the web-based QPR training are comparable to those of the face-to-face QPR training in Study 2.

STUDY 2

METHOD

Participants

As described earlier, participants who had originally served as the control group in Study 1 attended the web-based QPR training after completing the posttraining survey. Their results, hence, were combined with the original web-based QPR training group so that a total of 107 individuals participated in the web-based training in Study 2. Regarding the face-to-face QPR training, the data were derived from 949 adult participants who were recruited by suicide prevention communities in a western state of the United States. These participants were recruited to take the face-to-face QPR training because they likely had contact with youth at risk due to their roles (e.g., social workers, probation officers, and teachers). These participants were primarily female (69.2%) and White (81.2%). The mean age was 40.6 years ($SD = 15.1$ years).

Procedure

Both web-based and face-to-face trainings were designed with the same content. Participants of both groups received three evaluation surveys at the following times: immediately prior to the training (T1), immediately following the training (T2), and approximately 6 months following the

training (T3). For the T3 survey, participants received an e-mail from the research team approximately 6 months after the training that included a hyperlink to an online survey. The T3 survey was completed by 50.5% of the participants in the web-based training group, and 21.5% of the participants in the face-to-face training group. The response rates are somewhat within the range reported by Cook, Heath, and Thompson (2000), who found an average response rate with no missing data in web-based survey of 34.6% ($SD = 15.7\%$).

Measures

Reactions. Participants responded to items that assessed their reactions to the training program immediately after the training. Web-based participants responded to the items, "Do you believe this training will help you in helping someone who is suicidal?" and "I would recommend this training program to other people." Both items had a yes/no response option. Scale variance was near zero because 99 percent responded "yes" to both questions. Therefore, internal consistency could not be computed. Face-to-face participants responded to similar items, "The training increased my knowledge about suicide prevention," "This training was practical to my work and/or my daily life," "I am now more ready to help with youth suicide prevention in my community," and "I will use what I learned from this training." Response categories ranged from 1 (*Strongly Disagree*) to 4 (*Strongly Agree*). Coefficient alpha for these items was 0.83.

Knowledge about Suicide and Suicide Prevention. A subset of seven items from Study 1, which were used in both the web-based and face-to-face trainings, were included to assess knowledge of suicide and suicide prevention. For the web-based training group, item difficulty ranged from 0.45 to 0.99 with an average of 0.69 at T1; from 0.78 to 1.0 with an average of 0.91 at T2; and from 0.59 to 1.0 with an average of 0.77 at T3. For the face-to-face training

group, item difficulty ranged from 0.43 to 0.98 with an average of 0.67 at T1; from 0.72 to 0.99 with an average of 0.86 at T2; and from 0.49 to 0.99 with an average of 0.78 at T3. Similar to Study 1, an overall test score for each participant was derived by summing all the correct answers.

Self-efficacy for Suicide Prevention. Self-efficacy for suicide prevention was measured by the two-item scale described in Study 1. Coefficients alpha for the web-based training group at T1, T2, and T3 were 0.86, 0.66, and 0.56, respectively; coefficients alpha for the face-to-face training group were estimated to be 0.79, 0.60, and 0.73, respectively. The low alpha values (e.g., 0.56) are likely attributed to range restriction at time points in which nearly all participants responded at the "strongly agree" end of the scale. For instance, the variance of the scale in the web-based training group was 3.28, 1.25, and 1.34 at T1, T2, and T3, respectively, and the scale variances for the face-to-face training group were 3.47, 1.93, and 2.28 at T1, T2, and T3, respectively. The low scale variances correspond to the low alpha values at T2 and T3.

Behavioral Intentions to Engage in Suicide Prevention. Behavioral intentions to ask a potentially suicidal individual if he/she is contemplating suicide were measured by the same 2-item scale as in Study 1. Response categories for both items ranged from 1 (Strongly Disagree) to 5 (Strongly Agree). Coefficients alpha for the web-based training group at T1, T2, and T3 were 0.86, 0.49, and 0.77, respectively; coefficients alpha for the face-to-face group were 0.89, 0.93, and 0.93, respectively. The low coefficient alpha for the web-based group at T2 may be attributed to a relatively smaller correlation between the two items ($r = .40$) than those at T1 and T3 ($r \geq .63$).

Past Suicide Prevention Behaviors. Three items used in Study 1 were employed to assess the extent to which participants had engaged in three suicide prevention behaviors in the previous 6 months. Because the items assess different types of suicide

prevention behavior, they were not combined into a scale. These items were measured both at T1 and T3. Should mean differences at T1 be found between the two groups, these behaviors would be statistically controlled. Suicide prevention behaviors at T3, however, would be employed to assess the effects of both training programs.

RESULTS AND DISCUSSION

In the face-to-face training group, 95 percent of the participants had positive reactions to the training as indicated by responding "agree" or "strongly agree" to all items. In the web-based training group, 99 percent of trainees had positive reactions to the training. Overall, the vast majority of participants reported positive reactions to both training programs. A series of *t*-tests were conducted first and found no significant mean differences (based on familywise $\alpha = .01$) between the web-based and face-to-face groups for knowledge, self-efficacy, behavioral intentions, and three suicide prevention behaviors at Time 1 (all *p* values ranged from 0.1 to 0.55).

Due to the low response rates at T3, we conducted a series of attrition analyses for the web-based training group and face-to-face training group to determine if completion of the T3 survey was related to any variables of interest.¹ For the web-based training group, there were no significant mean differences on knowledge, self-efficacy, and behavioral intention at T1, $F(3, 102) = 2.16$, $p = .1$, and at T2, $F(3, 103) = 0.17$, $p = .92$, between respondents who completed the T3 survey and those who did not. In addition, there was no significant mean difference on the three T1 suicide prevention behaviors, $F(3, 101) = 2.14$, $p = .1$.

For the face-to-face training group, the overall mean differences were significant at T1, $F(3, 849) = 5.93$, $p = .00$, and T2, $F(3, 835) = 6.06$, $p = .00$. However, there

was no significant mean difference on the three T1 suicide prevention behaviors, $F(3, 915) = 0.98$, $p = .4$. Subsequent comparisons (based on familywise $\alpha = .01$) only showed that those who failed to complete the T3 survey tended to score lower on T1 knowledge, $t(738) = 2.84$, $p = .01$, and T2 knowledge, $t(738) = 4.06$, $p = .00$.

We analyzed the results based on T1 and T2 data first, followed by the analysis based on T1, T2, and T3 data together. The means, standard deviations, and effect sizes of T1 versus T2, and T2 versus T3 knowledge, self-efficacy, behavioral intentions, and three suicide prevention behaviors are presented in Table 2.

Three 2 (time) \times 2 (group) ANOVAs were conducted to examine effects of training on posttest knowledge, self-efficacy, and behavioral intentions related to suicide prevention. For knowledge, a significant effect was found for time, $F(1, 845) = 502.73$, $p = .00$, as well as for group, $F(1, 845) = 3.98$, $p = .05$. No significant time-by-group interaction was found. Subsequent comparisons (based on familywise $\alpha = .01$) results suggested that both groups demonstrated similar improvement in knowledge from T1 to T2, and the web-based training group had significantly higher knowledge score than the face-to-face training group at T2, $t(962) = 3.19$, $p = .00$.

For self-efficacy, there was a significant effect for time, $F(1, 933) = 426.81$, $p = .00$; group, $F(1, 933) = 21.48$, $p = .00$; and time-by-group interaction, $F(1, 933) = 22.64$, $p = .00$. Similarly, subsequent comparisons showed an improvement in self-efficacy for both groups from T1 to T2, and the web-based training group scored significantly higher than the face-to-face training group at T2, $t(1,021) = 7.44$, $p = .00$.

Regarding behavioral intentions, there was a significant time effect, $F(1, 940) = 170.01$, $p = .00$, which suggested an overall improvement from T1 to T2 for both groups. Neither the group effect nor the time-by-group interaction reached the statistically significant level.

To examine training effects on 6-month outcomes, we first examined if the trainings

¹We thank an anonymous reviewer for a suggestion regarding attrition analyses.

TABLE 2
Descriptives, Effect Sizes, and F-test Statistics of Training Outcomes for the Web-Based and Face-to-Face Groups across Three Times

Variable	Web-Based						Face-to-Face					
	Pretest			Posttest			Pretest			Posttest		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Knowledge ^{c,d}	107	4.81	1.12	107	6.37	0.78	54	5.41	1.27	740	4.74	1.26
Self-efficacy ^{e,f}	106	6.81	1.81	106	9.01	1.12	51	8.24	1.16	829	6.55	1.88
Behavior intentions ^{g,h}	106	8.08	1.75	106	9.24	1.43	51	9.22	0.92	836	7.74	1.94
Identifying behavior ⁱ	51	1.90	2.11	—	—	—	51	1.94	1.56	179	1.30	2.73
Questioning behavior ^j	52	1.35	2.26	—	—	—	52	1.98	2.17	179	2.23	10.03
Referring behavior ^k	51	1.08	1.72	—	—	—	51	1.61	1.85	181	.84	1.78

^aCohen's *d* effect size estimate for standardized mean difference between web-based and face-to-face groups at posttest.

^bCohen's *d* effect size estimate for standardized mean difference between web-based and face-to-face groups at 6-month follow-up.

^cANOVA based on T1 and T2: Time factor, $F(1, 845) = 502.73, p = .00$; group factor, $F(1, 845) = 3.98, p = .05$; and time-by-group interaction, $F(1, 845) = 3.25, p = .07$.

^dANOVA based on T1, T2, and T3: Time factor, $F(2, 216) = 120.51, p = .00$; group factor, $F(1, 217) = 0.14, p = .71$; and time-by-group interaction, $F(2, 216) = 0.51, p = .6$.

^eANOVA based on T1 and T2: Time factor, $F(1, 933) = 426.81, p = .00$; group factor, $F(1, 933) = 21.48, p = .00$; and time-by-group interaction, $F(1, 933) = 22.64, p = .00$.

^fANOVA based on T1, T2, and T3: Time factor, $F(2, 225) = 110.88, p = .00$; group factor, $F(1, 226) = 2.14, p = .15$; and time-by-group interaction, $F(2, 225) = 8.00, p = .00$.

^gANOVA based on T1 and T2: Time factor, $F(1, 940) = 170.01, p = .00$; group factor, $F(1, 940) = 3.71, p = .054$; and time-by-group interaction, $F(1, 940) = 0.51, p = .48$.

^hANOVA based on T1, T2, and T3: Time factor, $F(2, 226) = 32.56, p = .00$; group factor, $F(1, 227) = 1.13, p = .29$; and time-by-group interaction, $F(2, 226) = 0.62, p = .54$.

ⁱANOVA based on T1 and T3: Time factor, $F(1, 228) = 0.60, p = .44$; group factor, $F(1, 228) = 0.73, p = .39$; and time-by-group interaction, $F(1, 228) = 0.45, p = .50$.

^jANOVA based on T1 and T3: Time factor, $F(1, 229) = 0.24, p = .63$; group factor, $F(1, 229) = 0.49, p = .48$; and time-by-group interaction, $F(1, 229) = 0.01, p = .91$.

^kANOVA based on T1 and T3: Time factor, $F(1, 230) = 4.16, p = .04$; group factor, $F(1, 229) = 0.49, p = .48$; and time-by-group interaction, $F(1, 230) = 0.12, p = .74$.

improved suicide prevention behaviors as reported 6 months after the training (T3) compared to pretest (T1). Based on three 2 (group) \times 2 (time) ANOVAs, a significant time main effect was found on referring behavior, which improved from T1 (\bar{x} = 0.89) to T3 (\bar{x} = 1.59), $F(1, 30) = 4.16, p = .04$. No significant main or interaction effects were observed on identifying and questioning behaviors.

Three additional 2 (group) \times 3 (time) ANOVAs were conducted to examine training effects on knowledge, self-efficacy, and behavioral intentions. A significant main effect on knowledge was found for time, $F(2, 216) = 120.51, p = .00$, but not for group, $F(1, 217) = 0.14, p = .70$, and for the time-by-group interaction, $F(2, 216) = 0.51, p = .60$. Post-hoc *t*-tests (based on familywise $\alpha = .01$) indicated that knowledge in both groups increased from T1 to T2, $t(218) = 17.21, p = .00$, and then declined from T2 to T3, $t(232) = 10.23, p = .00$. However, the T3 performance on the knowledge test remained higher than that at T1, $t(238) = 4.83, p = .00$.

For self-efficacy, significant effects were found for time, $F(2, 225) = 110.88, p = .00$, and time-by-group interaction, $F(2, 225) = 8.00, p = .00$. No significant group effect was found, $F(1, 226) = 2.14, p = .15$. Post-hoc *t*-tests (based on familywise $\alpha = .01$) indicated that both groups increased from T1 to T2, $t(227) = 14.29, p = .00$, although the web-based training group reported higher self-efficacy at T2 compared to the face-to-face training group, $t(236) = 4.01, p = .00$. Even though both groups' self-efficacy declined from T2 to T3, $t(237) = 3.00, p = .00$, self-efficacy at T3 remained higher than the self-efficacy at T1, $t(240) = 12.71, p = .00$.

Finally, for behavioral intentions to intervene, only the time effect was significant, $F(2, 226) = 32.56, p = .00$. Post-hoc *t*-tests (based on familywise $\alpha = .01$) suggested that both groups demonstrated substantial increases from T1 to T2, $t(228) = 9.63, p = .00$, but not from T2 to T3, $t(238) = 1.82, p = .07$. Finally, both groups

reported higher intentions at T3 than they did at T1, $t(240) = 8.25, p = .00$.

The results suggest that the web-based and face-to-face QPR programs may be similarly effective in improving knowledge, self-efficacy and behavioral intentions related to suicide prevention from pretest (T1) to posttest (T2). Furthermore, the web-based training seemed to produce higher posttest levels of knowledge and self-efficacy compared to the face-to-face format, lending further support for the utility and effectiveness of this alternative format. Similar findings were revealed when analyses were extended to include the 6-month follow-up assessment; however, observed mean levels of the evaluation outcomes at T3 consistently decreased compared to T2, albeit remaining significantly higher than T1 levels. This alludes to potential issues with decay in training effects and transfer of learned knowledge, attitudes, and behavior outside the training context. Finally, out of the three evaluated gatekeeper behaviors, only referring behavior showed significant improvements from T1 to T3 and this improvement was similar for both formats of the QPR training program. These findings may be also related to pre-training levels of the targeted behaviors: referring behavior was reported as least frequent in both groups at T1 (\bar{x} = 1.08 and \bar{x} = .84 for web-based and face-to-face, respectively) compared to identifying (\bar{x} = 1.90 and \bar{x} = 1.30 for web-based and face-to-face, respectively) and questioning (\bar{x} = 1.35 and \bar{x} = 2.23 for web-based and face-to-face, respectively) behaviors.

GENERAL DISCUSSION

Findings in Study 1 established the initial evidence about the feasibility and effectiveness of the web-based QPR training for improving knowledge about suicide and suicide prevention, self-efficacy for suicide prevention, and behavioral intentions to engage in suicide prevention, compared to a control group. Improvements in the outcomes from T1 to T2 were also shown

in Study 2: Participants in the web-based QPR training group showed improvements on knowledge, self-efficacy, and behavioral intentions from T1 to T2, which were similar to the face-to-face QPR training group. However, knowledge, self-efficacy, and behavioral intentions in both groups generally declined 6 months after the training. Furthermore, a significant increase in gatekeeper referring behavior from 6 months before to 6 months following the training was observed for both groups.

There are five limitations that deserve consideration and further elaboration when interpreting the results from the two studies reported here. First, several important and long-term outcome variables such as prevention behaviors, number of referrals, or successful referrals should be assessed via multiple data sources to provide additional evidence of the effectiveness of QPR. Second, more feasibility data are needed in the future, such as completion rates, training layout, and presentation style, to further assess the feasibility of the web-based QPR. For example, a different data set collected from 921 employees in a county in a western state of the United States has shown that the web-based QPR completion rate is around 96%. Furthermore, 94% of 496 students in a public university in the western United States rated the multimedia presentation of the web-based QPR training either good, very good, or excellent. Future studies should be designed to investigate effects of different layouts and styles on QPR training outcomes.

Third, random assignment was utilized in Study 1, but not in Study 2, even though no mean differences on key outcomes and past suicide prevention behaviors existed prior to the training in Study 2. Fourth, comparable effects between the two groups in Study 2 should be interpreted with caution because these groups may not be similar due to country of origin (i.e., Australians and Americans), attrition rate, and nature of work (respondents working in the Salvation Army vs. respondents working with at-risk youth). Australia and the Uni-

ted States, both being considered Western countries, are assumed to have similar attitudes toward suicide. The shared cultural values between Australia and the United States are largely based on the fact that both countries originated from European societies and have similar religions, political systems, and languages. In addition, suicide rates, age, and method to die by suicide between Australia and the United States tend to be similar (Australian Bureau of Statistics, 2007; National Center for Health Statistics, 2008). We hasten to emphasize that the present study focuses on the feasibility of the web-based QPR training and to what extent effects of the web-based training are comparable to those in the face-to-face training.

The fifth limitation relates to our ability to generalize the results in Study 2 because of low response rate at T3, particularly in the face-to-face training group. Consequently, results involving T3 should be interpreted with caution since there is evidence that the Study 2 participants in the face-to-face training group, who completed T3 survey, tended to demonstrate higher knowledge at T1 and T2 compared to non-completers. Although the current findings indicate no mean difference in knowledge at T3 across groups ($d = 0.01$, see Table 2), this conclusion is tentative given that the mean knowledge scores of the face-to-face trainees at T3 may be an overestimate, thus masking a potential difference.

FUTURE DIRECTIONS AND IMPLICATIONS

Overall, the results are promising for adopting web-based media to deliver gatekeeper training, particularly considering that this medium likely decreases training costs, increases administration flexibility, and increases learner control in the training process (Long, DuBois, & Faley, 2008). There are a couple of plausible theoretical reasons that may explain why the web-based training

in the present study performs as well as the face-to-face training, which deserve further investigation in future research.

From a theoretical perspective, web-based media may have given trainees more control over their own learning experiences (e.g., ability to determine pace of the material in our case) than face-to-face training (Lawless & Brown, 1997). It should be noted, however, that learner control may not necessarily be beneficial for all trainees in the web-based training unless trainees invest more effort and time into training (Brown, 2001).

Another theoretical reason is that there is often more anonymity in a web-based training environment. Thus, trainees may be more likely to participate and engage in a training focusing on sensitive topics such as suicide, even when there is no instructor to facilitate the process. The anonymity inherent in the training process may ease trainees' anxiety in the web-based training and motivate them to engage in the learning process.

It is important to note that both trainings should not be compared unless the web-based training was delivered exactly in the same way as the face-to-face training (e.g., video of face-to-face instruction that is delivered via the web medium). According to a meta-analytic study, Sitzmann et al. (2006) revealed that instruction in a web-based training format was about 6% more effective on acquiring factual knowledge than instruction in a face-to-face classroom format. Yet, the above difference diminished when the same instruction methods were used. In the present study, the web-based training incorporated a mixture of texts, pictures, video, and audio features, which indicated that instruction methods used in both training programs were different, even though essential contents about suicide prevention were the same.

As noted, our findings indicated that desired outcomes declined during the 6 months following training. Similar results about long-term effects of a gatekeeper training have also been reported in previous stud-

ies (e.g., Keller et al., 2009). Baldwin and Ford (1988) contend that most training effects decay over time, and such decay is more likely when trainees have not had opportunities to apply skills learned during training (Arthur, Bennett, Stanush, & McNelly, 1998). In the context of suicide prevention, it is quite possible that many gatekeepers do not have the opportunity to apply their skills following training. To address the challenge of training decay, Wyman et al. (2008) examined if a post-training intervention strategy (i.e., 30-min QPR refresher training) might help gatekeepers sustain the effect of their training, but had little success.

Gatekeeper training as an approach to reduce suicide attempts and deaths has its benefits and limitations. Isaac et al.'s (2009) systematic review of the literature found gatekeeper trainings to be successful in positively affecting participants' knowledge, skills, and attitudes. However, the researchers acknowledged that there exists a lack of evidence that gatekeeper training programs are able to positively impact suicide identification and helping behaviors. The lack of evidence does not mean that there is no association between gatekeeper training and detection of suicidal individuals, but rather there is a dearth of studies that have even attempted to adequately measure this association. Additionally, Cross et al. (2010) and Wyman et al. (2008) acknowledged that the brevity of QPR training may result in a lack of behavioral change (e.g., increased communication with at risk individuals) among participants. In other words, QPR training may be too brief to teach communication skills (i.e., active listening, empathy) necessary to "engage others in emotionally charged conversations" (Cross et al., 2010, p. 156).

Considering that millions of dollars, which have been allocated toward suicide prevention efforts over the years, and that the effectiveness of gatekeeper training may not last over time, it seems evident that more research needs to be conducted to understand how to maintain gatekeep-

ers' knowledge, confidence, motivation, and skills after training so that they con-

tinue to be effective in helping individuals in crises.

REFERENCES

- AJZEN, I., & FISHBEIN, M. (1980). *Understanding attitudes and predicting social behaviors*. Englewood Cliff, NJ: Prentice-Hall.
- ALBARRACIN, D., JOHNSON, B. T., FISHBEIN, M., & MUELLERLEILE, P. A. (2001). Theories of reasoned action and planned behavior as models of condom use: A meta-analysis. *Psychological Bulletin*, 127, 142–161.
- ALLIGER, G. M., TANNENBAUM, S. I., BENNETT, W., TRAVER, H., & SHOTLAND, A. (1997). A meta-analysis of the relations among training criteria. *Personnel Psychology*, 50, 341–358.
- ARTHUR, W., BENNETT, W., STANUSH, P. L., & MCNELLY, T. L. (1998). Factors that influence skill decay and retention: A quantitative review and analysis. *Human Performance*, 11, 57–101.
- Australian Bureau of Statistics. (2007). *Suicides, Australia 2005*. Retrieved February 23, 2011, from www.abs.gov.au.
- BALDWIN, T. T., & FORD, J. K. (1988). Transfer of training: A review and directions for future research. *Personnel Psychology*, 41, 63–105.
- BATES, R. A., HOLTON, E. F., III, & SEYLER, D. L. (1996). Principles of CBI design and the adult learner: The need for further research. *Performance Improvement Quarterly*, 9, 3–24.
- BROWN, K. G. (2001). Using computers to deliver training: Which employees learn and why? *Personnel Psychology*, 54, 271–296.
- BROWN, C. H., WYMAN, P. A., BRINALES, J. M., & GIBBONS, R. D. (2007). The role of randomized trials in testing interventions for the prevention of youth suicide. *International Review of Psychiatry*, 19, 1–15.
- CIGULAROV, K., CHEN, P., THURBER, B. W., & STALLONES, L. (2008). Investigation of the effectiveness of a school-based suicide education program using three methodological approaches. *Psychological Services*, 5, 262–274.
- COOK, C., HEATH, F., & THOMPSON, R. L. (2000). A meta-analysis of response rates in web- or internet-based surveys. *Educational and Psychological Measurement*, 60, 821–836.
- CROSS, W., MATTHIEU, M. M., CEREL, J., & KNOX, K. L. (2007). Proximate outcomes of gatekeeper training for suicide prevention in the workplace. *Suicide and Life-Threatening Behavior*, 37, 659–670.
- CROSS, W., MATTHIEU, M. M., LEZINE, D., & KNOX, K. L. (2010). Does a brief suicide prevention gatekeeper training program enhance observed skills? *Crisis*, 31, 149–159.
- FISHBEIN, M., & AJZEN, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- ISAAC, M., ELIAS, B., KATZ, L. Y., BELIK, S., DEANE, F. P., ENNS, M. W., ET AL. (2009). Gatekeeper training as a preventative intervention for suicide: A systematic review. *The Canadian Journal of Psychiatry*, 54, 260–268.
- KELLER, D. P., SCHUT, L. J. A., PUDDY, R. W., WILLIAMS, L., STEPHENS, R. L., MCKEON, R., ET AL. (2009). Tennessee lives count: State-wide gatekeeper training for youth suicide prevention. *Professional Psychology*, 40, 126–133.
- KRAIGER, K. (2008). Transforming our models of learning and development: Web-based instruction as enabler of third-generation instruction. *Industrial and Organizational Psychology*, 1, 454–467.
- LAWLESS, K. A., & BROWN, S. W. (1997). Multimedia learning environments: Issues of learner control and navigation. *Instructional Science*, 25, 117–131.
- LONG, L. K., DUBOIS, C. Z., & FALEY, R. H. (2008). Online training: The value of capturing trainee reactions. *Journal of Workplace Learning*, 20, 21–37.
- MONTAZEMI, A. R., & WANG, F. (1995). An empirical investigation of CBI in support of mastery learning. *Journal of Educational Computing Research*, 13, 185–205.
- National Center for Health Statistics. (2008). Data retrieved February 23, 2011, from <http://www.cdc.gov/nchs/>.
- QUINNITT, P. (2007). *QPR gatekeeper training for suicide prevention: The model, rationale, and theory*. Retrieved July 7, 2012, from <http://www.qprinstitute.com/pdfs/QPR%20Theory%20Paper.pdf>.
- SITZMANN, T., KRAIGER, K., STEWART, D., & WISHER, R. (2006). The comparative effectiveness of web-based and classroom instruction: A meta-analysis. *Personnel Psychology*, 59, 623–664.
- THOMPSON, E. A., EGGERT, L. L., RANDALL, B. P., & PIKE, K. C. (2001). Evaluation of indicated suicide risk prevention approaches for potential high school dropouts. *American Journal of Public Health*, 91, 742–752.

TIERNEY, R. J. (1994). Suicide intervention training evaluation: A preliminary report. *Crisis*, 15, 69–76.

World Health Organization. (2011). *Suicide prevention*. Retrieved December 16, 2011, from http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/.

WYMAN, P. A., BROWN, C. H., INMAN, J., CROSS, W., SCHMEELK-CONE, K., GUO, J., ET AL.

(2008). Randomized trial of a gatekeeper program for suicide prevention: 1-year impact on secondary school staff. *Journal of Consulting and Clinical Psychology*, 76, 104–115.

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