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Long-Term Effectiveness of the Question, Persuade, Refer (QPR) Suicide Prevention Gatekeeper Training Program: Lessons from Missouri

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Abstract Suicide in Missouri is a significant public health issue that has taken the lives of 8351 individuals over the last decade. The recognition of suicide as an imminent concern has led to the development of evidence-based prevention programs to decrease suicide-related mortality. One pro- gram, question, persuade, refer (QPR), has become the most widely-distributed gatekeeper training program in the world. This article presents both immediate and 2-year follow-up analyses of QPR trainees who work with youth, specifically examining changes in knowledge, self-efficacy, and help- giving behaviors. Results indicate both short- and long-term positive outcomes in knowledge and self-efficacy, supporting use of QPR.

Keywords QPR · Suicide prevention · Gatekeeper training · Public health

Introduction

Suicide in the United States is a significant public health issue with a rate of 13.26 suicides per 100,000 (age adjusted) in 2015 (CDC 2017). Suicide outnumbers homicides by more than two to one, and in 2015, there were more deaths by suicide than motor vehicle accidents. In Missouri, suicide

represents an even greater issue, as the state has the 17th highest rate in the country with 16.98 per 100,000. Addi- tionally, rates have been increasing over time; in 2000, the overall suicide rate in Missouri was 12.49 (CDC 2017). Rates are almost four times higher among men than women (27.17 vs. 7.49 per 100,000) and are highest among older (75+) white males (53.48 per 100,000) followed by middle-
aged (45–54) white males (41.28 per 100,000). While rates among those under 25 are generally lower, among those 15–19 and 25–34, it is the 2nd leading cause of death and the third leading cause of death among 10–14 and 20–24 year olds (CDC 2017). In Missouri, 15.6% of all high school students reported seriously considering suicide within the past 12 months and 7.3% attempted suicide during this same time interval, equating to approximately 1.5 million suicide attempts per year based on 2015 U.S. Census population estimates (Missouri Student Survey 2016; CDC 2017). Moreover, the impact of suicide extends beyond the individuals themselves. Previous research has shown that suicide can also dramatically impact survivors including family, friends, schools, and even entire communities (Cerel et al. 2008; Bozigar et al. 1993).

The recognition of suicide as a public health issue has resulted in the development of evidence-based prevention programs to decrease suicide-related mortality. Specifically, suicide prevention gatekeeper training programs have emerged in the wake of the recognized urgent need to address suicide. Gatekeepers have been defined as "those people who regularly come into contact with individuals or families in distress" (U.S. Department of Health and Human Services, Public Health Service 2001). Gatekeepers can include *anyone* who could potentially assist someone who is suicidal, including family members, friends, teachers, members of the clergy, law enforcement, co-workers, correctional personnel, or primary and mental health care professionals (U.S. Department of Health and Human Ser- vices, Public Health Service 2001). "Question, Persuade, Refer" or "QPR" is an hour-long gatekeeper training pro- gram that has been disseminated widely and has been cited by the QPR Institute as being "the most widely taught gate- keeper training in the world" with more than 1,000,000 adults trained (QPR Institute 2017). Specifically, the QPR program attempts to increase knowledge and dispel myths about suicide and suicidal behaviors, including warning signs and available resources. The program also aims to strengthen the ability of gatekeepers to ask individuals about their suicidal thoughts and/or intentions, persuade them to obtain help, and accompany them to the appropriate service provider (QPR Institute 2014). QPR is listed in the Sub- stance Abuse and Mental Health Services Administration (SAMHSA) National Registry of Evidence-based Programs and Practices (NREPP) and the Suicide Prevention Resource Center's (SPRC) Programs with Evidence of Effectiveness (SAMHSA 2017; SPRC 2017).

Considerable research has been conducted to test the
effectiveness of QPR. Several studies have focused on its immediate effects using pretest/posttest-only designs and found positive changes in knowledge, self-efficacy, or help- giving behaviors among program participants (Cross et al. 2007, 2010; Matthieu et al. 2008). These studies focused on specific subgroups, including staff in universities, hospitals and the Veteran's Administration. Follow-up studies have also demonstrated positive effects. Using a randomized-trial design, Wyman et al. (2008) found increases in preparedness and efficacy of gatekeepers with a 1-year average follow-up among secondary school staff. Keller et al. (2009) found immediate positive improvements in knowledge and self- efficacy among youth-serving adults. At 6 months, these effects had decreased but still remained higher than baseline scores. Matthieu et al. (2009) conducted a 1-year follow-up of Veterans Administration (VA) hospital employees who had completed the training and found that self-efficacy and knowledge both increased from pretest to posttest, with sus- tained self-efficacy effects at 1-year follow-up but decreases in knowledge to almost baseline levels. Mitchell et al. (2013) conducted a 3–6 month follow-up study with college stu- dents and staff who had completed QPR and found sustained effects on eight items that assessed knowledge, attitudes, and skills. Godoy Garraza et al. (2015) evaluated the effec- tiveness of the Garrett Lee Smith programs nationwide and found reductions in suicide attempts, but this study aggre- gated findings across all suicide prevention programs offered through the GLS grants and therefore included a wide array of suicide prevention programs beyond QPR only.

While these studies serve to demonstrate QPR's short-
term effectiveness on attributes such as knowledge and self- efficacy, to date there are no published articles on its abil- ity to influence trainees beyond 1 year. Furthermore, most published studies targeted specific subpopulations (e.g., col- lege students and staff, secondary school staff, VA employ- ees and hospital staff). This paper expands the growing body of knowledge regarding the program's effectiveness by pre- senting findings from a 2-year follow-up study of adults in Missouri who serve youth. Given QPR's goals as outlined above, we anticipate our analysis to show sustained increases in

gatekeeper knowledge about suicide prevention, including attitudes, behaviors and warning signs, improved gatekeeper self-efficacy and increases in the number of youth who are helped by the gatekeeper. We also hypothesize that improve- ments will occur regardless of the gender, race or age of the training participant. We will also explore the effect of prior suicide prevention training on gatekeeper outcomes.

Methods

A total of 3692 adults received gatekeeper suicide preven- tion training in Missouri between July of 2010 and Sep- tember of 2011 through funding from the Garrett Lee Smith (GLS) Youth Suicide Prevention Initiative through SAMHSA and Missouri Department of Mental Health (DMH) Mental Health Block Grant Funds. Of those adults, 2988 received training in QPR. Because most of the fund- ing received was through the GLS initiative, the majority of adults who participated in QPR served youth (ages 10–24) in some capacity.

Procedures

The longitudinal research design included measurements immediately prior to and after each training and at 2 years post-training. Pretest and posttest surveys were completed using paper/pencil methods and the follow-up survey was completed using SurveyMonkey, an online survey tool. Pre/ post surveys were completed in 2010 and 2011, and all sur- vey data collection was completed by January of 2014.

Posttests included a section requesting consent to con- tact participants 2 years following the QPR training. Those who agreed to be contacted provided their names and email addresses to the researchers. Follow-up reminders were sent to those individuals who did not immediately respond to the survey 3 months after initial contact. Of the 2988 adults who participated in both the pretest and posttest, 491 received a follow-up survey and 98 completed the survey.

Participants

Pre/Post participants (n = 2988)

The average age of the QPR participants who completed pretests and posttests was 40 and ranged from 17 to 95. Approximately three-fourths (76.1%) were female, 88.3% were white, 7.2% were African American, and the rest identified as another race. Participants included school staff (40.9%), youth service providers (14.9%), students (9.9%), and parents (9.2%) with the remaining individuals representing a wide array of professions, including physical and mental health care professionals, clergy, mental health and substance use professionals, and probation and parole officers. A majority had participated in at least one suicide prevention program before the QPR training (58.3%).

Two-Year Follow-up Participants (n = 98)

The average age of participants who completed follow-up was 42.6 and ranged from 18 to 77, and 82.4% were female. Almost all (95.8%) were white, and 4.2% were African American. Of those reporting their role, 40.0% took this training as school staff, 20.5% as youth service providers, 11.1% as students, and 2.6% as parents. Almost two-thirds (63.8%) of the participants had suicide prevention training prior to QPR.

Instrumentation

The survey instrument was designed to capture key elements of the QPR training, including suicide prevention knowl- edge, self-efficacy, and help-giving behaviors, three con- structs specifically addressed in the QPR training program. Measures were adapted from a gatekeeper training survey developed at the QPR Institute and from a study of QPR effectiveness by Wyman et al. (2008).

Self-efficacy

Because QPR was designed to equip individuals with the skills needed to talk directly to suicidal individuals and get them the help they need, participants were asked three questions regarding their perceptions of effectiveness. Specifically, they were asked how *comfortable* they felt asking someone if they were suicidal, how *prepared* they felt connecting them to help, and how *confident* they felt in knowing where to refer them for help. Answer choices included “not very,” “somewhat,”

"very," and "extremely," with "not very" coded as 1 and "extremely" coded as 4. Self-efficacy items were collapsed into one scale yielding an alpha coefficient of 0.79.

Knowledge

Four items related to suicide knowledge and warning signs were included to examine QPR's effectiveness in dispelling myths regarding suicidal behaviors and increasing knowledge regarding warning signs. First, participants were asked to indicate whether they agreed that "Asking directly, 'Are you thinking about suicide?' is an important step in prevent- ing suicide". This question was included because a key com- ponent of QPR is educating participants that asking direct questions regarding suicidal thoughts and behaviors is more effective in eliciting accurate information than asking ques- tions indirectly. Second, gatekeepers were asked whether they agreed that "Sometimes when people say, 'I want to die,' or make a suicide attempt, they might really want help". This question was included to address the incorrect percep- tion that when individuals tell others that they want to die, they are merely asking for attention. Third, they were asked whether they believed that "Even if a person makes a plan to kill themselves, it might still be possible to stop them". Again, this was included to assess whether QPR dispelled the myth that suicide attempts are inevitable once a person has developed a suicide plan. Finally, because QPR intends to educate gatekeepers as to how to identify a potentially sui- cidal individual, gatekeepers were asked whether they could name three suicide warning signs. Questions were adapted from a QPR-developed survey and modifications were made so that all statements were statements of fact rather than myth. Answer choices were "no," "maybe," and "yes," with "no" coded as 1 and "yes" coded as 3.

Help-Giving Behaviors

Because the QPR program ultimately aims to increase the degree to which suicidal individuals seek and get help, three items explored the extent to which participants had interacted with and helped a suicidal individual both 3 months before the QPR training and 3 months prior to the administration of the 2-year follow-up. These items included (1) the number of suicidal individuals who had approached them with thoughts or feelings of suicide; (2) the number of youth whom they themselves had approached and (3) their actions based upon these conversations (e.g., did they refer them to help, seek advice from a mental health professional, contact the caregiver/youth, help them without additional assistance). We hypothesized that the number of youth who the participant approached would rise and that participants would be more likely to refer individuals to mental health professionals after the training.

The questionnaire also included gender, age, race, their role as it relates to serving youth (teacher, mental health professional, etc.), and whether they had participated in a suicide prevention program in the past.

Data Analysis

Data was analyzed using IBM SPSS Statistics Version 22 for Windows. RM-ANCOVA was selected as an omnibus test of differences across the three time points and was used to

assess differences in the pre/post analysis to have a consist- ent and comparable approach. Missing data were imputed using estimated-maximization missing value analysis (maxi- mum iterations = 25) controlling for race, age, and gender. Covariates included gender, race, previous suicide preven- tion training, age, and role with respect to youth (parent, school staff, youth service provider, student, and other). Preliminary models controlled for these covariates and those found to be insignificant were removed in a step-wise manner until all covariates in the model were significant at the 0.10 level. The 0.10 level was used because, though covariates may not exhibit significance at the standard 0.05 level, they may still be relevant to the research question and may still have an important effect on the model. Analyses included calculation of significance levels, estimated mar- ginal means (EMMs), effect size (Hill et al. 2008), and least significant difference (LSD) post-hoc tests for the overall model, as well as for subgroups of those covariates included in final models.

Results

Pre- Post-analysis

Self-efficacy

To assess the short-term effectiveness of QPR related to self-efficacy, a RM-ANCOVA was conducted with an ini- tial model that controlled for gender, race, age, role, and previous suicide prevention training. All variables with the exception of gender were found to be significant at the
0.10 level and were retained in the final model. Analysis indicated positive and statistically significant interaction effects for role, previous suicide prevention training, race and age. The EMMs significantly increased for all subgroups (see Table 2), with an overall increase in EMMs, yielding a significant positive main effect and a medium effect size [$F(1,2431) = 244.67$, $p = 0.000$; $d = 0.63$] (see Table 1).

Knowledge

Four items related to participant knowledge of suicide prevention facts. First, participants were asked to indicate whether they believed that directly asking someone about potential suicidal thoughts and/or behaviors could lead to

Table 1 Repeated measures analysis for self-efficacy scale and knowledge before and after training (n = 2988)

Scale/item	Pre-test EMM (95% CI)[c]	Post-test EMM (95% CI)[c]	F	DF	Sig.	Partial eta squared	Effect size (*d*)	Significant ($p = 0.10$) covariates controlled for
Self-efficacy scale[a]	2.60 (2.53–2.67)	3.25 (3.19–3.30)	244.67	1, 2431	0.000	0.091	0.63 (Med)	Role; race; previous training; age
Asking directly, "Are you thinking about suicide?" is an important step in preventing suicide[b]	2.21 (2.13–2.29)	2.73 (2.68–2.78)	47.31	1, 2336	0.000	0.020	0.29 (Small)	Role; race; previous training; age
Sometimes when people say, "I want to die." or make a suicide attempt, they might really want help[b]	2.88 (2.87–2.89)	2.96 (2.95–2.97)	138.52	1, 2842	0.000	0.046	0.44 (Small)	None
Even if a person makes a plan to kill themselves, it might still be pos- sible to stop them[b]	2.86 (2.83–2.89)	2.91 (2.89–2.94)	0.517	1, 2311	0.472	0.000	0.00	Gender; race; previous training; age
I can name 3 warning signs of suicide[b]	2.27 (2.20–2.34)	2.89 (2.86–2.92)	305.81	1, 2215	0.000	0.121	0.74 (Med)	Gender; race; previous training; role

[a]Ordinal scale: 1 = not very; 2 = somewhat; 3 = very; 4 = extremely

[b]Ordinal scale: 1 = no; 2 = maybe; 3 = yes

[c]When age is included in model, EMM is calculated for average age

Table 2 Pretest, posttest subgroup analysis

Scale/item	Subgroup	F	DF	Sig.	Partial eta squared	Effect size (*d*)	Pretest EMM[c]	Pretest 95% CI[c]	Posttest EMM[c]	Posttest 95% CI[c]
Self-efficacy[a]	Parent	206.65	1, 2431	0.000	0.078	0.58	2.56	2.45–2.67	3.25	3.16–3.34
	School staff	362.62	1, 2431	0.000	0.130	0.77	2.44	2.36–2.52	3.14	3.07–3.21
	Youth service provider	158.53	1, 2431	0.000	0.061	0.51	2.86	2.76–2.96	3.41	3.33–3.49
	Student	242.22	1, 2431	0.000	0.091	0.63	2.51	2.39–2.62	3.29	3.19–3.38
	African American	119.73	1, 2431	0.000	0.047	0.44	2.65	2.53–2.77	3.23	3.13–3.33
	White	826.98	1, 2431	0.000	0.254	1.17	2.52	2.46–2.58	3.25	3.20–3.30
	Previous suicide prevention training	251.82	1, 2431	0.000	0.094	0.64	2.99	2.93–3.05	3.41	3.36–3.46
	No previous suicide prevention training	879.83	1, 2431	0.000	0.266	1.20	2.36	2.30–2.43	3.24	3.18–3.29
Asking directly, "Are you thinking about suicide?" is an important step in preventing suicide[b]	Parent	107.43	1, 2336	0.000	0.044	0.43	1.88	1.76–2.01	2.52	2.45–2.60
	School staff	138.87	1, 2336	0.000	0.056	0.49	2.29	2.20–2.38	2.83	2.78–2.89
	Youth service provider	34.99	1, 2336	0.000	0.015	0.25	2.48	2.37–2.59	2.80	2.74–2.87
	Student	77.84	1, 2336	0.000	0.032	0.36	2.26	2.13–2.38	2.81	2.73–2.89
	African American	98.92	1, 2336	0.000	0.041	0.41	1.92	1.79–2.06	2.60	2.51–2.68
	White	202.68	1, 2336	0.000	0.080	0.59	2.36	2.29–2.42	2.81	2.77–2.85
	Previous suicide prevention training	149.83	1, 2336	0.000	0.060	0.51	2.36	2.30–2.43	2.78	2.74–2.82
	No previous suicide prevention training	225.17	1, 2336	0.000	0.088	0.62	2.18	2.11–2.26	2.75	2.70–2.79
Even if a person makes a plan to kill themselves, it might still be possible to stop them[b]	Male	3.71	1, 2311	0.054	0.002	0.09	2.86	2.83–2.90	2.90	2.87–2.93
	Female	15.98	1, 2311	0.000	0.007	0.17	2.85	2.82–2.89	2.93	2.90–2.95
	African American	0.00	1, 2311	0.962	0.000	0.00	2.85	2.80–2.91	2.85	2.81–2.89
	White	26.67	1, 2311	0.000	0.011	0.21	2.88	2.85–2.90	2.95	2.93–2.97
	Previous suicide prevention training	0.90	1, 2311	0.342	0.000	0.00	2.90	2.87–2.93	2.91	2.89–2.94
	No previous suicide prevention training	10.68	1, 2311	0.001	0.005	0.14	2.88	2.85–2.91	2.93	2.91–2.96

Table 2 (continued)

Scale/item	Subgroup	F	DF	Sig.	Partial eta squared	Effect size (*d*)	Pretest EMM[c]	Pretest 95% CI[c]	Posttest EMM[c]	Posttest 95% CI[c]
I can name 3 warning signs of suicide[b]	Male	256.93	1, 2215	0.000	0.104	0.68	2.19	2.11–2.27	2.86	2.83–2.90
	Female	242.55	1, 2215	0.000	0.099	0.66	2.35	2.27–2.42	2.92	2.89–2.95
	Parent	174.17	1, 2215	0.000	0.073	0.56	2.09	1.99–2.20	2.82	2.78–2.86
	School staff	321.79	1, 2215	0.000	0.127	0.76	2.17	2.09–2.26	2.93	2.89–2.96
	Youth service provider	97.49	1, 2215	0.000	0.042	0.42	2.44	2.34–2.54	2.93	2.89–2.97
	Student	104.55	1, 2215	0.000	0.045	0.43	2.37	2.26–2.48	2.94	2.89–2.98
	African American	94.68	1, 2215	0	0.041	0.41	2.29	2.17–2.41	2.88	2.83–2.92
	White	546.10	1, 2215	0	0.198	0.99	2.22	2.16–2.28	2.91	2.89–2.93
	Previous suicide prevention training	76.21	1, 2215	0	0.033	0.37	2.64	2.58–2.70	2.92	2.89–2.94
	No previous suicide prevention training	558.91	1, 2215	0	0.201	1.00	2.07	2.01–2.14	2.90	2.87–2.92

[a]Ordinal scale: 1 = not very; 2 = somewhat; 3 = very; 4 = extremely

[b]Ordinal scale: 1 = no; 2 = maybe; 3 = yes

[c]When age is included in model, EMM is calculated for average age

a suicide. Specifically, they were asked to indicate whether they believed that "Asking directly, 'Are you thinking about suicide?' is an important step in preventing suicide" is true. The final model included role, race, previous suicide pre- vention training and age. EMMs of all subgroups of these covariates and overall EMMs increased significantly (see Table 2). There was also a significant positive main effect and a medium effect size [$F(1,2336) = 47.31$, $p = 0.000$; $d = 0.63$] (see Table 1).

With respect to the item, "Sometimes when people say, 'I want to die.' or make a suicide attempt, they might really want help," no significant interaction effects were detected, so no covariates were retained in the final model. QPR train- ees showed significant overall increases in EMMs, yielding a significant main effect and a small-to-medium effect size [$F(1,2842) = 138.52$, $p = 0.000$; $d = 0.44$] (see Table 1).

For the item, "Even if a person makes a plan to kill themselves, it might still be possible to stop them," gen- der, previous training and age were included in the final model. Females exhibited a significant increase in EMMs from pretest to posttest, while males did not, though the p value approached significance (see Table 2). White individu- als exhibited significant increases in EMMs, but positive results were not found among African American individu- als. Those who did not have previous suicide prevention training exhibited significant increases in EMMs, while those who did have previous suicide training did not, likely due to higher pretest EMMs. QPR trainees overall did not exhibit a significant increase in EMMs for this item likely due to ceiling effects, yielding a non-significant main effect [$F(1,2311) = 0.517$, $p = 0.472$; $d = 0.00$] (see Table 1).

Gender, previous suicide prevention training, race, and role [$F(4,2215) = 12.41$, $p = 0.000$; $d = 0.30$] were included in the final model for the knowledge item, "I can name 3 warning signs of suicide." EMMs of all subgroups and over- all EMMs increased significantly (see Table 2), and a sig- nificant main effect and medium effect size were detected [$F(1,2215) = 305.81$, $p = 0.000$; $d = 0.74$] (see Table 1).

Two-Year Follow-up Analysis

Self-efficacy

In the follow-up self-efficacy analysis, previous suicide pre- vention training was included in the final model. Both those who indicated that they *did* have previous suicide preven- tion training and those who *did not* increased in self-efficacy from pretest to posttest and from pretest to follow-up (see Table 4). Overall, there were sustained increases in self- efficacy, as posttest and follow-up measures were signifi- cantly higher than pretest ($p = 0.000$ and $p = 0.000$ respec- tively). A significant overall main effect was observed and

a large effect size was detected [$F(2,89)=34.68$, $p=0.000$; $d=1.77$] (see Table 3).

Knowledge

For the item, "Asking directly, 'Are you thinking about sui- cide?' is an important step in preventing suicide," role and age were included in the final model. School staff exhibited an increase in EMMs from pretest to posttest, but this was not sustained at follow-up, as 2-year EMMs were not sig- nificantly higher than at pretest. There were no significant differences found in EMMs at different time points for the other roles, possibly due to small sample sizes of these sub- groups (see Table 4). The same trend was seen overall, as there was an increase from pretest to posttest ($p = 0.003$), but there was not a significant difference between pretest and follow-up ($p = 0.098$), though the p value approached significance. There was not a significant overall main effect for this model perhaps due to the small sample size, but a small effect size was detected [$F(2,79) = 1.58$, $p = 0.213$; $d = 0.40$] (see Table 3).

There were no significant interaction effects for the items "Sometimes when people say, "I want to die" or make a suicide attempt, they might really want help" and "Even if a person makes a plan to kill themselves, it might still be possible to stop them," at the 0.10 level so no covariates were included in these models. There were also no signifi- cant differences detected between any time points for the first item, likely due to the already high means at pretest. For the latter item, posttest scores were significantly higher than pretest scores ($p = 0.014$), but follow-up scores were not ($p = 0.154$). A significant main effect and medium effect size were found for the item "Even if a person makes a plan to kill themselves, it might still be possible to stop them" [$F(2,92) = 3.28$, $p = 0.042$; $d = 0.54$]. For the item, "Sometimes when people say, "I want to die" or make a suicide attempt, they might really want help," no significant main effect was found, but a small effect size was detected [$F(2,94) = 0.57$, $p = 0.570$; $d = 0.22$] (see Table 3).

For the item, "I can name 3 warning signs of suicide", significant interaction effects were observed in the final model for previous suicide prevention training and age. Those who had no previous suicide prevention training showed sustained significant increases in EMMs, as both posttest and follow-up scores were higher than pretest. Participants who had previous suicide prevention train- ing showed a significant increase in EMMs from pretest to posttest, but this increase was not sustained at follow-up, likely due to high means at pretest (see Table 4). Overall, both posttest and follow-up scores were higher than pretest ($p = 0.000$ and $p = 0.000$ respectively). The main effect of the model approached significance and a medium effect size was found [$F(2,84)=2.90$, $p=0.061$, $d=0.53$] (see Table 3).

Help-Giving Behavior Questions (2-Year Follow-up)

Prior to QPR training, among those who completed a 2-year follow-up (n=98), six participants reported having approached a young person about suicide in the 3 months before they completed the QPR training, while 12 partici- pants reported having youth come to them about suicide in the same time period. In the 2 years after the training, 25 reported having initiated contact with youth about sui- cide, and 25 reported that youth came to them. In other words, before the training, participants were half as likely to approach youth about suicide as youth were to approach them (6/12), and after the training, they were equally likely to approach youth as youth were to approach them (25/25). Table 5 displays types of help-giving behaviors given by participants 3 months before the training and 3 months immediately prior to the 2-year follow-up. There was a significant increase in the number of adults who were able help the youth by themselves (pre-training: 31.3%; follow- up: 56.3%; $p=0.017$). There were also large increases in the percentage of adults who sought advice from a men- tal health professional (pre-training: 31.3%; follow-up: 56.3%; $p=0.197$), referred the youth to a hotline or mental health professional (pre-training: 56.3%; follow-up: 81.3%; $p=0.375$), or told the youth's parent or caregiver (pre-train- ing: 50.0%; follow-up: 60.8%; $p=0.106$). However, these increases were not found to be significant due to the small sample size (n=16).

Discussion

As hypothesized, the QPR gatekeeper training program resulted in both immediate and long-term positive effects in suicide prevention knowledge, self-efficacy and help-giving behaviors. On the whole, effects were sustained regardless of gender,

age, race or role and participation in a prior suicide prevention program.

Analysis of the knowledge items indicated that the pro- gram was effective in dispelling suicide prevention myths and training participants about warning signs. Specifically, participants were less likely to believe that directly talk- ing about suicidal thoughts or behaviors planted seeds in a youth's mind that would result in a suicide. Additionally, they were still more likely to be able to identify warning signs even given the large gap in time between the training and follow-up survey. The remaining two items had ceiling effects at baseline which resulted in non-significant findings from pretest to 2-year follow-up. Findings for all four knowledge items indicated no significant decrease from posttest to 2-year follow-up, suggesting no significant loss of knowledge between these time points.

Table 3 Two-year follow-up repeated measures analysis for self-efficacy scale and knowledge (n = 98)

Scale/item	Pre-test EMM (95% CI)[c]	Post-test EMM (95% CI)[c]	2-Year EMM (95% CI)[c]	F	DF	Sig.	Partial eta squared	Effect size (*d*)	Significant ($p = 0.10$) covariates controlled for
Self-efficacy scale[a]	2.43 (2.19–2.68)	3.28 (3.09–3.48)	3.32 (3.11–3.54)	34.68	2, 89	0.000	0.438	1.77 (Large)	Previous training
Asking directly, "Are you thinking about suicide?" is an important step in preventing suicide[b]	2.65 (2.43–2.86)	2.97 (2.88–3.06)	2.82 (2.69–2.96)	1.58	2, 79	0.213	0.038	0.40 (Small)	Role; age
Sometimes when people say, "I want to die" or make a suicide attempt, they might really want help[b]	2.97 (2.93-3.00)	2.99 (2.97–3.01)	2.99 (2.97–3.01)	0.57	2, 94	0.570	0.012	0.22 (Small)	None
Even if a person makes a plan to kill themselves, it might still be possible to stop them[b]	2.93 (2.87–2.98)	2.99 (2.97–3.01)	2.97 (2.93-3.00)	3.28	2, 92	0.042	0.067	0.54 (Med.)	None
I can name 3 warning signs of suicide[b]	2.21 (1.98–2.43)	2.99 (2.95–3.02)	2.86 (2.75–2.97)	2.90	2, 84	0.061	0.065	0.53 (Med.)	Previous training; age

[a]Ordinal scale: 1 = not very; 2 = somewhat; 3 = very; 4 = extremely

[b]Ordinal scale: 1 = no; 2 = maybe; 3 = yes

[c]When age is included in model, EMM is calculated for average age

The multi-dimensional components of the self-efficacy scale included *comfort* in talking directly to individuals about suicide intentions, *preparedness* in finding help for those who indicate they are suicidal, and *confidence* that they can connect them to help. Follow-up analyses of the self-efficacy scale indicated sustained effects over time. Significant positive findings for this construct are highly encouraging given that key to being an effective gatekeeper is having the ability to motivate a person with suicidal thoughts to seek help and to assist them in obtaining that help.

In addition to exploring participant knowledge and self- efficacy, we also explored whether the training program resulted in behavior change. Analysis of help-giving behaviors at pretest and 2-year follow-up indicate that after completing the QPR training, more adults approached youth to ask whether they had suicidal intentions than prior to the training. This finding suggests that QPR encourages adults to seek out youth who may be at risk for suicide rather than waiting for the youth to come to them. Moreover, there was a significant increase in the number of adults who were able to help the youth by themselves and large, though non-significant, increases in the percentages of adults who sought advice from a mental health professional, referred the youth to a hotline or mental health professional, and told the youth's parent or caregiver. The lack of significant findings for these variables is likely due to the small number (n = 16) of adults who had communicated with possibly-suicidal youth both in the 3 months before and in the 2 years following QPR training.

Limitations

The results of this study are somewhat constrained due to modifications to existing questionnaire items, elements of the research design, and sample size. While knowledge items were largely drawn from the existing QPR surveys, modifications were made to eliminate negatively worded "myth" statements. Additionally, items had to be removed to shorten the survey so that it could be administered during the relatively short time period in which QPR is offered. For that reason, only items perceived to be more central to the tenets of QPR were included. Furthermore, because knowledge items were reversed, baseline ceiling effects were detected for two items, limiting the ability to detect effects for two

Table 4 Two-year follow-up subgroup analysis

Scale/item	Subgroup	F	DF	Sig.	Partial eta squared	Effect size (*d*)	Pretest EMM[C]	Pretest 95% CI[C]	Posttest EMM[C]	Posttest 95% CI[C]	2-Year follow-up EMM[C]	2-Year follow-up 95% CI[C]
Self-efficacy[a]	Previous suicide prevention training	24.45	2, 89	0.000	0.355	1.48	2.92	2.73–3.11	3.53	3.38–3.69	3.38	3.21–3.54
	No previous suicide prevention training	33.29	2, 89	0.000	0.428	1.73	2.25	1.98–2.53	3.24	3.03–3.46	3.13	2.89–3.36
Asking directly, "Are you thinking about suicide?" is an important step in preventing suicide[b]	Parent	3.58	2, 79	0.032	0.083	0.60	2.85	2.03–3.66	3.03	2.69–3.38	2.36	1.87–2.86
	School staff	4.71	2, 79	0.012	0.106	0.69	2.67	2.45–2.90	3.00	2.90–3.09	2.87	2.73–3.01
	Youth service provider	2.23	2, 79	0.115	0.053	0.47	2.62	2.23–3.01	3.02	2.85–3.18	3.01	2.78–3.25
	Student	0.40	2, 79	0.674	0.010	0.20	2.76	2.29–3.23	2.96	2.76–3.15	2.96	2.68–3.25
I can name 3 warning signs of suicide[b]	Previous suicide prevention training	7.81	2, 84	0.001	0.157	0.86	2.69	2.51–2.88	3.01	2.98–3.03	2.91	2.82-3.00
	No previous suicide prevention training	29.21	2, 84	0.000	0.410	1.67	1.97	1.72–2.22	2.96	2.92-3.00	2.86	2.74–2.99

[a]Ordinal scale: 1 = not very; 2 = somewhat; 3 = very; 4 = extremely

[b]Ordinal scale: 1 = no; 2 = maybe; 3 = yes

[c]When age is included in model, EMM is calculated for average age

Table 5 Help-giving behavior responses for gatekeepers who reported having contact with a suicidal individual for both pretest and 2-year follow-up (n = 16)

Action taken when talking to suicidal individual	Pre-training N	Pre-training percent of respondents (%)	Follow-up N	Follow-up percent of respondents (%)	Percent change (%)	Chi-square	Chi-square *p* value
"Nothing, I felt uncomfortable."	0	0.0	0	0.0	0.0	–	–
"I sought advice from a mental health professional."	5	31.3	9	56.3	+25.0	1.667	0.197
"I sought advice from someone else."	5	31.3	5	31.3	0.0	0.259	0.611
"I was able to help them myself."	5	31.3	9	56.3%	+25.0	5.657	0.017
"I told someone that I thought might help."	5	31.3	6	37.5	+6.2	1.571	0.210
"I referred them to a hotline or mental health professional."	9	56.3	13	81.3	+25.0	0.788	0.375
"I told the young person's parent/caregiver."	8	50.0	11	68.8	+18.8	2.618	0.106
"I didn't think they were serious."	0	0.0	1	6.3	+6.3	–	–
Other	2	12.5	1	6.3	−6.2	0.152	0.696

rather than four items. Nonetheless, most items in the ques- tionnaire were sensitive to change over time and resulted in positive long-term effects.

Second, the use of a convenience sample limits gener- alizability, especially with respect to the 2-year follow-up analysis. Compared to the Missouri adult population, the fol- low-up sample had a higher percentage of females (82.4 vs. 51.0%) and whites (95.8 vs. 83.0%) and a lower percentage of African Americans (4.2 vs. 11.5%) (US Census Bureau 2015). Accordingly, the follow-up results by-and-large reflect changes in knowledge, self-efficacy and help-giving behaviors as they related to white females. However, RM- ANCOVA models included gender and race covariates when significant interaction effects existed to control for possible effects of these demographic characteristics on results.

Third, while findings for many follow-up items are highly suggestive of significant improvements, the small follow-up sample size somewhat reduced the ability to detect statisti- cally significant differences. This is particularly true regard- ing the help-giving questions related to referrals, because only 16 adults reported having contact with possibly suicidal youth both before and in the 3-months prior to the 2-year follow-up survey. Nonetheless, the significant increase in the number of youth approached by the trainees at follow-up is very promising, suggesting that the ultimate aim of QPR, to get people help, was achieved. A randomized control group design with a larger sample size would strengthen the gener- alizability of the study and help to identify other factors that may have influenced the outcomes suggested in the analyses presented in this article. Wyman et al. (2008) used a simi- lar research design which strengthened their assertions that QPR positively changed participant knowledge and behav- iors. However, that study was limited to assessing change over a 1-year period only. Future studies of long-term QPR effectiveness would benefit from a larger and representative sample of the target population to build on the work of Wyman et al. and the research presented here

Implications

The 2-year follow-up study design is the longest QPR follow-up study to date. The changes in self-efficacy and knowledge add to an already large evidence base supporting the effectiveness of the training. Specifically, this study sug- gests evidence of effectiveness much longer than had previ- ously been researched. Furthermore, effects were detected regardless of age, race, gender, and role as well as with individuals who had already received suicide prevention training, implying that QPR can be efficacious in a variety of settings. These findings suggest that this relatively short suicide prevention gatekeeper training can have an impact far into the future, making it a viable option for organiza- tions with limited time and resources.

Results also suggest that QPR continue to be recom- mended in state suicide prevention plans as an effective gatekeeper program with long-term effects. Many plans cur- rently endorse QPR on their menu of suggested gatekeeper programs (e.g., Alaska, North Carolina, Missouri, Montana, Tennessee, Washington). However, many state plans are either under development or in the process of being updated, including that of Missouri. This research suggests that QPR be included in any future plans or plan revisions. As youth- serving agencies with limited time and resources search for programs with long-term impacts, this relatively short pro- gram stands out. If more youth-serving agencies can offer suicide prevention programming to more individuals, the number of trained gatekeepers will increase. Consequently, expansion of this pool increases the number of people who

can be helped and ultimately can reduce suicide rates in Missouri and elsewhere.

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Compliance with Ethical Standards

Conflict of interest Clay Litteken, MPH, and Elizabeth Sale, PhD declare no conflicts of interest.

Ethical Approval Institutional Review Board approval was received from the University of Missouri—St. Louis.

Informed Consent Informed consent was obtained from all individu- als included in the study.

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