Randomized Trial of a Gatekeeper Program for Suicide Prevention: 1-year Impact on Secondary School Staff

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Abstract

Gatekeeper-training programs, designed to increase identification and referral of suicidal individuals, are widespread but largely untested. A group-based randomized trial with 32 schools examined impact of QPR (Question, Persuade, Refer) training on a stratified random sample of 249 staff with one-year average follow-up. To test QPR impact, we introduced and contrasted two models of gatekeeper-training effects in a population: Gatekeeper Surveillance and Gatekeeper Communication. Intent-to-treat analyses showed that training increased self-reported knowledge (ES 0.41) and appraisals of efficacy (ES 1.22) and service access (ES 1.07). Training effects varied dramatically. Appraisals increased most for staff with lowest baseline appraisals, and suicide identification behaviors increased most for staff already communicating with students about suicide and distress. Consistent with the Communication model, increased knowledge and appraisals were not sufficient to increase suicide identification behaviors. Also consistent with the Communication model were results from 2,059 8th and 10th graders surveyed showing that fewer with prior suicide attempts endorsed talking to adults about distress. Skill training for staff serving as 'natural-gatekeepers' plus interventions that modify students' help-seeking behaviors are recommended to supplement universal gatekeeper training.

Keywords

gatekeeper training; suicide prevention; group randomized trial; adolescents help seeking

INTRODUCTION

Interventions to prevent youth suicides have proliferated in response to widespread concerns about the number of young people who die from suicide each year (Centers for Disease Control and Prevention, 1992). Gatekeeper training in schools is one widely used strategy designed to improve early identification of students at high risk for suicide and to facilitate timely mental health referrals, responding to the fact that suicidal youth are under-identified and few are using services (Gould & Kramer, 2001, Brown et al., 2007). "Universal" gatekeeper programs train staff to increase their knowledge of risk factors and warning signs of suicidal intentions (CDCP,

1992). Gatekeeper training also typically includes strategies for questioning students about suicide and increasing awareness of referral protocols for suicidal students (Quinnett, 1995). Despite widespread use, gatekeeper training has been largely untested in rigorous evaluations.

Gatekeeper training has increased intentions to offer help and knowledge of suicide intervention steps in studies of adults in community settings compared to non-trained comparison groups (Eggert et al., 1997; King & Smith, 2000) and in single-group pretest-posttest evaluations (e.g., Grossman & Kruesi, 2000; Mackesy-Amiti et al., 1996; Tierney, 1994). Large-scale community deployment of gatekeeper training increased commitment to suicide awareness and prevention several months after training in a pre-post design (Turley & Tanney, 1998). Gatekeeper training was also a part of the multi-component US Air Force program that reduced suicide and injuries and increased mental health service use over several years (Knox et al., 2003). These findings provide support for a potential benefit from gatekeeper training but have limitations. Because they are based on comparison groups with non-random assignment or pre-post comparisons with no controls, these studies cannot distinguish whether the effects are from training itself, from administrative or system-wide acceptance of the responsibility for preventing suicide, or from external factors such as media coverage about suicide.

The present study used a randomized trial design to assess the impact of a universal gatekeeper training program (Question, Persuade, Refer; Quinnett, 1995) on school staff's knowledge, appraisals including willingness to assume a 'gatekeeper' role, and self-reported suicide identification behaviors with students. In addition to assessing overall impact, we tested whether the QPR training had a differential effect by contrasting two distinct models: gatekeeper surveillance and gatekeeper communication models. The surveillance model posits that increased knowledge of risk factors and attitudes about preventing suicide is sufficient to equip most adults to respond to suicidal communications from students and provide an appropriate referral (Brown, Wyman, Guo & Pena, 2006). For example, brief training of everyone would increase referrals from staff who read a suicidal note from a student or when a student makes an explicit suicidal statement. This surveillance model is consistent with broad public health initiatives such as providing CPR training and placing defibrillators in the community. This model posits that training will increase most people's ability to detect explicit suicidal risk signs and initiate a response that leads to an overall lessening of suicide rates. Findings from a recent CDC study support the premise that increased knowledge of risk factors may promote earlier identification of suicidal students. In this retrospective study of youth suicide deaths, well-established risk factors including the expression of suicidal thoughts were identifiable in most cases as warning signs of impending self-injurious behavior (CDC-MMWR, 2004). The rationale for teaching staff about mental health services also is supported by evidence that adults with knowledge of services more frequently direct youths to treatment (Stiffman et al., 2001). According to the surveillance model, gatekeeper training should have a relatively comparable impact across trained staff, in which case modest increases in knowledge and attitudes could raise exponentially the overall rate of referrals of suicidal youths in a school (Brown et al., 2006).

The gatekeeper communication model posits that any sizable increase in suicide identification and referral behaviors will require actions among a subset of staff who are actively engaged with distressed students. According to this model, only a portion of staff will be effective in addressing the topic of suicide, even after training that increases overall knowledge and attitudes about one's role as a gatekeeper. We know that avoidance of suicidal communications often occurs in families in which a member has made a suicide attempt; many adults in families either ignore or are immobilized by direct suicidal communications (Wolk-Wasserman, et al., 1986). Also, low rates of recognition of youth mental health problems by adults including health professionals (Burns et al., 1995; Earls, Robins, Stiffman, & Powell, 1989) suggest that

gatekeeper training alone may not increase recognition of youths in distress or an appropriate response. Similar to many parents who are unable to communicate effectively with their own suicidal children and health professionals who do not respond to youth in distress, many school staff may be unprepared to initiate an interaction or make a direct response to a youth's suicidality.

This gatekeeper communication model is transactional; it posits that suicidal students' own attitudes and behaviors will influence whether school staff members will learn about students' suicidality and, ultimately, affect the success of gatekeeper training. Many suicidal youth hold negative attitudes about coping with emotional problems (Asarnow, Carlson, & Guthrie, 1987; Rotheram-Borus, Trautman, Dopkins, Shrout, 1990), and their experiences with most adults may be viewed as unsupportive. Consequently, many suicidal youth may not explicitly communicate their distress or warning signs to adults. For those youth, detection and referral would depend on interacting with staff in whom they can confide and who can respond effectively.

This article reports on the impact of a widely-implemented gatekeeper program, QPR (Question, Persuade, Refer; Quinnett, 1995), on staff in secondary schools in a district with an extensive, existing suicide prevention program. Our first hypothesis was that QPR training would increase staff members' knowledge of risk factors for youth suicide and appraisals of their ability to identify and refer youth at high risk for suicide. Staff whose jobs already involve intervention with distressed students (e.g., counselors, nurses) were expected to have higher knowledge and appraisals than other staff at baseline. We expected that QPR training would increase knowledge and appraisals more for staff who would not normally address students' mental health problems, which would be consistent with both the gatekeeper surveillance and communication models.

Second, we expected that QPR impact on staff suicide identification behaviors would be moderated by their relationships with students, consistent with the communication rather than the surveillance model. QPR training should increase staff queries of students about suicide primarily for staff already communicating with students about emotion-laden problems, not necessarily limited to staff in health service roles. In accordance with our communication model, increased knowledge and attitudes towards the gatekeeper role were not expected to mediate any increases in staff queries of students about suicide from training. A third, exploratory aim pertained to students' intentions to communicate with adults outside an existing relationship. We hypothesized that recent suicide attempters would have negative attitudes about help-seeking and lower expectations of help from school staff, consistent with the communication model.

METHODS

Research Design and Participants

A randomized controlled trial tested the impact of QPR training (Quinnett, 1995) in the Cobb County (Georgia) School District (102,000 students in 2003–04). Random assignment occurred at the school level because training was intended for all staff. A random sample of staff from each school was identified prior to school randomization and followed an average of 1-year after training. Figure 1 summarizes the design and flow of participants. Two high schools and one middle school were excluded due to prior gatekeeper training; all remaining 32 schools participated. Prior to assignment to condition, schools were stratified by middle or high school and high versus low rates of student crisis referrals in the previous year. After stratification, 10 middle and 6 high schools were randomly assigned to training or to a wait-listed control group for future training. No school withdrew or altered its assigned status. Training and control schools were comparable on students' race/ethnicity and free or reduced

lunch eligibility (average of 20.3% for training and 19.1% for controls), years of staff experience, and staff race/ethnicity. Control schools had slightly more Asian staff (1.06%) versus trained (0.38%; p=0.01.)

Regarding staff participation, all staff in the 32 study schools (n=4,830) were stratified by job role and 1047 were randomly selected in December 2003. Three-hundred forty-two enrolled and completed baseline assessments (32.6%); 81.9% were female, mean age was 44.5 years (range 22 – 75 years), and 84.5% were White/Non-Hispanic, identical to this proportion in the District. The remaining were 11% Black, 2% Hispanic, and 2% other race. Administrators were more likely to participate (45.6% enrolled) than were support staff (31%) or teachers (31.7%). Participation rates were equivalent in training (31.7%) and control schools (32.7%).

A total of 322 participants remained employed by the District in March 2005 after training in all 16 intervention schools; 249 completed follow-up (77.4% retention). Five staff transferred from control to training schools, and 35 staff from training schools were not trained either due to absence at training time or non-attendance. One-hundred twelve staff received training an average of 342 days before follow-up (range 29 – 568 days). Of the 112 trained staff, 70 (62.5%) received QPR refresher training. The 249 staff included in data analyses consisted of 151 teachers (60%), 30 administrators (12%), 21 health/social service staff (8%), and 50 support staff (20%). The only baseline difference was that trained subjects had worked more years in a school (M=12.8 years; SD=9.2) than untrained (M=9.9 years; SD=8.0; t = 2.36; p = .019).

Student Participants—In spring 2005, 2,059 8th and 10th grade students completed an annual school survey that included questions about suicidal ideation/behavior. The sample had 1,348 8th and 711 10th graders, which was 19.4% of all 8th graders and 10.4% of all 10th graders. Females were 49% of the sample (1,009). The sample was 52% white, 26% African American, 8% Latino, 4% Asian, and 10% other. The race/ethnicity proportions of the sample were highly comparable to overall district rates (54.8% white, 29.6% African American, 9.1% Latino, 3.6% Asian). Although the proportion of participants was not large in relation to all 8th and 10th graders, the responses to questions about suicidal behavior on this survey had very similar distributions to those in the prior year as well as that from national surveys such as the YRBS.

Gatekeeper Training

In each school assigned to training, all staff members were asked by their principals to attend QPR (Question, Persuade, Refer) Training (Quinnett, 1995; 1999). The 1 ½ hour training covers: rates of youth suicide; warning signs and risk factors for suicide, procedures for asking a student about suicide, persuading a student to get help, and referring a student for help. Consistent with QPR recommendations, the training reviewed local rates of student suicidal behavior and the District protocol for responding to suicidal students.

Training was conducted by one of eight staff from the District's Prevention/Intervention Center (P/I Center) who received QPR Instructor and Triage training (12 – 16 hours) and co-led by a counselor in each school who received Instructor Training (6–8 hours) and served as the primary source for referrals in that school. Training was completed in an average of 2.7 sessions per school (range of 1–8) with an average of 28 staff per session (range 8 – 180). A QPR implementation fidelity checklist was completed for 96.2% of all sessions (checklist available from the first author). Only 12.6% of sessions had imperfect fidelity, most due to the school's counselor not being a trainer, in which case training was conducted by two well-trained P/I Center staff. In the 16 training schools, 1,864 of 2,464 staff (75.6%) were trained from February 2004 to March 2005. We note that before the study began, the District's senior leadership and principals of all 32 schools were trained to inform them about the study.

Staff were invited for a 30-minute QPR refresher several months after training, a School District action to promote ongoing suicide prevention. The refresher was created with the program developer (Paul Quinnett, personal communication). Refresher training was completed in an average of 1.8 sessions (range 1–4), with an average of 42.3 staff attending each session (range 1–151). Refresher training took place an average of 282 days after initial training (range 201–324 days) and an average of 128 days before the time 2 assessment (range 60–297 days).

Procedures for Staff

Prior to school randomization in December 2003, selected staff in the 32 schools were sent invitation letters, informed consent documents, and measures. To enroll, participants returned signed consent forms and completed measures by mail. Recruitment procedures were modest. Only a single invitation letter was sent with no follow-up contact, and no monetary compensation was offered. After training was conducted in all 16 training schools, participants were sent a second set of measures in March – August 2006, which were also returned by mail. The study protocol was approved by the IRB of the University of Rochester.

Procedures for Students

Students in 8th and 10th grade health classes and study halls were invited to complete the on-line anonymous survey in their school computer labs in April 2005. Each lab was supervised by an adult and had computer stations spaced apart, which provided an appropriate confidential climate and opportunity for private responses. Students are routinely accustomed to answering questions in this format for other school district surveys. Student participation was voluntary. No personal identifiers were put on the surveys. Standard District procedures of parental notification for this annual survey were followed. The survey encouraged any student who endorsed positively a question about suicidal behavior to contact a counselor.

Measures

Staff Suicide Prevention Survey—Participants completed a Suicide Prevention Survey at baseline and follow-up assessing three constructs targeted by the QPR training. Starting from a short list of QPR knowledge items (QPR Institute), we created several scales to measure knowledge, appraisals and self-reported behaviors with students specific to the main elements of QPR training. An expert panel reviewed these items for content validity. The instrument is available from the first author.

Knowledge of QPR: Fourteen multiple-choice questions assessed content taught by the training, eight pertaining to appropriate question, persuade, and refer (QPR) behaviors with students and six to suicide risk factors. A respondent's score is the percentage of correct responses. Higher scores on a shorter list of these items have distinguished between respondents who have and have not received specialized training in suicide risk assessment (Quinnett, 1999).

Appraisals: Five scales assessed appraisals targeted by training. Eight questions assessed preparation to perform activities such as 'ask appropriate questions about suicide', responded to on a seven-point Likert scale ('not prepared'=1, 'quite well prepared'=7). Higher mean item scores reflect positive *Gatekeeper Preparedness* (Cronbach's alpha = .94). Nine items assessed perceived knowledge answered on a 7-point scale ('nothing' =1, 'very much'=7), with higher scores reflect more positive *Self-Evaluation Knowledge* (Cronbach's alpha = .97).

Two scales were created from 16 questions assessing appraisals regarding performing suicide prevention activities on a 7-point scale ('Strongly Disagree' to 'Strongly Agree'). Factor analyses using promax rotation identified the same 2-factor solution for baseline and follow-up responses. Higher scores on the first 7-item factor (e.g., 'I can make appropriate referrals

within my school for students contemplating suicide') indicate more *Gatekeeper Efficacy* (Cronbach's alpha = .80). The second factor, *Gatekeeper Reluctance*, was created from nine items (e.g., 'School teachers and staff should not be responsible for discussing suicide with students') (Cronbach's alpha = .68). We have recoded this scale so that higher values mean less reluctance.

The fifth 4-item scale assessed awareness of school policies and ability to use referral resources for suicidal students. Responses were coded into no (0) or yes (1), and higher mean scores indicate more *Access to Services* (Cronbach's alpha = .74).

Gatekeeper Behaviors: Corresponding to QPR, the primary outcome variable was response to the question, 'How many times in the last 6 months have you asked a student whether s/he was considering suicide?' Higher responses on a 5-point frequency scale (None, 1, 2, 3, 4 or more times) were coded to indicate more frequent *Ask Students about Suicide*.

Staff also indicated how frequently in past six months they performed six QPR behaviors consistent with safety protocols (e.g., 'Notified the appropriate referral resources'), ranging from Never (1) to Always (5) (Cronbach's alpha = .94). We used this measure to assess consistency with safety protocols rather than as behaviors performed to identify new cases of students at risk for suicide. Higher scores indicated more frequent *Referral Behaviors*.

Communication with Students: To assess staff-student communication, three questions assessed appraisals of staff interactions with students (e.g., 'Students talk to me about their thoughts and feelings') using a 6-point Likert scale (Never=1, Always=6). Higher mean item scores reflected more positive *Natural Gatekeeper* scale (Cronbach's alpha = .89). Staff also indicated how often in the last six months they asked students about distress or depressed mood, QPR training was not expected to change responses to these communication questions.

Each participant's exposure to training was determined by training attendance records. In the case of one school that did not keep attendance records, we used self-reports of attendance collected through the second survey. This affected seven subjects.

Student Survey—The District's annual Smart-Track© survey for 8th and 10th graders included questions about behaviors and attitudes including drug and alcohol use and school safety. This study used eight questions about suicidal behavior from the DISC-IV (e.g., 'Have you tried to kill yourself in the last year?') (APA, 1994) chosen due to sound test-retest reliability (Goldston, 2003). This study also used four items about seeking help from adults at school, including own help-seeking attitudes and expectations for receiving help, and friends' and family members' attitudes; all were answered on a 4-point Likert scale (1=Strongly Disagree, 4= Strongly Agree). Higher scores reflect more positive *Help-Seeking from Adults at School* (Cronbach's alpha = 0.84). The Smart-Track on-line survey has several controls for identifying erroneous responding, including deleting surveys that are completed too quickly or have more than 5% unanswered questions.

Statistical Analysis

Separate analyses take into account the school-level randomization of training, the small amount of mobility of staff members across condition during the trial, and refresher training before time 2. In all analyses schools were included as random factors and also as level-2 influences through their mean levels of baseline variables. Both intent-to-treat analyses (ITT) and as-treated (AT) analyses were conducted, the former to evaluate QPR in a realistic setting where training is not complete, and the latter to focus on direct exposure to training. In ITT analysis, each staff member's training status was assigned to that of the staff's school at time of baseline measurement (either to early training or wait-listed control school). The AT

analyses used each individual's true training status by follow-up and also included random effects of that staff member's current school at time 2 to allow for potential variation in impact across schools. We tested for the impact of refresher training and time since training as well.

Baseline equivalence of staff in the trained versus untrained groups was tested using ordinary t-tests for continuous measures and Chi-square tests for categorical variables. To determine if attrition might have differentially affected trained and untrained groups, we conducted analyses to compare staff that completed follow-up measures with those who were missing at follow-up. Staff in the four different job roles were compared on baseline measures using ANOVA; following significant findings, we compared pairs of job role group using Tukey post-hoc tests, which control for error inflation due to multiple comparisons.

To examine the overall impact of the training on continuous, dichotomous, and count data, we used multilevel linear, logistic, and Poisson mixed regression models in Splus (Pinheiro & Bates, 2000). Changes due to training were tested using models involving baseline and baseline by training status interactions. The training changes from baseline were compared using an adjusted version of Cohen's d effect sizes (ES; Rosenthal, 1994). These ES values are based on regression models measuring training impact on each outcome after adjusting for the same variable at baseline with school treated as a random intercept. For the sample sizes in this study and moderate intraclass correlations (ICC = 0.06) across schools, we have the ability to detect an adjusted effect size of 0.6 under a 5% Type I error rate with 80% power. Unless otherwise reported, all reported coefficients are significant at the 0.05 level or stronger. Tests of significance for main effects were carried out first to show overall changes in means adjusted for baseline. Interactions were tested by comparing slopes using Wald-type tests comparing the coefficient to its standard error. Significant baseline variable by training interaction terms are shown using smooth, nonlinear fits to baseline levels computed separately for the trained and not-trained groups (Hastie & Tibshirani, 1990).

Testing the gatekeeper surveillance model against the communication model involved examining mediation and moderation effects. These models test the degree to which staff questioning behavior of students about suicide at time 2 is impacted by, or interacts with: (1) prior communication with youth at Time 1, (2) knowledge and attitudes about suicide at Time 2 and their own predictors from Time 1, (3) staff questioning behavior of students about suicide at baseline, and (4) QPR training. Support for the surveillance model would be found if 1) knowledge and attitudes mediate the relationship between training and questioning and referral behaviors, and 2) there is no evidence that communication interacts with training on self reports of behaviors. Support for the communication model would come from 1) evidence that the training effect is concentrated among staff with higher baseline communication and from 2) suicide identification behaviors occurring mostly when there is a positive, strong relationship with youth.

To add students' perspectives on the potential for staff gatekeeper training to identify suicidal students, we used logistic regression to test whether help-seeking attitudes differed by youths' suicidality, adjusting for grade, gender, and race/ethnicity.

RESULTS

Staff Characteristics and Baseline Job Role Differences

Rates of attrition were equivalent in the two groups of randomly assigned staff. Follow-up participation rates were 73.5% and 72.2%, respectively, for staff in training and control schools. Attrition was not associated with any baseline measure nor differentially predicted by staff condition as a function of baseline (training condition by baseline measure interaction).

Staff in trained and untrained schools were comparable on baseline measures (Table 1, column 3). These null differences paralleled the minimal differences between trained and non-trained groups on demographic and job role characteristics described earlier. The scaled variables all had approximate normal distributions as judged by relatively low levels of skewness and kurtosis. As we expected, the single item of 'ask about suicide' had a small mean and high skewness; this variable was further analyzed by dichotomizing and using logistic regression. There was adequate distribution of scores on baseline measures, with the exception of Gatekeeper Reluctance scores; few staff indicated reluctance to engage with suicidal students.

Staff in different job roles had substantially different baseline levels of knowledge, appraisals, and behaviors (Table 1, columns 4 and 5). Health/Social Service staff had the highest knowledge, the most positive gatekeeper appraisals, and highest rates of gatekeeper behaviors and communication. Support staff reported lowest levels. Staff reported large differences in asking students about suicide by job role (ANOVA F=146.69, p <0.001): 72% of Health/Social Service staff asked one or more students about suicide in the prior 6 months, compared to 22% of Administrators, 7% of Teachers and 1% of Support Staff. In our analyses below examining impact of training, we take into account the important differences by job role.

Training Impact

We found very consistent findings of a positive training impact on staff knowledge and appraisals, whereas training impact on behaviors was concentrated within staff in certain job classes and in those communicating with distressed youth about suicide at baseline. ITT analyses are summarized in Table 2 and AT analyses in Table 3. Means and standard deviations are shown in columns 1 and 2, and training impact ES's are shown in column 3.

Both ITT and AT analyses yielded highly comparable findings regarding main effects of training (Table 2 and Table 3, column 3). Regression analyses indicated that time 2 scores were strongly predicted by baseline scores in both groups (not shown). An average of one year post-training, we found a moderate, positive training condition effect on knowledge (ITT ES 0.41); very large positive effects on perceived preparedness (ES 1.21), self-evaluated knowledge (ES 1.32), efficacy (ES 1.22), and access to services (ES 1.07). On reluctance, the overall effect was non-significant for ITT but positive for AT analyses (AT ES 0.37). No overall training effect for suicide identification behaviors was found, although a significant condition by baseline interaction for *Ask Students about Suicide* showed differential impact of training as a function of staff baseline level (described in detail below). As expected, training did not impact staff communication with students, either *Natural Gatekeeper* or *Ask Students about Distress*. We found no evidence that receiving refresher training had an effect on time 2 outcomes. Furthermore, duration since training was unrelated to any time 2 outcome measure as well. None of the results were different when we adjusted for the single baseline variable that differed between the groups at baseline (years employed), by repeating analyses with staff years employed added as a covariate.

The analyses showed significant school-level effects on knowledge, appraisals and behaviors, from both ITT and AT analyses that included random effects for staff members' current school placement (Column 5 in Table 2 and Table 3). Those intraclass correlations for school-level effects were larger for As-Treated analyses, i.e., 0.06 for appraisals of preparation, 0.097 for efficacy to perform gatekeeper role, and 0.088 for asking students about suicide.

We also found that training affected staff differently depending upon their baseline levels of attitudes and behaviors. In column 4 of Table 2 and Table 3 we summarize how the training effects differed by participants' baseline scores, with the relative change being a ratio of change in these slopes for the trained versus untrained groups relative to that in the untrained group. Significance levels were based on testing of homogeneity of slopes. A negative ratio (in

combination with positive main effects discussed earlier) indicates a greater gain from training for participants who had low scores at baseline compared to the gain for those with higher scores at baseline. Participants with the lowest appraisals at baseline had the largest gains from training on *Gatekeeper Preparedness, Self-Evaluation of Knowledge*, and *Access to Services*. Figure 2 shows scores on *Self-evaluation of Knowledge* at time 2 as a function of baseline scores for trained and non-trained staff to illustrate the largest training impact for staff with lowest baseline scores.

In contrast, training had a greater impact on staff suicide identification behaviors with students for those with higher baseline scores, indicated by positive ratio of slopes comparing training impact for trained versus untrained staff on *Ask Students About Suicide* for ITT (Relative Change=0.27; 95% CI: 0.03, 0.51) and for AT (Relative Change=0.31; 95% CI: 0.07, 0.54). Because of the low frequency of staff asking students about suicide, we also examined differences by dichotomizing this variable. For staff not asking students about suicide at baseline (i.e., 86% of non-trained and 87% of trained staff), there was no training effect: 14% in the trained group asked students about suicide at time 2 compared to 16% in the un-trained group. Among those staff asking about suicide at baseline (i.e., 14% in the non-trained group and 13% in the trained group), 100% in the trained group asked one or more students about suicide at time 2 (mean number of students M=3.14 SD=1.2) compared to only 58% of controls (M=1.79 SD=1.8). Training therefore had a positive effect on asking about suicide for the 13% of staff already asking students about suicide before training and had little benefit for the 87% of remaining staff.

Training Impact by Job Classification

We next report AT findings separately by job role, focusing first on the two largest groups, teachers and support staff (AT analysis). Whereas QPR training had positive impact for teachers and support staff on knowledge and appraisals, only teachers showed positive training impact on suicide identification behaviors. Training had large positive effects on increasing perceived preparedness for both groups (ES for teachers=1.53; 95% CI: 1.17, 1.90; ES for support staff=1.04; 95% CI: 0.77, 1.31); on self-evaluated knowledge (ES for teachers=1.76; 95% CI: 1.39, 2.14; ES for support staff=1.77; 95% CI: 1.42, 2.13); on gatekeeper efficacy (ES for teachers=1.89; 95% CI: 1.50, 2.28; ES for support staff=1.07; 95% CI: 0.79, 1.36); and on access to services (ES for teachers=1.52; 95% CI: 1.18, 1.86; ES for support staff=1.04; 95% CI: 0.75, 1.32). Teachers with lower baseline appraisals gained most from training (Relative Change −0.24 to −0.62), whereas no significant differences in training impact as a function of baseline appraisals was found for support staff. Training had a positive effect for teachers on knowledge (ES=0.58; 95% CI: 0.20, 0.94) but no significant effect for support staff.

For teachers, although the overall training effect on asking students about suicide was non-significant (ES=0.24; 95% CI: −0.13, 0.61), examination of a significant condition by baseline level interaction (Relative Change=2.00; 95% CI: 0.15, 3.84) showed that training increased self-reported asking behavior primarily for teachers already asking students about suicide at baseline. Training also increased teachers' appropriate referral behaviors with suicidal students (ES = 0.42; 95% CI: 0.08, 0.75). In contrast, no support staff in the trained group reported asking students about suicide at time 2 (ES = 0.00), and training for support staff also had a directionally negative effect on referral behaviors that was non-significant (ES = −0.65; 95% CI: −1.34, 0.03; p = 0.08).

For staff in health/social service roles, training had very large positive effects on knowledge (ES = 1.11; 95% CI: 0.17, 2.04), perceived preparedness (ES = 1.78; 95% CI: 0.90, 2.65), self-evaluated knowledge (ES = 2.31; 95% CI: 1.12, 3.51), efficacy (ES = 1.98; 95% CI: 0.82, 3.09), and on lower gatekeeper reluctance (ES = 1.14; 95% CI: 0.23, 2.06). For health/social

service staff, training also had a non-significant, directionally positive relationship with *Ask Students about Suicide* (ES = 0.66; 95% CI: −0.23, 1.56; p = 0.17).

For administrators, QPR training had directionally positive, but comparatively smaller, effects. We found large positive training effects for administrators after one year on knowledge (ES = 1.03; 95% CI: 0.25, 1.81) and efficacy (ES = 1.02; 95% CI: 0.24, 1.81).

Prediction of Changes in Asking About Suicide

To assess whether the main behavioral variable changed during training, we compared the distributions of *Ask Students about Suicide* from Time 1 to Time 2 by training condition. For the trained group, there was a significant increase in the numbers of times each staff member reported asking about suicide, with one more student asked for every four staff members (by paired t-test mean difference of 0.26, CI: 0.14, 0.38; p < 0.0001). In contrast, the gain in the non-trained group was a more modest one additional student reported asked for every ten staff members (by paired t-test mean difference of 0.10, CI: −0.01, 0.22; p = 0.08). A direct comparison of these two differences by training condition indicated this difference did not quite reach significance (CI: −0.02, 0.32; p = 0.07). Overall, we found that seven staff members need to be trained (NNT) in order to result in a staff member asking one more student about suicide (NNT = 1/(1/4 − 1/10)).

The Role of Staff-Student Communication in Predicting Identification Behaviors by Staff

In this section, we extend our analysis of training impact on *Ask Students about Suicide*, our primary outcome behavior, by adding predictors related to staff-student communication. Because the variable *Ask Students about Suicide* had such a skewed distribution, we used Poisson modeling with random school effects to examine the impact. We found significant impact on baseline levels of Asking Students about Suicide (β = 3.47 se = 0.79, p < 0.0001), *Natural Gatekeeper* relationship (β = 0.35 se=0.10, p < 0.001) and three-way interactions involving these two variables and training (β = 0.60 se=0.23 p = 0.01). Plots of these interactions indicated that the highest predicted number of students asked about suicide were from staff who were highest on this variable at baseline and simultaneously high on *Natural Gatekeeper Relationship*.

Contextual Predictors in Asking About Suicide

To examine differences in training across schools, we added school contextual variables to individual level baseline variables in predicting *Ask Students about Suicide* at Time 2. School level averages of knowledge and appraisals were computed based on Time 1 scores for those in our sample. Only *Appropriate Referral Behaviors* showed any indication of predictive ability in Poisson multilevel modeling, and this effect was marginal (β = 0.44 se = 0.22, p = 0.06).

Testing Mediational Pathways through Knowledge and Appraisals to Identification Behaviors by Staff

Earlier we found that training impacted appraisals through interactions involving these respective variables at baseline. Furthermore, we found an interactive effect of training and baseline asking about suicide on that variable at Time 2. In this section, we investigate whether knowledge and appraisals mediate this latter relationship. To examine these mediation-moderation effects, we predicted Time 2 *Ask Students about Suicide* using all previously found main effects and interactions, and then added both Time 1 and Time 2 knowledge and appraisals as predictors. If mediation pathways do go through knowledge or appraisals, the coefficients involving training should be diminished. The interactions changed very little with these potential mediators. For example, the three-way interaction involving asking about suicide, natural gatekeeper relationship, and training coefficient changed from β = 0.58 (se = 0.30, p =

0.05) without these mediators to β = 0.50 (se = 0.29, p = 0.09). Also, second order interactions involving training changed little as well, and the main effect of training remained non-significant after mediators were added. Thus we did not find evidence that gains in staff knowledge and appraisals mediated the relationship between QPR training and asking students about suicide.

Help-Seeking Attitudes: Students with and without suicide attempt

Students who reported a suicide attempt were significantly less likely to report positive help-seeking attitudes regarding asking an adult for help at school. Of 2,059 students surveyed, 7.3% (150/2059) indicated that they had tried to kill themselves in the last year. That rate was comparable to the proportion of students who indicated a suicide attempt in the prior year survey (6.8%) in the same District and also similar to YRBS rates (YRBSS, 2005). Also, the odds for girls reporting a suicide attempt was 1.68 times that for boys (95% CI: 1.19, 2.35; p = .01). Attempt rates were comparable for 8th and 10th graders.

Help seeking attitudes differed between students with and without prior suicidal behaviors (Table 4). For students who reported a suicide attempt, their odds of reporting that they would talk to a counselor or other adult at school if they needed help was less than half as likely as those with no attempt (17.8% vs. 37.8%), or believed a counselor or other adult at school could help them (21.9% vs. 46.5%). Students with a suicide attempt were also less likely to report that friends would want them to talk to an adult at school (34.9% vs. 44.6%) or their family would want them to talk to an adult at school (35.4% vs. 53.4%).

DISCUSSION

We begin by summarizing the results of the main effects of QPR gatekeeper training including tests of moderators and mediators of training impact. First, the largest impact from QPR training was to raise school staff members' appraisals of their preparation and efficacy to perform a 'gatekeeper' role and their access to services for suicidal students. There was substantial durability of those training effects, with time since training or refresher unrelated to those outcomes. Second, training changed appraisals most for those staff with the lowest appraisals initially, as shown by significant baseline appraisal by training condition interactions. For self-evaluation of knowledge, nearly all trained staff achieved an equally high level regardless of initial status. Training enhanced appraisals among teachers and support staff, as well as among health/social service staff and, to a lesser extent, administrators. Third, with respect to knowledge, training had a medium-sized effect on increasing participants' accuracy to identify warning signs and risk factors for youth suicide and recommended QPR intervention behaviors. Fourth, for the primary suicide identification behavior targeted by QPR, training increased the number of staff queries of students about suicide but only for the 14% of staff already communicating with students about suicide before training, as shown by a significant baseline by training condition interaction. Staff entering the study with closer communication with students about emotional distress asked more students about suicide after training. QPR did not change staff communication with students about emotional distress, nor were those changes expected because the training did not target those behaviors. Fifth, there was substantial school-level variation on knowledge, appraisals, as well as suicide identification behaviors, suggesting that staff working together tend to share attitudes and commitment to suicide prevention activities due to school-level contextual influences. For *Ask Students about Suicide*, we found that baseline school-level knowledge and appraisals did not provide an explanation of this school-level variation.

This randomized trial with follow-up an average of 1-year after training centered on adult staff who were the direct recipients of the QPR gatekeeper-training program in schools. Our objective was to determine which staff benefited and in what ways over time, by examining

variations in training impact on knowledge, self-evaluated preparation, and on participants' reports of their communications with students about suicide. To our knowledge, this is the first completed study of gatekeeper training using a randomized trial design. These results strengthen the base of evidence (Eggert et al., 1997; King & Smith, 2000; Mackesy-Amiti et al., 1996; Tierney, 1994; Turley & Tanney, 1998) indicating that gatekeeper training for adults in community settings increases their knowledge of youth risk factors for suicide and their intentions and perceived efficacy. With regards to increasing knowledge and commitment to assist students in receiving help before they engage in potentially lethal self-harm behaviors, QPR was highly successful in this school district. We found comparable, significant training impact on knowledge and appraisals from both intent-to-treat analyses, which examined impact based on participants' initial school placement, as well as from as-treated analysis comparing participants according to their actual training status at follow-up. The intent-to-treat findings show a positive impact even though there was incomplete training of staff in schools (75% of staff trained) and modest staff mobility, which are expectable, 'real world' conditions for implementing schools. By using schools rather than individual staff as the unit for random assignment, this group-based trial also reduced the potential for condition bias, a threat to internal validity when individuals in close proximity are randomized to different conditions and yet influence each others' attitudes and behavior over time (Brown, 2002).

QPR training had a more moderate effect in increasing the self-reported number of students asked by staff about suicide. Although the number of staff querying students about suicide increased from before to after QPR training in the trained schools, this increase was just marginally different than that for the non-trained staff (ES=0.22, 95% CI: −.020, 0.32). A significant condition by baseline level interaction showed that increases in queries about suicide occurred primarily for staff already asking about suicide before training. Increasing the rates of adults asking students about suicidal thoughts or intentions is a principal goal of the training (Quinnett, 1995) in order to identify youth who require more evaluation and possible intervention. Overall, seven staff required QPR training to add one additional staff querying a student about suicidal intentions. The clinical significance of this effect could well be important in terms of overall effect, but the strength of this inference is limited by the size sample we had available.

We found that the QPR training impact was consistent with our hypothesized 'gatekeeper communication' model. Congruent with this model, the large increases in staff appraisals of efficacy and preparedness from training that occurred for many staff were not directly linked to increased communication with students about either suicide or their distress. Instead, our findings suggest that identifying more students at high risk for suicide in school settings with pre-existing suicide prevention awareness will require expanding staff members' open communication with students about issues of emotional distress. Such a gatekeeper communication model will likely involve the actions of a small number of staff, who already have close communication with students either through their ongoing job role (e.g., nurses, school counselors) or by virtue of personal qualities such as warmth and empathy that draw in students for supportive interactions.

Our finding that staff communication styles with students were not changed due to a brief training program such as QPR was clarified by our finding that barriers to open communication include students' reluctance to seek assistance from adults. Less than one-fifth of 8th and 10th graders with a recent suicide attempt indicated they would talk to a counselor or other adult at school if they needed help and a comparably small proportion did not believe that an adult at school could help them. These findings suggest many vulnerable youth will not signal to adults their distress even if they are suicidal, thereby limiting the effects of gatekeeper training if training does not increase the open communication between capable staff and difficult-to-reach students. We believe that interventions aimed at opening this communication

between staff and suicidal students should not target all adults in a school since this communication depends on the degree of empathy that adults already have. Skill training could well enhance communication in empathic adults. Engaging influential student 'peer leaders' as agents of change to promote positive peer group attitudes and expectations about seeking help from trusted adults might also help to strengthen communication between distressed students and adults in schools.

Our findings prompt us to consider under what conditions gatekeeper surveillance or communication training might be beneficial for schools. The effectiveness of either of these models in a specific school context may depend on the already existing level of awareness about suicide, identification of students and the existence of an appropriate system of response to distressed and suicidal youth. In settings with minimal existing preparation, basic gatekeeper training to everyone in a surveillance model may lead to a large increase in recognition of suicidal students who manifest explicit warning signs. For other communities such as that described here, where recognition of explicit warning signs about suicide is already high, we expect that the gatekeeper communication model, added on top of a citizen surveillance model, would lead to more recognition of students whose suicidality is not readily apparent.

A second question is how to integrate gatekeeper training with other strategies such as youth screening (Gould, et al., 2005; Shaffer, Scott, Wilcox, Maslow, & Hicks, 2004; Thompson & Eggert, 1999) and approaches that combine screening with education (Aseltine & DeMartino, 2004)? First, the success of gatekeeper training as well as these other approaches relies on the existence of adequate networks for referral of students for crisis management and mental health treatment, or of informal but effective support. It may be potentially harmful to suicidal youth to be identified but have no referral source available. Second, if the base of awareness of youth suicide in the community is low, this relatively short training program might be highly effective in enhancing awareness and increasing identification of students who are in obvious distress. If a community already has high awareness and a moderate level of identification of suicidal youth through screening or other means, additional training gatekeeper communication components added on to a program such as QPR might be required to enhance that rate of identification. One useful component to consider adding is a second stage of training, for staff already serving as 'natural gatekeepers' in their school. Enhancing the skill of those natural gatekeepers to actively engage marginalized youth and establish open communication has the potential to increase awareness of those students' needs for assistance, as well as to address directly a need among those students for support and connectedness. Another useful component to add is training of direct gatekeeper skills through role playing and other active learning techniques (Cross et al., 2007). Such skills training may decrease barriers to addressing suicide and facilitate transfer of knowledge and efficacy into more direct action and communication with students.

To determine the most effective allocation of scarce school training resources for suicide prevention, we recommend research to determine if targeted skills training for adult 'natural gatekeepers' in schools will enhance the gatekeeper communication approach that we have outlined. An alternative strategy, which we are now examining, is to provide citizen gatekeeper training in a school to all staff followed by training of peer leaders to help direct troubled youth to trusted adults. Research on the impact of gatekeeper training in other school districts would be valuable. This district has an 18-year history of following a systematic protocol for responding to suicidal students and facilitating their connection to mental health services. Gatekeeper training was an addition to that existing framework. Gatekeeper training in this District also occurred in the context of substantial institutional commitment. A counselor in each school received a day of training. All principals and district leadership received training, many before the schools were randomized. In this District with a long-standing commitment to suicide prevention, 75.6% of staff were trained, leaving one-quarter untrained. This rate

underscores the challenges in implementing a universal surveillance model of gatekeeper training in other settings. How gatekeeper training would impact a community with limited resources and preparation is an important question not answered by our data. Other approaches warranting additional research include those directed at youth to either help them identify if they are depressed or in crisis, increase their help-seeking behavior, or serve as gatekeepers themselves. With the exception of identifying their own depression (Aseltine & DeMartino, 2004), there is little research available on peer interventions, and iatrogenic effects are possible.

The present study also had several limitations. One was the moderate rate of staff enrollment into this study, i.e., only one-third of staff enrolled once selected. Although we identified few differences between enrolled and non-enrolled staff, we cannot rule out differences in motivations or awareness that may limit generalization of findings. The present study also occurred with primarily White/Non-Hispanic school staff and may not generalize to staff from different backgrounds. Another limitation was the absence of direct measures of staff members' interactions with students and reliance on staff self-reports. Finally, we tested the implications of the surveillance and communication models in this one study, but the design did not test these two models head to head, which would have provided more scientific evidence. This study did not address whether identification and referral increased students' contact with services and improvements in mental health. Those questions are being addressed in ongoing work.

Acknowledgments

References

American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-IV. Vol. 4th Ed. Washington: American Psychiatric Association; 1994.

Asarnow JR, Carlson GA, Guthrie D. Coping strategies, self-perceptions, hopelessness, and perceived family environments in depressed and suicidal children. Journal of Consulting & Clinical Psychology 1987;55(3):361–366. [PubMed: 3597949]

Aseltine RH Jr, DeMartino R. An outcome evaluation of the SOS Suicide Prevention Program. American Journal of Public Health 2004;94(3):446–451. [PubMed: 14998812]

Brown, CH. Design principles and their application in preventive field trials. In: Bukoski, WJ.; Sloboda, Z., editors. Handbook of Drug Abuse Prevention: Theory, Science, and Practice. New York: Plenum Press; 2002. p. 523-540.

Brown CH, Wyman PA, Guo J, Pena J. Dynamic wait-listed designs for randomized trials: new designs for prevention of youth suicide. Clinical Trials 2006;3(3):259–271. [PubMed: 16895043]

Brown CH, Wyman PA, Brinales JM, Gibbons RD. The Role of Randomized Trials in Testing Interventions for the Prevention of Youth Suicide. International Review of Psychiatry. 2007in press

Burns BJ, Santos AB. Assertive community treatment: an update of randomized trials. Psychiatric Services 1995;46(7):669–675. [PubMed: 7552556]

Centers for Disease Control and Prevention (CDC). Youth suicide prevention programs: A resource guide. Atlanta: National Center for Injury Prevention and Control; 1992.

Centers for Disease Control and Prevention (CDC). Appendix A: Selected healthy people 2010 objectives related to child and adolescent unintentional injury, violence, and suicide prevention. MMWR - Morbidity & Mortality Weekly Report 2001;50(RR22):65–66.
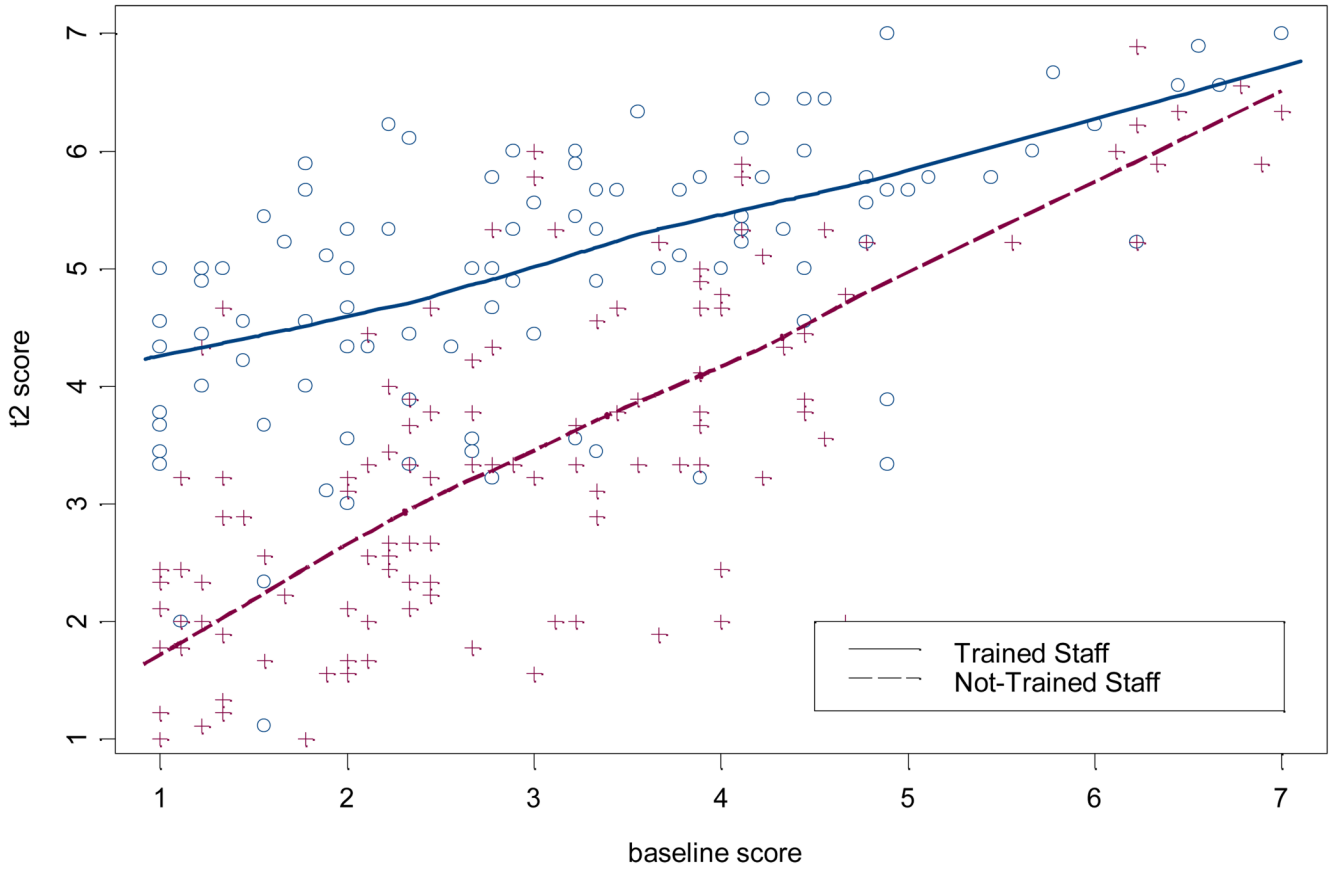
Centers for Disease Control and Prevention (CDC). Violence-related behaviors among high school students--United States, 1991–2003. MMWR - Morbidity & Mortality Weekly Report 2004;53(29): 651–655. [PubMed: 15282447]

Cohen, J. Statistical Power Analysis for the Behavioral Sciences. Vol. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum; 1988.

Cross W, Matthieu MM, Cerel J, Knox KL. Proximate outcomes of gatekeeper training for suicide prevention in the workplace. 2007Unpublished manuscript

Earls F, Robins LN, Stiffman AR, Powell J. Comprehensive health care for high-risk adolescents: an evaluation study. American Journal of Public Health 1989;79(8):999–1005. [PubMed: 2751040]

Eggert, LL.; Randell, BR.; Thompson, EA.; Johnson, CL. Washington State Youth Suicide Prevention Program: Report of Activities. Seattle: University of Washington; 1997.

Goldston, D. Measuring suicidal behavior and risk among children and adolescents. Washington, DC: American Psychological Association; 2003.

Gould MS, Kramer RA. Youth suicide prevention. Suicide & Life-Threatening Behavior 2001;31:6–31. [PubMed: 11326760]

Gould MS, Marrocco FA, Kleinman M, Thomas JG, Mostkoff K, Cote J, Davies M. Evaluating iatrogenic risk of youth suicide screening programs: a randomized controlled trial. JAMA 2005;293(13):1635–1643. [PubMed: 15811983]

Grossman, JA.; Kruesi, MJP. Innovative approaches to youth suicide prevention: An update of issues and research findings. In: Maris, R.; Canetto, SS.; McIntosh, JL.; Silverman, MM., editors. Review of Suicidology, 2000. New York: Guilford Press; 2000. p. 170-201.

Turley, B.; Tanney, B. LivingWorks Australian Field Trial Evaluation Report on Suicide Intervention Field Trial Australia (SIFTA). Melbourne, Australia: LifeLine Australia, Inc.; 1998.

Hastie, T.; Tibshirani, R. Generalized Additive Models. London: Chapman & Hall; 1990.

King KA, Smith J. Project SOAR: a training program to increase school counselors' knowledge and confidence regarding suicide prevention and intervention. Journal of School Health 2000;70(10): 402–407. [PubMed: 11195950]

Knox KL, Litts DA, Talcott GW, Feig JC, Caine ED. Risk of suicide and related adverse outcomes after exposure to a suicide prevention programme in the US Air Force: cohort study. British Medical Journal 2003;327(7428):1376. [PubMed: 14670880]

Lipsey, MW. Design Sensitivity: Statistical Power for Experimental Research. Newbury Park: Sage Publications; 2002.

Mackesy-Amiti ME, Fendrich M, Libby S, Goldenberg D, Grossman J. Assessment of knowledge gains in proactive training for postvention. Suicide & Life-Threatening Behavior 1996;26(2):161–174. [PubMed: 8840420]

Moskos M, Olson L, Halbern S, Keller T, Gray D. Utah youth suicide study: psychological autopsy. Suicide & Life-Threatening Behavior 2005;35(5):536–546. [PubMed: 16268770]

Pinheiro, JC.; Based, DM. Mixed-Effect Models in S and S-PLUS. New York: Springer; 2000.

Quinnett, P. QPR: Ask a Question, Save a Life. The QPR Institute and Suicide Awareness/Voices of Education; 1995.

Quinnett, P. QPR Institute. 1999. Retrieved February 9, 2007 from http://www.qprinstitute.com/

Rosenthal, R. Parametric measures of effect size. In: Cooper, H.; Hedges, LV., editors. The handbook of research synthesis. New York: Russell Sage Foundation; 1994. p. 231-244.

Rotheram-Borus MJ, Trautman PD, Dopkins SC, Shrout PE. Cognitive style and pleasant activities among female adolescent suicide attempters. Journal of Consulting & Clinical Psychology 1990;58 (5):554–561. [PubMed: 2254501]

Shaffer D, Scott M, Wilcox H, Maslow C, Hicks R, Lucas CP, Garfinkel R, Greenwald S. The Columbia Suicide Screen: validity and reliability of a screen for youth suicide and depression. Journal of the American Academy of Child and Adolescent Psychiatry 2004;43(1):71–79. [PubMed: 14691362]

Stiffman AR, Striley C, Horvath VE, Hadley-Ives E, Polgar M, Elze D, et al. Organizational context and provider perception as determinants of mental health service use. Journal of Behavioral Health Services & Research 2001;28(2):188–204. [PubMed: 11338330]

Thompson EA, Eggert LL. Using the suicide risk screen to identify suicidal adolescents among potential high school dropouts. Journal of the American Academy of Child and Adolescent Psychiatry 1999;38 (12):1506–1514. [PubMed: 10596250]

Tierney RJ. Suicide intervention training evaluation: a preliminary report. Crisis: Journal of Crisis Intervention & Suicide 1994;15(2):69–76.

Wolk-Wasserman D. Suicidal communication of persons attempting suicide and responses of significant others. Acta Psychiatrica Scandinavica 1986;73(5):481–499. [PubMed: 3751655]

YRBSS. 2005 State and Local Youth Risk Behavior Survey. 2005. Retrieved February 9, 2007, http://www.azrapeprevention.org/stats/2005AZYRBS/2005YRBSAZQuestionnaire.pdf

35 middle/high schools in District

3 schools excluded due to prior gatekeeper training

1047 staff randomly selected out of 4,830
342 enrolled; all completed time 1 assessment
705 declined

32 schools randomized stratified by type, crisis referrals

10 middle and 6 high schools randomized to receive QPR training
166 staff

10 middle and 6 high schools randomized to control condition
176 staff

Training Allocation

120 (72.3%) staff trained in QPR
70 (62.5%) received 'refresher'
35 (21.1%) not trained
11 (6.6%) left District (6 trained, 5 not trained)

158 (89.7%) staff not trained
5 (2.8%) transferred and trained
9 (5.1%) left District, not trained
4 (2.3%) left study schools, not trained

Follow-up and Analysis

122 (78.7%) in District completed 1-year follow-up and analyzed
33 (21.3% in District) declined follow-up (14 trained, 19 not)

127 (76.1%) in District completed 1-year follow-up and analyzed
40 (23.9% in District) declined follow-up

Figure 1.
Flowchart of schools and participants in the trial.

Figure 2.
Training Impact on Self-Evaluation of Suicide Prevention Knowledge at Time 2 as a Function of Baseline Self-Evaluation.

Table 1

Baseline gatekeeper training variables and communication with students by training status (Intention to Treat) and job role

Variables	Trained Staff (n=122) Mean	(SD)	NonTrained (n=127) Mean	(SD)	Training Status t value p-value	Job Role $F_{3,248}$ value	p-value	Tukey Tests for Job Role
Knowledge of QPR	70.13	(12.18)	71.04	(12.18)	0.57 0.57	5.32	0.001	HSS>T,SS
Appraisals								
Gatekeeper Preparedness	3.48	(1.61)	3.41	(1.55)	-0.32 0.75	21.48	<0.001	HSS>A>T>SS
Self-Evaluation Knowledge	3.17	(1.61)	2.82	(1.47)	-1.78 0.08	28.19	<0.001	HSS>A,T>SS
Gatekeeper Efficacy	3.50	(1.08)	3.40	(1.07)	-0.69 0.49	26.86	<0.001	HSS>A>T,SS
Gatekeeper Reluctance *	5.75	(0.64)	5.68	(0.69)	0.79 0.43	3.80	0.01	HSS>A,T
Access to Services	0.38	(0.36)	0.33	(0.35)	-0.94 0.35	30.54	<0.001	HSS,A>T,SS
Gatekeeper Behaviors								
Ask Students about Suicide	0.33	(0.95)	0.28	(0.83)	-0.42 0.67	146.69	<0.001	HSS>A,T,SS
Referral Behaviors	1.96	(1.37)	1.95	(1.36)	0.03 0.97	29.04	<0.001	HSS>A>T,SS
Communication								
Natural Gatekeeper	3.13	(0.85)	3.14	(0.93)	-0.05 0.95	28.25	<0.001	HSS>A>T>SS
Ask Students about Distress	2.30	(1.54)	2.21	(1.53)	-0.46 0.65	15.74	<0.001	HSS>A,T>SS

Note. HSS=Health and Social Service staff, A=Administrators, T=Teacher, SS=Support Staff.

*
Higher scores indicate lower reluctance.

Table 2

Intention to Treat Analyses: Gatekeeper Training Variables and Communication at 1-year Follow-up by Training Status

Variables	Trained (n=122)		Non-Trained (n=127)		Effect Size (ES)			Relative Change (RC)			ICC^
	Mean	(SD)	Mean	(SD)	ES	(95% CI)	p-value	RC	(95% CI)	p-value	School
Knowledge	76.30	(12.16)	71.78	(12.05)	0.41	(0.10, 0.71)	0.001	−0.26	(−0.66, 0.13)	0.18	0.058
Appraisals											
Gatekeeper Preparedness	5.01	(1.34)	3.75	(1.40)	1.21	(0.95, 1.49)	<.001	−0.28	(−0.56, 0.00)	0.05	0.015
Self-Evaluation Knowledge	4.83	(1.31)	3.34	(1.46)	1.32	(1.06, 1.59)	<.001	−0.35	(−0.59, −0.11)	0.003	0.014
Gatekeeper Efficacy	4.64	(1.13)	3.52	(1.10)	1.22	(0.92, 1.53)	<.001	−0.12	(−0.38, 0.14)	0.37	0.048
Gatekeeper Reluctance*	5.96	(0.69)	5.77	(0.64)	0.30	(0.00, 0.60)	0.06	−0.03	(−0.43, 0.38)	0.90	0.044
Access to Services	0.74	(0.31)	0.38	(0.40)	1.07	(0.82, 1.33)	<.001	−0.61	(−0.90, −0.31)	<.0001	<.001
Gatekeeper Behaviors											
Ask Students about Suicide	0.56	(1.20)	0.41	(0.95)	0.18	(−0.12, 0.47)	0.25	0.27	(0.03, 0.51)	0.02	0.045
Referral Behaviors	2.54	(1.61)	2.40	(1.43)	0.07	(−0.20, 0.33)	0.63	0.14	(−0.34, 0.62)	0.56	<.001
Communication											
Natural Gatekeeper	3.24	(0.82)	3.29	(0.85)	−0.10	(−0.25, 0.15)	0.43	0.12	(−0.18, 0.41)	0.43	0.001
Ask Students about Distress	2.19	(1.50)	2.33	(1.41)	−0.15	(−0.41, 0.11)	0.27	0.13	(−0.25, 0.52)	0.49	0.010

Note. Effect Size is difference in means for trained and untrained groups after adjusting for a linear effect of baseline, divided by the total standard deviation; Relative change is ratio of slopes (time 2 scores regressed on baseline scores) for the trained versus untrained groups. Negative ratio indicates greater gain from training for participants with low baseline scores;

^ ICC=Intra class correlation;

* Values recoded so that higher scores indicate lower reluctance.

Table 3

As Treated Analyses: Gatekeeper Training Variables and Communication with Students at 1-year Follow-up by Training Status

Variables	Trained (n=112) Mean	SD	Non-Trained (n=140) Mean	SD	Effect Size (ES) ES	(95% CI)	p-value	Relative Change (RC) RC	(95% CI)	p-value	ICC^ School
Knowledge	76.95	(11.91)	71.37	(12.10)	0.54	(0.26, 0.82)	0.001	−0.23	(−0.62, 0.15)	0.23	0.032
Appraisals											
Gatekeeper Preparedness	5.08	(1.24)	3.78	(1.45)	1.27	(0.98, 1.56)	<.001	−0.35	(−0.61, −0.08)	<.001	0.064
Self-Evaluation Knowledge	4.93	(1.20)	3.36	(1.49)	1.46	(1.18, 1.74)	<.001	−0.43	(−0.65, −0.21)	<.001	0.049
Gatekeeper Efficacy	4.78	(1.04)	3.47	(1.08)	1.51	(1.20, 1.82)	<.0001	−0.21	(−0.45, 0.04)	0.09	0.097
Gatekeeper Reluctance*	5.97	(0.69)	5.78	(0.65)	0.37	(0.10, 0.66)	0.01	−0.15	(−0.53, 0.22)	0.42	0.034
Access to Services	0.77	(0.29)	0.38	(0.39)	1.22	(0.97, 1.48)	<.0001	−0.59	(−0.89, −0.29)	<.001	<0.001
Gatekeeper Behaviors											
Ask Students about Suicide	0.57	(1.19)	0.41	(0.88)	0.20	(−0.09, 0.50)	0.18	0.31	(0.07, 0.54)	0.009	0.089
Referral Behaviors	2.60	(1.60)	2.36	(1.45)	0.23	(−0.03, 0.49)	0.09	0.20	(−0.29, 0.89)	0.42	<0.001
Communication											
Natural Gatekeeper	3.25	(0.78)	3.28	(0.88)	−0.04	(−0.29, 0.21)	0.76	0.02	(−0.27, 0.31)	0.90	<0.001
Ask Students about Distress	2.28	(1.48)	2.28	(1.43)	−0.08	(−0.34, 0.17)	0.51	0.17	(−0.22, 0.55)	0.40	<0.001

Note. Effect Size is difference in means for trained and untrained groups after adjusting for a linear effect of baseline, divided by the total standard deviation; Relative change is ratio of slopes (time 2 scores regressed on baseline scores) for the trained versus untrained groups. Negative ratio indicates greater gain from training for participants with low baseline scores;

^
ICC=Intra class correlation;

*
Values recoded so that higher scores indicate lower reluctance.

Table 4

Eighth and Tenth Graders' Positive Help-Seeking Attitudes as a Function of Self-reported Suicide Attempt vs. No Attempt

Variables	Suicide Attempt		No Suicide Attempt			With vs. Without Suicide Attempt[*]	
	No./Total	(%)	No./Total	(%)	OR (95% CI)		p-value
Would talk to a counselor or other adult at school	26/146	17.8%	700/1,854	37.8%	0.35 (0.23,0.54)		.001
Believe a counselor or other adult at school could help me	32/146	21.9%	863/1,854	46.5%	0.31 (0.21,0.47)		.001
My friends would want me to talk to an adult at school	51/146	34.9%	826/1,852	44.6%	0.62 (0.43,0.88)		.01
My family would want me to talk to an adult at school	40/113	35.4%	760/1,424	53.4%	0.48 (0.32,0.72)		.001

Note. Abbreviations: CI, confidence interval; OR, odds ratio.

[*]
Suicide attempt group is coded 1 and control group is coded 0, adjusted for grade, race, and gender.