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Suicide Prevention Programs in the Schools: A Review and Public Health Perspective

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Abstract. The purpose of this article is to provide a comprehensive review of school-based suicide prevention programs from a public health perspective. A literature review of empirical studies examining school-based suicide prevention programs was conducted. Studies were required to contain information pertaining to the implementation and outcomes of a school-based program designed to address suicidal behaviors among children and youth. A total of 13 studies was identified. Most of the studies (77%) were classified as universal suicide prevention programs ($n = 10$), with the remaining studies classified as selected suicide prevention programs ($n = 3$). Studies were coded based on key methodological features of the Task Force on Evidence-Based Interventions in School Psychology Procedural and Coding Manual (Kratochwill & Stoiber, 2002). The highest methodology ratings were obtained by two universal suicide prevention programs (Klingman & Hochdorf, 1993; LaFromboise & Howard-Pitney, 1995) and one selected prevention program (Randell, Eggert, & Pike, 2001), although the selected suicide prevention programs demonstrated proportionally more key methodological features than the universal suicide prevention programs. However, only 2 of the 13 studies reviewed demonstrated strong evidence for statistically significant effects on primary outcome measures. Very few studies provided promising evidence of educational/clinical significance (7.6%), identifiable components linked to statistically significant primary outcomes (23.1%), and program implementation integrity (23.1%). Furthermore, no studies provided evidence supporting the replication of program effects. The implications of these results for practice are discussed as well as needs for future research.

Youth suicide continues to be a major public health problem in the United States. To put this problem in context, suicide is the fifth leading cause of death among children ages 5–14 and the third leading cause of death among adolescents and young adults ages 15–

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24. In recent years, more young people died from suicide than from cancer, heart disease, HIV/AIDS, congenital birth defects, diabetes, and other medical conditions combined (Centers for Disease Control and Prevention, 2007). Suicidal behavior is not conceptualized as being restricted to suicide alone; it also includes suicidal ideation and suicide attempts, and each of these behaviors affects thousands of children, adolescents, and families in the United States each year (Mazza, 2006). As such, youth suicidal behavior is a significant public health issue for individuals as well as entire communities. First, the loss of life that results from suicide is both tragic and preventable. Second, those who attempt suicide and survive may have serious injuries such as broken bones, brain damage, or organ failure. Moreover, individuals who survive a suicide attempt often experience depression and/or other mental health problems. Family and friends of youth who exhibit suicidal behavior may also experience a variety of mental health problems, and the financial, medical, social, psychological, and emotional costs of suicide on members of the community is substantial (Centers for Disease Control and Prevention, 2006).

Because of the seriousness and pervasiveness of this problem, and given that children and youth spend much of their time in schools, school personnel have been asked to take an increasingly prominent role in suicide prevention efforts (Gould & Kramer, 2001; Kalafat, 2003; Mazza, 1997; Miller & DuPaul, 1996). This development has been intensified by calls for school psychologists to become more proactive in the prevention of youth suicide (Lieberman, Poland, & Cassel, 2008) and other mental health problems (Power, 2003), and to shift from an individualized service delivery model to a population-based (Doll & Cummings, 2008), public health approach (Hoagwood & Johnson, 2003; Nastasi, 2004; Power, 2000; Power, DuPaul, Shapiro, & Kazak, 2003; Strein, Hoagwood, & Cohn, 2003). Recent initiatives by the federal government, including the surgeon general's Call to Action to Prevent Suicide (U.S. Department of Health and Human Services, 1999) and the National Strategy for Suicide Prevention: Goals and Objectives for Action (U.S. Public Health Service, 2001), have also recognized the importance of youth suicide prevention by classifying it as an urgent public health priority. For example, in 2004 the nation's first youth suicide prevention bill, the Garrett Lee Smith Memorial Act, was signed into law. In passing this legislation, the U.S. Congress noted that "youth suicide is a public health tragedy linked to underlying mental health problems and that youth suicide early intervention and prevention activities are national priorities" (p. 1).

Purpose of the Article

The purpose of this article is to provide a comprehensive review of school-based suicide prevention programs from a public health perspective. First, the article describes how taking a public health approach to the school-based prevention of youth suicidal behavior is a useful and appropriate response to this national problem. Next, the article provides a highly systematic review of the literature on school-based suicide prevention within a public health framework, using the Task Force on Evidence-Based Interventions in School Psychology Procedural and Coding Manual (Kratochwill & Stoiber, 2002). The article concludes by describing the implications of these results for practice and by outlining needs for future research.

A Public Health Perspective on School-Based Suicide Prevention

The central characteristic of a public health model is its emphasis on prevention (Strein et al., 2003; Woodside & McClam, 1998). Specific aspects of the public health model that have particular relevance for schools include (a) applying scientifically derived evidence to the delivery of psychological services; (b) strengthening positive behavior rather than focusing exclusively on decreasing problem behavior; (c) emphasizing community collaboration and linked services; and (d) using appropriate research strategies to improve the knowledge base and effectively

evaluate school psychological services (Strein et al., 2003). The importance of taking a public health approach to prevention and intervention in schools is reflected in recent landmark events and publications in school psychology, including the 2002 Multisite Conference on the Future of School Psychology (Harrison et al., 2004) and the National Association of School Psychologists Blueprint for Training and Practice III (Ysseldyke et al., 2006).

A school-based public health approach can perhaps best be illustrated by Walker et al.'s (1996) three-tiered model. This public health model includes three overlapping tiers that collectively represent a continuum of interventions that increase in intensity to meet individual student needs (Sugai, 2007). The first tier is referred to as the *universal* or *primary* level, because all individuals in a given population (e.g., school; classroom) are recipients of interventions designed to prevent particular emotional, behavioral, or academic problems. The second tier, referred to as the *selected* or *secondary* level, is comprised of more intensive interventions for those students who do not adequately respond to universal interventions. The third tier, referred to as the *indicated* or *tertiary* level, is characterized by highly individualized and specialized interventions for those students who do not adequately respond to universal and selected levels of prevention and intervention (Sugai, 2007; Walker et al., 1996). School psychology is increasingly embracing this perspective, which can be seen most clearly in the growing response to intervention movement (Burns & Gibbons, 2008) and in school-wide positive behavior support (Horner, Sugai, Todd, & Lewis-Palmer, 2005) This same public health approach can also be potentially useful in the school-based prevention of youth suicide (Hendin et al., 2005; Kalafat, 2003).

Universal suicide prevention programs appear to be the most widely used approach in the schools and typically focus on increasing awareness of suicide, providing information regarding risk factors and warning signs, dispelling myths about suicide, teaching appropriate responses to peers who may come into contact with someone who may be suicidal, and potentially identifying youth who may be suicidal or at risk for suicidal behavior (Mazza & Reynolds, 2008). These programs are presented to all students in a given population regardless of their level of risk, and the key assumptions underlying them are that the conditions that contribute to suicide risk in youth "often go unrecognized, undiagnosed, and untreated, and that educating students and gatekeepers about the appropriate responses will result in better identification of at-risk youth, and an increase in help seeking and referrals for treatment" (Hendin et al., 2005, p. 446).

Historically, many universal prevention programs have been of short duration, frequently promoting a "stress" model of suicide prevention (i.e., suggesting to students that suicidal behavior can occur primarily or exclusively as a result of extreme stress), and failing to assess program effects on more severe forms of suicidal behavior, despite research suggesting that these programs should be of longer duration, have a comprehensive mental health focus, and assess a broader spectrum of suicidal behaviors (e.g., suicide attempts) rather than simply focusing on knowledge and attitude change (Berman, Jobes, & Silverman, 2006; Kalafat, 2003; Mazza, 1997; Miller & DuPaul, 1996; Miller & Sawka-Miller, in press). Further, there are indications that students most likely to be suicidal may benefit from these programs less than their nonsuicidal peers, and that students at risk for a number of mental health problems, including suicide, are less likely to attend preventative education programs (Berman et al., 2006). Some universal prevention programs have attempted to reduce the stigma of suicide by deemphasizing the relationship between suicidal behavior and psychopathology (Hoberman & Garfinkel, 1988). By underemphasizing this relationship and essentially "normalizing" suicidal behavior, Shaffer, Garland, Gould, Fisher, and Trautman (1988) suggested that these programs may heighten the risk of imitation.

Selected suicide prevention programs focus on the subpopulation of students who may be at higher risk for engaging in suicidal behavior. For example, this may include ado-

lescents who have mental health problems, Native American males, youth who have access to firearms in their home, students at risk for dropping out of school, or students who are known to have family members with an affective disorder or to have engaged in previous suicidal behavior (Hendin et al., 2005). Possible components of a selected program may include developing and teaching decision-making skills and strategies, identifying resources in the school and community for help, emphasizing peer involvement and the role of peers in responding to someone who may be suicidal, and developing strategies for identifying high-risk youth (Mazza & Reynolds, 2008). Student screening programs such as the Columbia TeenScreen program (Shaffer et al., 2004) and the Signs of Suicide program (Aseltine & DeMartino, 2004) provide another example of selected suicide prevention programs. Although screening programs are typically administered to all students in a particular environmental context (e.g., school, classroom), because their purpose is to identify and intervene with high-risk individuals they are generally considered to be selected prevention programs rather than universal ones.

Indicated suicide prevention programs target youth who have already engaged in suicidal behavior, such as students who have expressed the desire to kill themselves or who have made one or more previous suicide attempts. As such, the focus of indicated programs is to reduce the current crisis or conflict as well as the risk for further engagement in suicidal behavior. In addition, because these programs are designed to treat specific problems students are experiencing, indicated prevention programs are generally based heavily on individualized, evidence-based interventions. Possible components of indicated programs in schools may include developing and teaching adaptive decision-making strategies that focus on times of stress or emotional dysregulation, accessing emergency help, providing ongoing support to students during a crisis, and identifying at least one caring adult in the school or community from whom to seek help (Mazza & Reynolds, 2008).

School psychologists and other school-based mental health professionals are often highly involved at this level, through conducting suicide risk assessments (Davis & Sandoval, 1991; Miller & McConaughy, 2005), intervening directly with suicidal youth (Lieberman et al., 2008; Sandoval & Zadeh, 2008), or offering suicide postvention (Brock, 2002; Poland, 1989). Although postvention involves strategies to implement after a suicide occurs, it serves a preventive function because it is designed to reduce the likelihood of additional suicides or further suicidal behavior (Brock, 2002). Research has suggested that if schools and/or communities implement appropriate postvention procedures in a timely manner, the likelihood of other suicides may decrease (Etzersdorfer & Sonneck, 1998; Gould, 2001). Given that some youth may be vulnerable to possible suicide contagion effects (Berman et al., 2006; Gould & Davidson, 1988), having clear postvention policies in place is clearly essential. Brock (2002), Davis and Sandoval (1991), Poland (1989), and Poland and McCormick (1999) provide useful guidelines for suicide postvention procedures in schools.

Selection of School-Based Suicide Prevention Programs for Review

To be included in the literature review, studies needed to meet predetermined selection criteria. At the most general level, studies were required to contain information pertaining to the implementation of a school-based program designed to address suicidal behaviors among children and youth. More specific selection criteria for inclusion was as follows: (a) the study was published in English; (b) the study examined the effectiveness of suicide prevention programs and contained outcome data; (c) the study included child and/or youth populations; (d) the suicide prevention program was implemented in a school setting; (e) the research design was either an empirical investigation or a descriptive study; and (f) the methods and results were specified in the text.

A number of strategies were incorporated to locate potential studies for inclusion in the literature review. First, potential studies

were identified through computerized bibliographic searches from the PsycINFO and ERIC databases in February 2008. For both databases, computerized searches were conducted based on the available electronic records at that time (September 1967 to February 2008). We conducted multiple searches in these databases, pairing the following terms: *suicide, prevention, intervention,* and *postvention*. In addition to the computerized searches, an ancestral search was conducted wherein the reference lists of all studies identified were reviewed to assist in locating additional studies. We also manually reviewed the journals of the following leading journals related to suicidal behaviors: *American Journal of Public Health, Journal of the American Academy of Child and Adolescent Psychiatry, Journal of Counseling Psychology,* and *Suicide and Life-Threatening Behavior.* Furthermore, because computerized databases update their contents quarterly, we manually reviewed journals in which the identified studies were published between the years 2007 and 2008.

The first and second authors reviewed the title and abstract of each potential study ($n = 52$) to determine whether it met the inclusionary criteria. The two most common reasons for excluding studies were as follows: (a) not using a school-based prevention program and (b) not using experimental or quasi-experimental methodologies. Each study meeting the inclusionary criteria was then independently reviewed by a research assistant. The research assistant evaluated the intercoder agreement relative to the inclusionary criteria of those identified studies. Intercoder reliability based on percentage of agreement for the inclusionary criteria was 100%.

Based on population-based intervention classifications proposed by Mazza and Reynolds (2008), studies were categorized based on three types of prevention program: (a) universal prevention programs (i.e., programs that target an entire population, such as all students in a school or all staff in a particular school); (b) selected prevention programs (i.e., programs that focus on an at-risk group of students); and (c) indicated prevention programs (i.e., programs that focus on students who have already engaged in suicidal behavior). To establish reliability of the categorization procedures used in this literature review, the second author and a research assistant categorized all of the studies. Intercoder reliability based on percentage of agreement for the prevention program categories was 100%.

In addition, all studies were assessed on eight methodological indicators based on the Task Force on Evidence-Based Interventions in School Psychology Procedural and Coding Manual (Kratochwill & Stoiber, 2002). These eight key features (i.e., measurement, comparison group, statistically significant outcomes, educational/clinical significance, identifiable components, implementation fidelity, replication, site of implementation) were coded on a 4-point rating of evidence (i.e., 0 = *no evidence*; 1 = *marginal or weak evidence*; 2 = *promising evidence*; 3 = *strong evidence*). The scores for the eight key features were averaged to provide a mean methodology rating for each study. Prior to coding the studies, the second author provided the research assistant with training on the coding criteria. Once 100% intercoder agreement was obtained on five mock studies, the second author and the research assistant independently coded each study. If a disagreement was discovered in the assignment of a specific rating, the coders reached consensus and adjusted the rating accordingly. The final intercoder agreement based on percentage of agreement for key coding criteria (i.e., study category, key features, rating level of evidence) was 89% (range: 83% to 100%).

Results

A total of 13 studies published between 1987 and 2007 were identified as meeting the inclusionary criteria (see Table 1). The majority of studies (69%) were published in leading journals related to suicidal behaviors. The remaining studies were published in journals related to social work (15%; *Social Work; National Association of Social Workers*) or youth development (15%; *Journal of Adolescence; Adolescence*). None of the studies was

Table 1
Characteristics of School-Based Suicide Prevention Programs for Children and Youth (n = 13)

Reference	Type of Program and Components	Sample Size and Participant Characteristics	Target Behaviors	Setting and Length	Findings
Aseltine & DeMartino (2004) [S1]	Selected; suicide awareness curriculum (SOS), brief mental health screening	Treatment: 1,027 students Control: 1,073 students Grade: 9–12 Sex: 50% female Ethnicity: 23% NHW, 29% NHB, 34 HL, 11% M, 5% O	Self-report of suicide attempts and suicidal ideation, knowledge and attitudes about depression and suicide, and help-seeking behaviors	Public school; half of school year; session length not reported	Participants reported significantly reduced rates of suicide attempts and improved knowledge and attitudes about depression and suicide. No significant effects were observed for suicidal ideation or help-seeking behaviors.
Ciffone (1993) [S2]	Universal; teaching suicide warning signs and peer response/intervention strategies	Treatment 203 students Control: 121 students Grade: 10 Sex: 47% female Ethnicity: not reported	Self-report of undesirable attitudes toward suicide and help-seeking behaviors behaviors	Public school; 2 days; session length 1 hr	Participants reported significantly improved attitudes toward suicide and help-seeking. No significant effects were observed for females' undesirable attitudes regarding seeking mental health services or considering suicide to be an option for individuals with mental health issues.
Ciffone (2007) [S3]	Universal; disseminating staff intervention policies, encouraging self- and peer referrals, classroom discussions on mental health, disseminating prevention materials, engaging in follow-up screening/intervention; postintervention procedures	Treatment: 221 students Control: 200 students Grade: 10 Sex: 53% female Ethnicity: not reported	Self-report of undesirable attitudes toward suicide and help-seeking behaviors	Public school; 1 month, 2 days; session length 1 hr	Participants reported significantly more desirable attitudes toward suicide and help-seeking behaviors in both school districts for all areas targeted.

(Table 1 continues)

Table 1 Continued

Reference	Type of Program and Components	Sample Size and Participant Characteristics	Target Behaviors	Setting and Length	Findings
Eggert, Thompson, Herting, & Nicholas (1995) [S4]	Selected; Identification of at-risk youth, suicide risk screening, in-depth mental health assessment, small group prevention program (PGC)	Treatment A: 36 students Treatment B: 34 students Treatment C: 35 students Control: 202 students Sex: 42% female Ethnicity: 2.9% AIAN, 5.7% API, 2.9% HL, 7.6% M, 1.9% NHB, 72.5% NHW, 7.5% O	Self-report of direct suicide risk factors, related risk factors, and protective factors	Public school; 1–2 semesters; Treatment A lasted 5 months, session length 55 min; treatment lasted 10 months; session length 55 min	Participants assigned to all three groups reported less suicide risk behaviors, depression, hopelessness, stress, and anger. All participants reported increased levels of self-esteem and network support. Participants in the personal growth program reported increased personal control.
Kalafat & Elias (1994) [S5]	Universal; suicide awareness curriculum, disseminated crisis response information	Treatment: 136 students Control: 117 students Grade: 10 Sex: 43% female Ethnicity: not reported	Self-report of attitudes and knowledge toward suicide, help-seeking behaviors; program acceptability	Public school; 3 sessions; session length 45 min	Participants demonstrated more knowledge about suicide, reported greater disagreement with negative help-seeking statements, and more appropriate responses toward suicidal peers. No differences were reported in participants' attitudes toward suicide. Program acceptability was high.
Klingman & Hochdorf (1993) [S6]	Universal; psychological education curriculum that included educational/ conceptual lessons on distress, exercise-training on coping skills, and implementation of coping skills via homework assignments	Treatment: 116 students Control: 121 students Grade: 8 Sex: 52% females Ethnicity: Not reported	Self-report of attitudes, emotions, knowledge, and awareness of distress coping skills	Public school; 12 weeks; session length 50 min	Participants demonstrated greater knowledge of suicide and coping skills. A reduction in suicide potentiality was reported among males and an increase in empathy was reported among females. No improvement in loneliness was reported. Program acceptability was high.

(Table 1 continues)

Table 1 Continued

Reference	Type of Program and Components	Sample Size and Participant Characteristics	Target Behaviors	Setting and Length	Findings
LaFromboise & Howard-Pitney (1995) [S7]	Universal; ZLSD curriculum that provides suicide awareness and intervention as well as addressing risk-taking behaviors	Treatment: 69 students Control: 59 students Grade: 9 and 11 Sex: 63% females Ethnicity: 100% AIAN	Self-report of suicide vulnerability, hopelessness, depression, and self-efficacy; observations of problem-solving skills; peer ratings of problem-solving skills.	Public school; 30 weeks, 3 sessions/week; session length not reported	Participants reported reductions in suicide vulnerability and hopelessness. Observations and peer ratings indicated improved problem-solving skills. No improvements in depression or self-efficacy were reported
Nelson (1987) [S8]	Universal; prevention seminars provided to youth, parents, and school staff, no specification regarding components	370 students, 132 school staff, and 40 parents Grade: 10–12 Sex: 50% females Ethnicity: 10% API, 17% HL, 16% NHB, 49% NHW, 8% O	Self-report of attitudes regarding distress, knowledge regarding suicide, and related factors; ability to identify suicidal behaviors in others; program acceptability	Public school; 4 hr student training; 90 min staff and parent training	Student participants reported improved attitudes and greater knowledge regarding suicide following program completion. Students, staff and parents reported high program acceptability.
Orbach & Bar-Joseph (1993) [S9]	Universal; prevention program that includes student workshops on coping strategies to address self-destructive behaviors and staff training	Treatment: 215 students Control: 178 students Grade: 11 Sex: 55% females Ethnicity: not reported	Self-report of suicidal tendencies, hopelessness, ego identity, and coping skills; program acceptability	Public school; 7 weeks, session length 2 hr	Participants in at least half of the schools reported reduced suicidal tendencies and feelings of hopelessness. Improved coping skills and ego identity were reported by participants in at least half of the schools. Program acceptability was high and no students reported negative effects.

(Table 1 continues)

Table 1 Continued

Reference	Type of Program and Components	Sample Size and Participant Characteristics	Target Behaviors	Setting and Length	Findings
Randell, Eggert, & Pike (2001) [S10]	Selected; C-CARE includes coping and problem-solving skills, cognitive strategies to reinforce strengths and interrupt risk behaviors, access to support services; CAST includes C-CARE components and provides specific training in self-esteem enhancement, mood management, substance abuse control, and accessing support services	C-CARE: 117 participants CAST: 103 participants Assessment: 112 participants Grade: 9–12 Gender: 48% females Ethnicity: 2% AIAN, 13% API, 7% HL, 13% M, 12% NHB, 40% NHW, 9% O	Self-report of suicidal behaviors, depression, anger, family and personal protective factors	Public school; C-CARE, 3–4 hr; CAST, 3–4 hr plus 6 weeks of two 1-hr sessions/ week	Participants in all three groups reported less suicide risk behaviors, depression, anger control problems, and family distress. Improvements in self-esteem, personal control, and perceived family support were reported for all participants. No improvements were reported for problem-solving coping. In comparison to typical youths, both programs resulted in large effects for suicide risk, personal protective factors, and family factors.
Shaffer, Garland, Vieland, Underwood, & Busner (2001) [S11]	Universal; suicide curriculum programs; Program 1 emphasized awareness and clinical features of suicide; Program 2 emphasized support networks; Program 3 emphasized problem-solving techniques	Treatment: 758 students Control: 680 students Grade: 9 and 10 Sex: 52% female Ethnicity: 22% HL, 25% NHB, 48% NHW, 4% O	Self-report of attitudes and knowledge of suicide; help-seeking behaviors; program acceptability	Public school; 1 session, session length 1.5 to 3 hr	Participants reported greater knowledge of help-seeking behaviors. No differences were reported for attitudes and knowledge of suicide. Students reported moderate to high program acceptability, with a small number of students reporting negative side effects.

(Table 1 continues)

Table 1 Continued

Reference	Type of Program and Components	Sample Size and Participant Characteristics	Target Behaviors	Setting and Length	Findings
Spirito, Overholser, Ashworth, Morgan, & Benedict-Drew (1988) [S12]	Universal; suicide awareness curriculum that discussed attitudes regarding suicide and related behaviors, suicide facts and risk factors, and peer identification and referral techniques	Treatment: 291 students Control: 182 students Grade: 9 Sex: not reported Ethnicity: not reported	Self-report of attitudes and knowledge of suicide; help-seeking behaviors, hopelessness, and coping skills	Public school; 6 weeks, session length not reported	Participants reported greater increases in certain coping skills and areas of knowledge. Pretest sensitization resulted in control students reporting increased knowledge, and attitudes of suicide as well as decreased hopelessness.
Zenere & Lazarus (1997) [S13]	Universal; district-wide suicide prevention and crisis management program that included staff in-service training, parent education, drug education curriculum (TRUST), life skills management curriculum in 10th grade addressing suicide and related risk behaviors, formal school policy related to suicide prevention and post-intervention, school-based crisis team, monitoring of students behavior (Student Intervention Profile), student referral program, youth crisis hotline, postvention procedures	Treatment: 330,000 students Grade: K–12 Sex: not reported Ethnicity: not reported	Suicidal ideation, suicide attempts, and completed	Public school district; school-wide program;5 yr	Significant decreases in suicides (63%) and suicide attempts (87 per 100,000 to 31 per 100,000) were observed. Suicidal ideation fluctuated over the 5-year period, with no significant decreases observed.

Note. AIAN = American Indian/Alaska Native; API = Asian/Pacific Islanders; HL = Hispanic/Latino; M = Multiethnic; NHB = non-Hispanic Black; NHW = non-Hispanic White; O = Other; SOS = Signs of Suicide; PGC = Personal Group Class; ZLSD = Zuni Life Skills Development; C-CARE = Counselors CARE; CAST = Coping and Support Training; TRUST = To Reach Ultimate Success Together.

published in school psychology journals. The majority of studies included in the literature review were classified as universal prevention programs (77%, $n = 10$). A smaller percentage of studies were classified as selected prevention programs (23%, $n = 3$), and no studies were classified as indicated prevention programs. The specific findings for each type of prevention program are discussed in the sections that follow.

Universal Suicide Prevention Programs

The majority of universal prevention program studies typically focused on curriculum programs presented to students. Although space limitations prohibit an extensive discussion of these studies, the majority of programs were embedded within the context of health education classes (Ciffone, 1993, 2007; Kalafat & Elias, 1994; Shaffer et al., 1991) and constituted an extended (Klingman & Hochdorf, 1993; LaFromboise & Howard-Pitney, 1995; Spirito, Overholser, Ashworth, Morgan, & Benedict-Drew, 1988) or abbreviated (Nelson, 1987; Orbach & Bar-Joseph, 1993) psychoeducational curriculum for students. However, the work of Zenere and Lazarus (1997) deviates significantly from the other universal prevention programs in that a system-wide school-based prevention and intervention program was developed and implemented over a 5-year period. The main characteristics of each study can be seen in Table 1.

Universal Suicide Prevention Programs: Methodological Quality

The methodological features of the universal suicide prevention programs varied considerably (see Table 2). Although the site of implementation (i.e., school setting) was consistent across all 10 studies, examination of the average methodology rating per study suggested that a majority of studies demonstrated weak to promising evidence (i.e., 54% of studies with ratings greater than 1.00). The programs evaluated by Klingman and Hochdorf (1993, Study 6) and LaFromboise and Howard-Pitney (1995, Study 7) demonstrated the highest methodological rigor of the universal prevention programs reviewed, including establishing strong evidence for statistically significant effects on the primary outcome measures and providing promising to strong evidence of program implementation integrity. In addition, LaFromboise and Howard-Pitney's investigation was one of the few studies providing strong evidence for their outcome measures, which included using a multimethod (i.e., self-reports, behavioral observation), multisource (i.e., participant and peer reports) method to examine program effects. Moreover, this was the only study to adopt a culturally tailored approach to developing a school-based suicide prevention program for use among Native American youth.

Consistent methodological weaknesses were noted with the majority of universal suicide prevention programs reviewed. A relatively small percentage of studies included reliable and valid measures (30%), demonstrated educational/clinical significance (10%), documented program implementation fidelity (20%), and replicated the effects (0%). The use of analytical techniques to account for nested models within data sets (i.e., classrooms nested within school) was not employed in any of the reviewed studies. In addition, follow-up analyses were rarely conducted regarding the moderating effects of relevant demographic factors (e.g., gender, drug and alcohol abuse, mental health risks), with the notable exception of Orbach and Bar-Joseph (1993; Study 9), who compared post-assessment outcomes based on those participants receiving low and high suicidal tendency scores at baseline. Furthermore, important factors related to school-based implementation (e.g., characteristics of the program implementer, cost analysis data, training and support resources, feasibility) were reported in only a limited number of studies. Finally, it is important to highlight that the majority of the studies provided either weak (50%) or promising evidence (30%) for statistically significant outcomes.

Selected Suicide Prevention Programs

To date, only three empirical studies have used selected approaches to suicide prevention (Aseltine & DeMartino, 2004; Eggert, Thompson, Herting, & Nichols, 1995; Ran-

Table 2
Summary of Evidence for Key Methodological Features of School-Based Suicide Prevention Program Studies (n = 13)

Feature	Study Number													Mean Rating
	S1[a]	S2[b]	S3[b]	S4[a]	S5[b]	S6[b]	S7[b]	S8[b]	S9[b]	S10[a]	S11[b]	S12[b]	S13[b]	
Measurement	1	0	0	2	1	1	3	0	2	2	1	1	3	1.31
Control or comparison group	3	1	1	2	2	2	2	0	2	3	2	2	0	1.69
Statistically significant key outcomes	2	1	1	1	2	3	3	1	2	2	1	1	2	1.69
Educational/clinical significance	1	1	1	1	1	1	1	0	1	1	0	0	2	0.85
Identifiable components	0	0	0	1	1	2	2	0	1	2	0	0	1	0.77
Implementation fidelity	0	0	0	1	1	2	3	0	0	3	0	1	0	0.85
Replication	0	0	1	0	1	0	0	0	1	0	0	0	1	0.31
Site of implementation	3	3	3	3	3	3	3	3	3	3	3	3	3	3.00
Total methodology rating	10	6	7	11	12	14	17	4	12	16	7	8	12	10.46
Mean methodology rating	1.25	0.75	0.88	1.38	1.50	1.75	2.13	0.50	1.50	2.00	0.88	1.00	1.50	

Note. S = Study. Ratings range from 0 to 3; 0 = no evidence/not reported, 1 = weak evidence; 2 = promising evidence; 3 = strong evidence.
[a]Selected suicide prevention program.
[b]Universal suicide prevention program.

dell, Eggert, & Pike, 2001); the main characteristics of each study are presented in Table 1. The selected approach used by Aseltine and DeMartino, the Signs of Suicide program, combines curricula to raise awareness of suicide and related issues with a brief screening for depression and other risk factors associated with suicidal behavior. In the didactic component of the program, students are taught that suicide is directly related to mental illness, typically depression, and that suicide is not a normal reaction to stress or emotional upset. Youth are taught to recognize the signs of suicide and depression in themselves and others, as well as specific action steps for responding to those signs. Action steps are described using the acronym ACT, which stands for *A*cknowledge, *C*are, and *T*ell: "First, *acknowledge* the signs of suicide that others display and take those signs seriously. Next, let that person know that you *care* and that you want to help. Then, *tell* a responsible adult" (Aseltine & DeMartino, 2004, p. 446).

The selected approaches to school-based suicide prevention used by Eggert, Thompson, et al. (1995) and Randell et al. (2001) focused on at-risk youth (i.e., at risk for school dropout and suicidal behavior) and included an assessment interview. In the Eggert, Thompson, et al. (1995) study, the selected program known as Personal Growth Class I provided one semester of small-group activities related to social support, weekly monitoring of mood management activities, interpersonal communica-

tion, training in self-esteem enhancement, decision making, and personal control training. The second selected approach evaluated in this study, Personal Growth Class II, included one semester of the Personal Growth Class I coupled with one semester of skill applications in home and school environments as well as developing adaptive recreation and social activities. In the Randell et al. (2001) study, two selected approaches were evaluated and included the following: (a) Counselors CARE (C-CARE) (i.e., brief counseling protocol and the facilitation of social support from school personnel and a parent); and (b) C-CARE plus Coping and Support Training (CAST) (i.e., small-group skills training and social support model adapted from Reconnecting Youth, a peer-group approach to building life skills, Eggert, Nicholas, & Owens, 1995).

Selected Suicide Prevention Programs: Methodological Quality

The methodological features of the selected suicide prevention programs varied (see Table 2, Studies 1, 4, and 10), with the site of implementation (i.e., school setting) consistent across studies. Randell et al. (2001, Study 10) demonstrated the greatest methodological rigor of the three studies, including strong evidence of intervention adherence and use of an active comparison group. This study was also unique in that it was one of the few studies to include a high-risk group of participants (i.e., potential high school dropouts) and compare the selected suicide prevention programs to a "typical intervention" comparison group. Finally, this study as well as the work of Eggert, Thompson, et al. (1995, Study 4) compared outcomes as a function of those participants who completed the program versus those participants who were noncompleters. This analytical consideration is a relevant and important feature within the context of suicide prevention programs. Another analytical advancement was reported in Aseltine and DeMartino (2004, Study 1), which incorporated hierarchical linear modeling to more fully examine the effect of nested models in school-based suicide prevention program research.

Consistent methodological weaknesses were noted across all three studies. Only Randell et al. (2001) documented intervention adherence and used analytical techniques to identify which identifiable components of their prevention programs were related to statistically significant primary outcomes (Randell et al., 2001, Study 10). None of the three studies reviewed demonstrated promising or strong evidence for educational/clinical significance or the replication of effects. In addition, many of the methodological criticisms noted previously for the universal suicide prevention programs (i.e., role of participant demographic factors moderating outcomes, factors related to school-based implementation) were characteristic of the selected suicide prevention programs reviewed. Finally, it is important to highlight that none of these studies provided strong evidence for statistically significant outcomes because the outcome measures relied on a single informant source (i.e., student self-report measures of knowledge, attitudes, and behaviors) and reliability evidence for a majority of these measures was not reported. Although the reliance on self-report methods is pervasive in school-based suicide prevention program research, establishing reliable and valid measures is crucial, as well as considering multimethod approaches to program evaluation. In addition, statistical significance was not observed for the majority (i.e., greater than 75%) of the primary outcome *constructs*, and none of these studies demonstrated that the suicide preventions programs was superior to a no-intervention or active-comparison group condition.

Indicated Suicide Prevention Programs

For the purposes of this literature review, no studies were classified as indicated prevention programs. As a result, there is limited information about effective programs at this level. Promising approaches to treatment of suicidal youth have been developed however, including dialectical behavior therapy, which has shown consistent results in reducing suicidal behavior among adults (Mazza, 2006) and is now being increasingly used with sui-

cidal youth (Miller, Rathus, & Linehan, 2007), and the Youth Nominated Support Team (King et al., 2006), which has been used successfully with adolescents who have been hospitalized for suicidal behavior. Designed for youth for whom suicide recidivism is a significant concern, this program consists of a psychoeducational-social network intervention to increase social support and treatment compliance and decrease negative parental perceptions of youth who have made previous suicide attempts and are at high risk for further suicidal behavior. Both dialectical behavior therapy and the Youth Nominated Support Team could be potentially employed with suicidal youth in school settings, although to date neither has been empirically evaluated in that context.

Discussion

Given the results of this review, it is clear that the current scientific foundation regarding school-based suicide prevention programs is very limited. Grounded on the criteria of the Task Force on Evidence-Based Interventions in School Psychology Procedural and Coding Manual (Kratochwill & Stoiber, 2002), consistent and considerable methodological weaknesses were noted for nearly all of the universal and selected suicide prevention programs reviewed. For example, of the 13 studies reviewed, only 5 studies showed promising evidence for statistically significant outcomes, and only 2 (Klingman & Hochdorf, 1993; LaFromboise & Howard-Pitney, 1995) demonstrated strong evidence in this area. The results for educational/clinical significance were even less encouraging, with only 1 study (Zenere & Lazarus, 1997) demonstrating promising evidence and no studies showing strong evidence. Further, 76.9% of the studies demonstrated either weak or no evidence of implementation fidelity or the ability to identify which components of their programs were related to statistically significant outcomes, and all of the studies either had weak evidence ($n = 4$) or no evidence ($n = 9$) to support the replication of program effects.

Two universal prevention programs (Klingman & Hochdorf, 1993; LaFromboise & Howard-Pitney, 1995) and one selected prevention program (Randall et al., 2001) were rated as relatively stronger than the other studies in their methodology ratings, although each of these studies had significant methodological limitations as well. Both the Klingman and Hochdorf (1993) study and the LaFromboise and Howard-Pitney (1995) study established strong evidence for statistically significant effects on their primary outcome measures and either promising (Klingman & Hochdorf) or strong (LaFromboise & Howard-Pitney) evidence of program implementation integrity. The LaFromboise and Howard Pitney study is particularly interesting because of its multimethod approach to evaluating program effects and its use with a high-risk (i.e., Native American) group of students in the context of a universal prevention program. The Randell et al. (2001) study demonstrated the greatest methodological rigor of any selected prevention program and was also notable for including a high-risk group of participants (i.e., potential high-risk dropouts).

Implications for Practice

Given the methodological limitations of these studies, discussing their implications for practice presents a challenging task. Unfortunately, results of this review provide little guidance for school personnel interested in implementing empirically supported school-based suicide prevention programs. Nevertheless, some tentative implications for practice may be provided. In general, there is some evidence that prevention programs that include providing information to students regarding suicide awareness and intervention, teaching them coping and problem-solving skills, and teaching and reinforcing strengths and protective factors while addressing risk-taking behaviors may lead to improvements in students' problem-solving skills and self-efficacy as well as reductions in self-reported suicide vulnerability. As such, incorporating informational and skill-building elements in prevention programs appears to be a poten-

tially useful strategy, although the extent to which these programs have actually reduced more severe forms of suicidal behavior (e.g., suicide attempts) remains open to question. Moreover, programs should ensure that they are providing accurate information to students, including emphasizing the link between suicide and mental health problems. The inclusion of skill-building elements (e.g., coping skills; problem solving) appears to be an important component of more promising prevention programs, especially given that increased knowledge alone appears insufficient to change behavior (Berman et al., 2006).

In regard to selected or indicated prevention programs, it is difficult to draw any firm conclusions based on this review, given the limited number of studies. In particular, although school-based screening programs have been widely recommended by researchers (e.g., Gutierrez, Watkins, & Collura, 2004; Mazza, 1997; Miller & DuPaul, 1996; Reynolds, 1991; Shaffer & Craft, 1999), there are limited data currently available regarding their effectiveness for reducing suicidal behavior. For example, although Aseltine and DeMartino (2004) found significantly reduced rates of suicide attempts and improved knowledge and attitudes about depression and suicide following implementation of the curriculum and screening program known as Signs of Suicide, the methodological limitations of this study combined with a dearth of other studies of this kind indicate that more research in this area is needed before more definitive practice guidelines can be provided.

Additional Considerations

Based on the results of this review, school psychologists and other school personnel looking for guidance on how to best develop suicide prevention programs may be optimally served by examining the literature on the prevention of other social/emotional/behavioral problems. For example, because of the high prevalence of problems often related to youth suicide, such as depression, substance abuse, and conduct problems, there is a significant need for school psychologists to identify and disseminate effective prevention programs generally. In particular, school psychologists need to understand the principles of effective school-based prevention programs (Nation et al., 2003) and how to successfully implement, coordinate, sustain, and evaluate them (Elias, Zins, Graczyk, & Weissberg, 2003; Greenberg et al., 2003; Miller & Sawka-Miller, in press; Power et al., 2003). An important element in this process is capacity building (Schaughency & Ervin, 2006). To build and sustain capacity in schools for the purpose of effectively meeting students' diverse needs, a public health approach involving multiple elements (e.g., multilayered prevention focus) is imperative (Merrell & Buchanan, 2006).

Research examining other types of prevention programs, including those closely associated with suicidal behavior (e.g., substance abuse), indicates they are most effective when they involve multiple levels of influence and when they address multiple risk factors (Kazdin, 1993; Nation et al., 2003). Suicide prevention may therefore be most effective when it is related to overall mental health problems and is embedded in this larger context (Kalafat & Elias, 1995; Miller & DuPaul, 1996). For example, prevention programs that reduce the use of drugs and alcohol, focus on identifying and alleviating depression, and/or build social skills and self-concept can potentially supplement and enhance suicide prevention efforts (Forman & Kalafat, 1998). Indeed, one important aspect of effective suicide prevention programs is that they may reduce the severity and/or frequency of specific risk factors for suicidal behavior as well as other mental health problems (Mazza & Reynolds, 2008).

School psychologists will likely be confronted with a variety of barriers and challenges in their attempts to implement and sustain school-based suicide prevention programs. These may include the perpetuation of misinformation and myths about youth suicide and what causes it, parent/caregiver refusal to have youth participate in suicide screening programs, resistance to suicide prevention programs from school administrators and/or

school personnel, possible funding problems, and potential ethical and legal issues (Mazza, 2006; Miller & DuPaul, 1996). These and other obstacles will have to be overcome for school-based suicide prevention programs to be successful. Finally, school psychologists will need to continuously update their knowledge and skills regarding effective suicide prevention programs and strategies. Professional organizations such as the American Association of Suicidology (www.suicidology.org), the American Foundation for Suicide Prevention (www.afsp.org), and the National Association of School Psychologists (www.nasponline.org) provide valuable information and training opportunities in school-based suicide prevention.

Future Research Needs

The results of this review clearly reveal that there is much still unknown about effective school-based suicide prevention. Most of the studies in this review exhibited significant methodological shortcomings that should be addressed in future research. For example, future studies should attempt to address the key methodological features outlined in the Task Force on Evidence-Based Interventions in School Psychology Procedural and Coding Manual (Kratochwill & Stoiber, 2002). The standards of evidence for school-based prevention programs can also be examined in other ways. For example, Flay et al. (2005) have articulated a comprehensive set of standards for prevention programs that provides separate criteria for efficacy, effectiveness, and dissemination.

In addition, most of the prevention programs reviewed targeted outcomes whose relationship to youth suicide has not been precisely determined. For example, many of these programs reported increased knowledge regarding suicide, although the effect of this knowledge on actual suicide behavior (e.g., suicide attempts) is not generally known. More attention also needs to be given to addressing the "gender paradox" of youth suicide, particularly how to prevent suicidal behavior in males, who are at much higher risk for suicide than females. Research is needed as well to identify long-term behavioral outcomes among students who are the recipients of school-based suicide prevention programs, particularly among those students with identifiable risk factors (Hendin et al., 2005). Given the relatively low base rate of youth suicidal behavior, however, particularly suicide and suicide attempts, this presents significant challenges for researchers.

There are also many currently unanswered questions about selected and indicated suicide prevention programs, particularly student screening programs. These programs appear to be more direct and proactive than other suicide prevention programs (e.g., staff inservice training), and reliable and valid screening measures are available (Gutierrez & Osman, 2008; Reynolds, 1991; Shaffer et al., 2004). Further, although fears have been raised regarding the possibility that directly asking students about suicide-related behaviors might increase the probability of their occurrence, research has not found this to be the case (Gould et al., 2005). Indeed, directly asking youth about suicide communicates to them that the school is concerned about their health and safety, a condition that may lead students to feel more comfortable disclosing possible suicidal behavior (Mazza, 2006). Unfortunately, although increasing the number of referrals to treatment is a primary goal of screening programs, there is currently no clear evidence of a linkage between increased referrals and decreased youth suicidal behavior (Hendin et al., 2005). Moreover, screening programs have generally not identified effective procedures for encouraging larger numbers of youth identified as being at risk for suicide engage in treatment. There is little data currently available about the cost-effectiveness of screening programs, as well as when and how often they are best used (Stoner, 2006). For example, given that youth suicidal ideation is often transitory, a screening conducted early in the school year may identify a different group of students than a screening done in the middle or at the end of the school year (Gutierrez & Osman, 2008).

Moreover, research has found that student screening programs are rated as significantly less acceptable than other forms of school-based suicide prevention (e.g., in-service training) among high school principals (Miller, Eckert, DuPaul, & White, 1999), school psychologists (Eckert, Miller, DuPaul, & Riley-Tillman, 2003), school superintendents (Scherff, Eckert, & Miller, 2005), and students (Eckert, Miller, Riley-Tillman, & DuPaul, 2006). Finally, as with predicting which students will engage in school violence (Mulvey & Cauffman, 2001), accurately predicting precisely which students will engage in suicidal behavior has inherent limitations. Despite their potential utility (Gould et al., 2005; Gutierrez et al., 2004; Reynolds, 1991; Shaffer & Craft, 1999), universal (e.g., classwide or school-wide) student screening approaches to suicide prevention present multiple logistical difficulties that will likely make their implementation a significant challenge to school personnel.

There also is a need for researchers to develop and evaluate school-based suicide prevention programs that emphasize greater interdisciplinary partnerships with families and communities (Power, 2003; Power et al., 2003), and to better understand the context of suicidal behavior among youth of different cultural backgrounds. In particular, research examining culture-specific triggers or processes leading to suicidal behavior, as well as culture-specific risk and protective factors, is sorely needed (Goldston et al., 2008). Cultural considerations have not been widely considered in the development, implementation, or evaluation of school-based suicide prevention programs, and this area is in great need of further research. In particular, more research is needed to address students from cultural groups who are at higher risk for suicidal behavior, such as Native American youth. For example, Hendin et al. (2005) observed that most programs for Native American youth have focused on changing individuals rather than the "external forces in the social and cultural environment" (p. 464) that contribute to the difficulties these young people face.

In addition, there is a need to evaluate prevention programs that promote individual student strengths, competencies, and healthy living skills. Future research on suicide prevention may therefore benefit from incorporating findings from the professional literature on health promotion (Nastasi, 2004; Power et al., 2003) and the emerging field of positive psychology (Peterson, 2006; Snyder & Lopez, 2007). For example, given that depression and hopelessness are highly associated with suicidal behavior, promoting hope and optimism (Gillham, Hamilton, Freres, Patton, & Gallop, 2006; Gillham & Reivich, 2004) and other positive emotions (Fredrickson & Joiner, 2002) and cognitions (Wingate et al., 2006) in children and youth could be a potentially useful approach to school-based suicide prevention. Similarly, developing programs designed to enhance students' perceived social support (Demaray & Malecki, 2002) and school connectedness (Appleton, Christenson, & Furlong, 2008) may promote their sense of belongingness, a potentially important protective factor that may decrease suicide risk (Joiner, 2005). The emphasis within positive psychology on wellness promotion (Miller, Gilman, & Martens, 2008; Phelps & Power, 2008) and increasing competencies rather than merely decreasing problems is strongly aligned with a public health approach to prevention and intervention (Miller, Nickerson, & Jimerson, 2009).

Finally, on a broader level, there remains the question of how to best use limited resources in developing and evaluating future school-based suicide prevention programs (Berman et al., 2006). Should primary efforts at suicide prevention, for example, be directed to all students in a given population, or those most at risk? Should greater prevention efforts be directed not at education but rather toward changing particular environmental conditions or legislation, such as gun control or drug abuse? As noted by Berman et al. (2006): "We need a theory of change and an effective public health model with which to define what targets should be approached best by whom and when—and all this at an affordable cost" (p. 316).

Conclusion

Youth suicide is a significant public health problem; as a result, schools and school personnel have been asked to take a greater role in its prevention. On the basis of this review, most of the studies examining the effects of school-based suicide prevention programs have exhibited a number of methodological problems, making definitive conclusions about the efficacy of these programs difficult. Nevertheless, school personnel will continue to be challenged by the presence of suicidal youth, and have an ethical and legal responsibility to identify and intervene with these students (Jacob & Hartshorne, 2007). Schools are logical and natural sites for suicide prevention, given this is where youth spend most of their time, where teaching and learning are normative tasks, and where peer interactions can be mobilized around a common theme (Berman et al., 2006). Moreover, because schools have the primary responsibility for the education and socialization of children and adolescents, they perhaps have the greatest potential to moderate the occurrence of risk behaviors and to identify and secure needed assistance for suicidal youth (Kalafat, 2003). Given the social service systems currently in place in the United States, no institutions other than schools directly oversee the mental health needs of youth (Strein et al., 2003), a situation unlikely to change in the foreseeable future. As such, if universal, selected, and indicated suicide prevention programs are to be provided, schools must take on this responsibility. School psychologists and other school personnel are encouraged to promote a public health approach to suicide prevention in the schools and to take leadership roles in selecting, implementing, and evaluating school-based suicide prevention programs.

Footnotes

*References marked with an asterisk indicate studies included in the literature review

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