

# Data Linkage Strategies to Advance Youth Suicide Prevention: A Systematic Review for a National Institutes of Health Pathways to Prevention Workshop

Holly C. Wilcox, PhD; Hadi Kharrazi, MHI, MD, PhD; Renee F. Wilson, MS; Rashelle J. Musci, PhD; Ryoko Susukida, PhD; Fardad Gharghabi, MD; Allen Zhang, BS; Lawrence Wissow, MD, MPH; and Karen A. Robinson, PhD

**Background:** Linking national, state, and community data systems to data from prevention programs could allow for longer-term assessment of outcomes and evaluation of interventions to prevent suicide.

**Purpose:** To identify and describe data systems that can be linked to data from prevention studies to advance youth suicide prevention research.

**Data Sources:** A systematic review, an environmental scan, and a targeted search were conducted to identify prevention studies and potentially linkable external data systems with suicide outcomes from January 1990 through December 2015.

**Study Selection:** Studies and data systems had to be U.S.-based and include persons aged 25 years or younger. Data systems also had to include data on suicide, suicide attempt, or suicidal ideation.

**Data Extraction:** Information about participants, intervention type, suicide outcomes, primary analytic method used for linkage, statistical approach, analyses performed, and characteristics of data systems was abstracted by 2 reviewers.

**Data Synthesis:** Of 47 studies (described in 59 articles) identified in the systematic review, only 6 were already linked to data

systems. A total of 153 unique and potentially linkable data systems were identified, but only 66 were classified as “fairly accessible” and had data dictionaries available. Of the data systems identified, 19% were established primarily for research, 11% for clinical care or operations, 29% for administrative services (such as billing), and 52% for surveillance. About one third (37%) provided national data, 12% provided regional data, 63% provided state data, and 41% provided data below the state level (some provided coverage for >1 geographic unit).

**Limitation:** Only U.S.-based studies published in English were included.

**Conclusion:** There is untapped potential to evaluate and enhance suicide prevention efforts by linking suicide prevention data with existing data systems. However, sparse availability of data dictionaries and lack of adherence to standard data elements limit this potential.

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For author affiliations, see end of text.

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In 2014, suicide was the second leading cause of death in the United States among persons between the ages of 15 to 19 and 20 to 29 years (1). Suicide rates increased by 24% from 1999 through 2014, and the percentage increase in suicide rates was greatest for females aged 10 to 14 years (2). It is difficult to evaluate the longer-term effect of prevention efforts that may be applied years before the peak period of risk for suicidal behaviors. Unanswered questions remain about the effectiveness of youth suicide prevention efforts, in part because of the difficulty associated with long-term follow-up of large populations.

Data systems comprise collections of information plus the information technology infrastructure required to operate, maintain, and access the systems. They can be organized in various forms and include electronic health records, payer claims databases, vital records, periodic population surveys, and health information exchanges. Data systems exist for various purposes, including surveillance, billing, and administration of services. The linkage of existing data from prevention studies to data systems that include suicidal behavior outcomes could help identify which interventions are most effective in preventing suicide. The aim of this project was to provide an objective description of the state of the science on data linkage strategies in suicide

prevention research, as well as a systematic summary of ongoing research limitations, barriers, gaps, and opportunities for future data linkage approaches to enhance suicide prevention efforts.

## METHODS

Detailed methods, including the full set of key questions, analytic framework, search strategies, inclusion criteria, and study data extraction, are available in the full Evidence-based Practice Center report (3). A protocol was developed in September 2015 and is provided in **Supplement 1** (available at [www.annals.org](http://www.annals.org)). This article addresses the following question: “What national, state, and community data systems can be linked to existing data from prevention efforts in order to add possible value for stakeholders?”

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## Data Sources and Searches

We conducted 3 parallel searches to identify suicide prevention studies and relevant data systems. We performed a systematic review of published literature to identify prevention studies, existing suicide data systems, and publications in which the two had been linked; we conducted an environmental scan to identify suicide data systems not reported in the published literature; and we performed a targeted search to identify suicide data systems used in selected states, cities, and communities.

## Systematic Review of Prevention Studies

We searched PubMed, the Cochrane Library, the Campbell Collaboration Library of Systematic Reviews, CINAHL, PsycINFO, and ERIC (Education Resources Information Center) for articles published from January 1990 to December 2015. The search strategies we used are provided in **Appendix Table 1** (available at [www.annals.org](http://www.annals.org)).

## Data Systems

We scanned all studies identified in the systematic literature search for data systems. We then conducted an environmental scan to identify additional data systems not reported in the published literature. Because data systems are usually developed and maintained for operational rather than research purposes, they are often not described in peer-reviewed publications that are the subject of systematic reviews. Finding data systems requires environmental scans, also known as searching the “gray literature,” which comprises preprints, preliminary progress and advanced reports, technical reports, statistical reports, memoranda, state-of-the-art reports, market research reports, theses, conference proceedings, technical specifications and standards, noncommercial translations, bibliographies, technical and commercial documentation, and official documents not published commercially (primarily government reports and documents) (4). We used the advanced search functions of 3 search engines (Google, Yahoo, and Bing [Microsoft]) to execute the search. We also searched the Web sites of the American Foundation for Suicide Prevention, the American Association of Suicidology, and the Suicide Prevention Resource Center.

## Targeted Search

We conducted a targeted search in 6 states (California, Delaware, Oregon, Illinois, Maryland, and Wisconsin), 2 cities (Baltimore, Maryland, and Wilmington, Delaware), and 1 tribal community (the Menominee Reservation in Wisconsin) for data systems that provided information about our primary outcomes (suicidal ideation, suicide attempt, and suicide) and that were maintained by a state-, city-, or community-level entity. We contacted (via e-mail and telephone) persons in each target area who were responsible for suicide prevention and other public health efforts to re-

quest information on state- and community-level sources or systems that included data on suicidal ideation, suicide attempt, and suicide among persons younger than 26 years.

## Study Selection

### Systematic Review of Suicide Prevention Studies

Two investigators independently reviewed titles and abstracts and then full-text articles using prespecified eligibility criteria. We included studies of humans aged 0 to 25 years with at least 1 intervention and at least 1 outcome of interest (suicide, suicide attempt, or suicidal ideation). Meeting abstracts, articles without original data, and studies conducted outside the United States and not written in English were excluded. We did not limit inclusion by population size or design. Studies published before 1990 were not included; according to the National Action Alliance for Suicide Prevention, suicide became a central issue in the United States in the mid-1990s with the publication by the U.S. Department of Health and Human Services of the Report of the Secretary's Task Force on Youth Suicide in 1989 and the Surgeon General's Call to Action to Prevent Suicide in 1999 (5). In addition, the amount of abstractable data is significantly limited before 1990. Disagreements about article eligibility that could not be resolved by the 2 reviewers were resolved by the domain experts on the team.

## Data Systems

Two independent experts reviewed the results of the systematic review and environmental scan and determined whether identified data systems met the same eligibility criteria as those applied in the systematic review (other than having to include data about an intervention) and whether they fulfilled the minimum requirements of a data system that can be useful for linkage to suicide prevention studies. We excluded data systems that did not meet all of the following requirements: 1) the data system still exists, and underlying data are available and accessible in digital format; 2) the data system can be shared and acquired by others for research purposes; 3) the data system collects and contains information on at least 1 of the primary outcomes; and 4) the data system is not a duplicate.

## Data Extraction and Quality Assessment

### Systematic Review of Suicide Prevention Studies

We abstracted data on study, participant, and intervention characteristics as well as suicide outcomes to Microsoft Excel tables. We also abstracted the primary analytic method used by the study, linkage to data systems (if present), and statistical tests used in the study and controlled for covariates. We identified and abstracted data system information (for example, location of the database) and how the data were linked to other sources.

## Data Systems

A coding and classification schema previously used for evaluating community-based data systems was used

to classify data system quality and accessibility, including whether data dictionaries and data were readily available (6). We sought additional information about the data systems by searching the Internet for data dictionaries and documentation associated with the data system, downloading a sample data set from the data system, and searching for additional reports that may have described the data system in more detail.

### Role of the Funding Source

The Agency for Healthcare Research and Quality (AHRQ) funded the review, and a working group convened by the National Institutes of Health assisted in developing the scope of the review and the key questions. Neither organization had a role in study selection, quality assessment, or synthesis. The investigators are solely responsible for the content.

## RESULTS

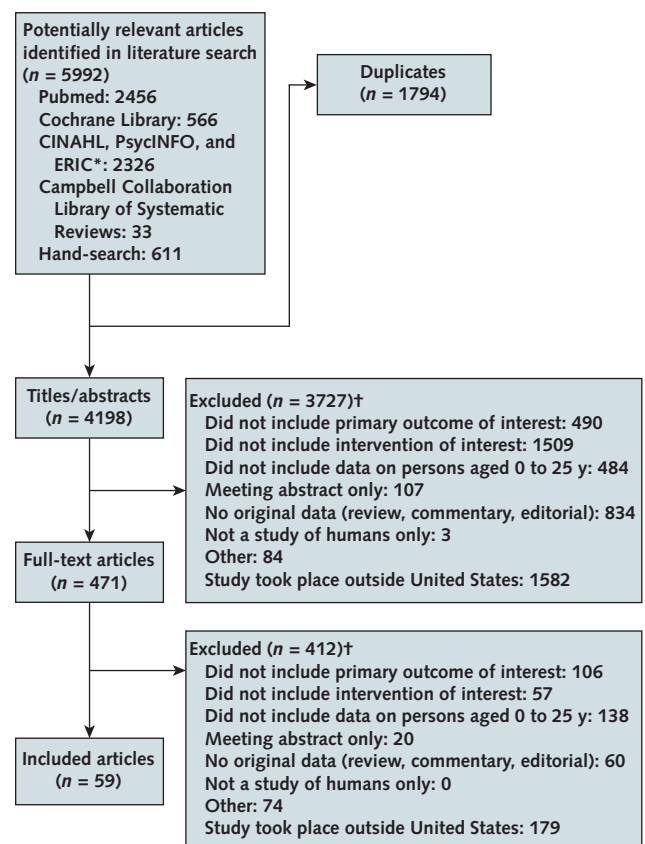
### Suicide Prevention Studies

The literature search identified 47 studies (reported in 59 articles) (Figure 1). Study population size was highly variable, ranging from 32 to 2100. Twenty-nine of the studies (62%) had 500 or fewer participants. One third (34%) of the prevention intervention studies we identified reported on outcomes more than 1 year after the intervention. Ten studies (21%) focused on special populations, including military personnel (7–10), incarcerated persons (11–13), survivors of sexual trauma (14), persons with major depressive disorder (15), and high-risk youth (16). The 47 studies used various interventions and prevention approaches, and many applied more than 1 prevention approach, such as behavioral and skill building (17 studies), medication or pharmaceutical (7 studies), psychotherapy (10 studies), educational and skill building (12 studies), policy (3 studies), screening (5 studies), and other approaches (9 studies) (Appendix Table 2, available at [www.annals.org](http://www.annals.org)).

### Data Systems

Our literature search, environmental scan, and targeted geographic searches identified 153 unique data systems (Figure 2; Supplement 2, available at [www.annals.org](http://www.annals.org)). Seven data systems were found in articles included in the systematic review describing prevention studies, and 43 came from articles screened at the full-text level but excluded from the systematic review. The environmental scan identified 80 unique data systems. Seventy-one percent of the state and tribal community entities that we contacted replied, resulting in identification of an additional 23 systems. We found that 90% of the 153 data systems could be acquired by an investigator, either for free or for a fee, and 75% could be downloaded from the Internet in an aggregated or anonymized format. Of the data systems available on the Internet, only 1% permitted an automated registration process to obtain the data, whereas 79% required review and approval by a data manager. Data dictionaries were accessible for 48% of the data systems.

**Figure 1.** Summary of evidence search and selection.



ERIC = Education Resources Information Center.

\* Searched simultaneously through the EBSCO database.

† Sum of individual reasons exceeds total number of exclusions because reviewers were not required to agree on reason for exclusion.

Nineteen percent of the data systems were developed primarily for research, 11% were developed for clinical care or operations, 29% were developed for administrative services (such as billing), and 52% were developed for surveillance (some systems had multiple uses). With regard to geographic coverage, 37% of the data systems provided national data, 12% provided regional data, 63% provided state data, and 41% provided data below the state level (communities by ZIP code, county, census block, tribal boundaries, territory, or island); some provided coverage for more than 1 geographic region or unit (Table). A few data systems were specifically designed with a focus on a subgroup of interest, such as tribal communities (0.7%); lesbian, gay, bisexual, transgender, and queer populations (2%); active duty military service members (7%); incarcerated populations (3.3%); and primary school, secondary school, and university students (18%).

For 97% of the data systems we identified, person-level data existed that allowed for potential individual-level linkage. A small proportion (3%) included only aggregated data, allowing for ecological linkage to prevention program data by demographic characteristics (60%); geographic region (56%); clinical specifica-

**Figure 2.** Results of the search for data systems.

Phase	Potential Data Systems Reviewed	Data Systems Excluded	Unique Data Systems Identified
Systematic review (Included articles)	71	64	7
Systematic review (excluded articles)	126	83	43
Environmental scan (Google, Yahoo, Bing)	477	425	52
Environmental scan (other/directed)	254	226	28
Targeted search	133	110	23
			Total Data Systems Identified 153

Reasons for exclusion were duplicate data system or failure to meet  $\geq 1$  element of the PICOTS (population, intervention, comparator, outcomes, timing of outcomes measurement, and setting) approach.

tions (43%); and entity type, such as health insurance carrier, health care provider, educational institution, or employer (18%). Data sampling was used by 16% of the data systems.

Among the data systems we identified, 71% included data on suicide, 54% included data on suicide attempts, and 29% included data on suicidal ideation. Coverage for intermediate and secondary outcomes of interest was as follows: 28% of the data systems included psychiatric and substance abuse disorders, 39% included service use for psychiatric and substance abuse disorders, 12% included high school graduation rates, 6% included incarceration and arrests, 44% included violence perpetration and/or victimization, 11% included social support and social connectedness, and 39% included access to lethal means. With regard to the types of data systems we identified, 18% were designed specifically to capture information about suicide, 42% were designed to compile death records, 44% were health care provider records, 48% had been developed from population-based surveys, and 5% comprised health insurance claims data. Ninety-four percent of the data systems are ongoing, with continuous data accrual. The average year of the start of data collection was 1994.

We classified the 153 data systems into 3 tiers ("fairly accessible," "potentially accessible," or "more information needed") to identify those that could be linked to existing data from suicide prevention programs. These classifications were based on whether individual-level or aggregated data were offered through 1 of the following models: 1) the data were

freely available on a Web site to download (for example, aggregated public use files); 2) data access required a registration process; 3) the request was manually reviewed by a person or committee before access to the data was granted; or 4) a data dictionary was available. Based on this classification, 121 data systems were identified as fairly accessible (66 of these had a data dictionary available), 20 were identified as potentially accessible, and more information was needed for 12.

## DISCUSSION

Linkage to external data systems could allow for longer-term assessment of suicide outcomes from prevention programs. Data system linkage is underutilized in suicide prevention studies. Although we identified 153 unique data systems, we found only 6 studies that assessed outcomes by linking their prevention data to external data systems at the individual or ecological level. Most of the prevention studies we identified had the capability to link to external data systems given that most systems are accessible online. More than 94% of the data systems we identified seem to have continuous accrual or are updated on an ongoing basis, increasing the likelihood that linkage would be useful. One barrier to data linkage could be lack of awareness of the accessible data systems; therefore, we provide a list of such systems in **Supplement 2**.

Our ability to determine which prevention studies might be linked to data systems was limited by the lack of available codebooks or data dictionaries outlining specifics about the available data systems. Few data sets are currently usable for linkage: Although 121 of the 153 data systems we identified are fairly accessible, only 66 of these have a codebook or data dictionary available online. Lack of readily available codebooks and data dictionaries for data systems limits ease of access and usability and limits the conclusions that can be drawn about the potential utility of linkage. In addition, we presume data linkage has not yet been more routinely conducted due to the costs associated with access to the National Death Index and similar data systems, the feasibility of accessing data systems, data interoperability challenges, and issues of sharing protected health information. Most of the potentially linkable data sets offer the possibility of linkage at the individual level, but ethical or legal barriers may prohibit linkage at this level. Direct data linkage on an individual level may require identifying information that is protected by the Health Insurance Portability and Accountability Act and may therefore also require explicit informed consent.

Most linkable data sets have outcomes related to suicide; fewer data systems include suicidal ideation and suicide attempts, which can be more useful for prevention studies because these outcomes are more prevalent than suicide and are actionable outcomes (that is, intervention could be initiated if a participant at high risk for suicide were identified). One data system may not have all of the outcomes of interest to preven-



tion studies; thus, linkage to multiple data systems may be needed for a more complete picture of outcomes. If suicide and suicide attempt were reportable events, as they are in the White Mountain Apache tribally mandated self-injury surveillance registry, these outcomes would be better captured (17, 18). Few data sets allow for the detailed study of specific high-risk populations, although variables indicating membership in one of those populations are widely available.

Only about half of the identified data systems were suicide-specific or had suicide data collection as their primary purpose. The rest were developed for other purposes (such as hospital discharge data that happened to include suicidal behaviors as admitting or discharge diagnoses), and variables specific to suicidal behavior were often limited and the data systems may have lesser or variable quality in terms of ascertaining suicide morbidity and mortality (19).

Although data linkage is possible, the quality of available data on suicide mortality and morbidity has serious inadequacies. First, the definitions of suicidal behavior vary greatly. Second, suicide is a rare outcome, so detecting the impact of an intervention on suicide mortality is challenging without large studies. Third, problems with the validity and reliability of data on suicide and suicide attempt exist due to misclassification, and underreporting of suicide and suicide attempt as outcomes exists due to stigma, lack of information to confirm the presence of suicidal intent, and other issues. Finally, there is no single, comprehensive national system to document the scope of nonfatal suicide attempts. There is regional variation in how suicide is investigated and coded and how people making a determination of suicide are trained. Rockett and colleagues (20) note that variation in coding in the United States seems to be partially an artifact of geographic region and partially related to toxicologic assessment in the case-ascertainment process. Variation in classification could be driven by sociocultural or political factors (such as stigma), economic factors, or forensic factors (such as lack of training of providers to elicit the information needed). However, as pointed out by the Centers for Disease Control and Prevention (CDC), the quality of the data on nonfatal suicidal behavior is even more problematic than the quality of data on suicides (21). The codes from the International Classification of Diseases, 10th Revision, that are used to capture suicide and attempted suicide also include self-harm of unknown intent, which can be viewed as an important limitation. Thus, one additional reason researchers may choose not to take advantage of linkage to outside data sets could be the concern about misclassification of key outcomes.

Many of the prevention studies that we identified had small samples. Large samples are needed to find an intervention effect on suicide attempt or suicide because these outcomes are rare. Approaches to advance intervention harmonization might allow for smaller studies of like interventions to be combined to increase power. Intervention harmonization could also help to

identify who benefits most from specific youth suicide prevention programs and under what conditions.

Lack of adherence to a standard set of data elements in suicide data systems and prevention studies is a barrier that reduces the potential utility of linkage. The CDC document “Self-directed Violence Surveillance: Uniform Definitions and Recommended Data Elements” addresses definitional inconsistencies as well as common data elements to promote and improve consistency of surveillance (21). Only the National Violent Death Reporting System (NVDRS) and individual state versions adhere to the CDC common data dictionary for suicide databases (21). We were not able to assess the quality of the prevention studies or the data systems identified.

There are challenges in the United States related to financing of the infrastructure required to sustain large-scale, coordinated suicide prevention efforts. Suicide prevention programs have limited ability to study long-term outcomes under the current funding structure. Our results show that longer-term results could be ob-

Table. Summary of Data Systems Identified\*

Characteristic	Yes	No	N/A
<b>Geographic coverage</b>			
National	36.6	63.4	0.0
Regional (e.g., East Coast)	12.4	87.6	0.0
State	63.4	36.6	0.0
Below state level	41.2	58.8	0.0
County	32.0	67.3	0.7
ZIP code	15.0	84.3	0.7
Census block	2.0	98.0	0.0
Tribal	1.3	98.7	0.0
Territory	0.7	99.3	0.0
Islands	0.7	99.3	0.0
Other	0.0	0.0	0.0
<b>Level of information available</b>			
Data can be acquired for free or for a fee	89.5	0.0	10.5
Data are publicly available for download (e.g., publicly uploadable file)	74.5	21.6	3.9
Data can be acquired, but automated registration is required	1.3	97.4	1.3
Data can be acquired if confirmed by a person (e.g., e-mail communication required)	79.1	0.0	20.9
Data dictionary or codebook is accessible	47.7	52.3	0.0
<b>Primary use</b>			
Research	19.0	81.0	0.0
Clinical care/operations	11.1	88.9	0.0
Administrative services (e.g., census)	29.4	70.6	0.0
Public health (e.g., surveillance)	52.3	47.7	0.0
<b>Suicide outcomes included</b>			
Suicide	70.6	25.5	3.9
Suicide attempt	54.2	38.6	7.2
Suicidal ideation	29.4	64.1	6.5

N/A = not enough information to make yes/no determination.  
\* Numbers are percentages.

tained by linking prevention efforts to existing data systems. Ideally, suicide prevention efforts could be sustained by communities after funding for suicide prevention programs ends; however, there are few resources to sustain the assessment of study outcomes. With minimal resources, existing data systems could be accessed by prevention scientists or public health agencies to assess the effect of suicide prevention activities. Ideally, this could be a bidirectional process whereby those agencies could also use data systems to proactively identify individuals, communities, or subgroups at risk for suicide to whom they could direct outreach and interventions.

Linkage to accessible, current surveillance data could help to address the lack of studies testing the effect of early intervention on risk for suicide attempt and suicide (19). Primary prevention approaches delivered in early development require extended follow-up to track populations through the period of onset of risk for suicidal thoughts and behaviors. Randomized trials of prevention programs conducted in early childhood have reported reduced occurrence and severity of mental, emotional, and behavioral problems that increase risk for suicidal behavior later in life (for example, aggression, depression, substance use, and deviant peer associations) (22–24); however, with the exception of 1 study (25), the effect of these programs on reducing suicidal behaviors is unknown at present because evaluators of these interventions have rarely followed their cohorts through the peak age of risk for suicide attempt and suicide and often did not include suicidal behavior outcome measures.

In addition to individual studies of interventions, several ongoing national initiatives are targeting key risk factors for suicide, such as the National Child Traumatic Stress Network and Project LAUNCH (Linking Actions for Unmet Needs in Children's Health). These initiatives and others represent large investments by the federal government, with broad national reach and the potential to affect suicide morbidity and mortality. Linkage of these prevention program data to such systems as state health information exchanges and the restricted-access NVDRS would enable access individual-level quantitative data as well as incident narrative reports on all suicide decedents. The NVDRS is available in only 32 states, but efforts are under way to expand it to all states. These data are potentially available for linkage with other external data systems if coordinated with state public health departments.

By integrating data from health care delivery systems, health insurance systems, and other population-wide data sources (such as PCORnet, the U.S. Food and Drug Administration Sentinel Initiative, the National Institutes of Health Precision Medicine Initiative, and the Nationwide Health Information Network), a national health research data infrastructure could be developed. The expansion of the electronic medical record and state health information exchanges could also greatly facilitate the ability to access data on hospital visits involving suicidal thoughts and behaviors. This

type of national resource could advance linkage opportunities to suicide prevention data.

A national suicide outcomes repository that combines data from several sources to achieve better coverage of suicidal ideation, suicide attempt, and suicide on a national level could be created. Guidelines on data linkage methods and procedures as well as technical and legal aspects of data linkage could be developed to facilitate the linkage of prevention data with external data systems. A technical support center could be established to assist researchers, prevention scientists, health systems, states, and others with methods and procedures for data linkage.

From Johns Hopkins University School of Medicine and Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland.

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**Reproducible Research Statement:** *Study protocol:* A protocol was developed in September 2015 and is available in **Supplement 1. Statistical code:** Not applicable. *Data set:* All abstracted data appear in the appendix section of the corresponding evidence report by Wilcox and colleagues (3).

**Requests for Single Reprints:** Holly C. Wilcox, PhD, Department of Psychiatry and Behavioral Sciences, Johns Hopkins School of Medicine, 550 North Broadway, Room 921, Baltimore, MD 21287; e-mail, [hwilcox1@jhmi.edu](mailto:hwilcox1@jhmi.edu).

Current author addresses and author contributions are available at [www.annals.org](http://www.annals.org).

## References

- Centers for Disease Control and Prevention. Injury Prevention & Control: Data & Statistics (WISQARS). Atlanta: Centers for Disease Control and Prevention. Accessed at [www.cdc.gov/ncipc/wisqars](http://www.cdc.gov/ncipc/wisqars) on 26 August 2016.
- Curtin SC, Warner M, Hedegaard H. Increase in suicide in the United States, 1999–2014. NCHS Data Brief. 2016;1-8. [PMID: 27111185]
- Wilcox H, Wissow L, Kharrazi H, Wilson R, Musci R, Zhang A, et al. Data Linkage Strategies to Advance Youth Suicide Prevention. Evidence Report/Technology Assessment no. 222. (Prepared by the Johns Hopkins University Evidence-based Practice Center under contract no. 290-2012-00007-I.) Rockville: Agency for Healthcare Research and Quality; 2016.

4. Alberani V, De Castro Pietrangeli P, Mazza AM. The use of grey literature in health sciences: a preliminary survey. *Bull Med Libr Assoc.* 1990;78:358-63. [PMID: 2224298]
5. Report of the Secretary's Task Force on Youth Suicide. Volume 1: Overview and Recommendations. Washington, DC: Alcohol, Drug Abuse, and Mental Health Administration; 1989.
6. Kharrazi H, Weiner JP. IT-enabled community health interventions: challenges, opportunities, and future directions. *EGEMS (Wash DC).* 2014;2:1117. [PMID: 25848627] doi:10.13063/2327-9214.1117
7. Jobes DA, Lento R, Brazaitis K. An evidence-based clinical approach to suicide prevention in the Department of Defense: the Collaborative Assessment and Management of Suicidality (CAMS). *Mil Psychol.* 2012;24:604-23. doi:10.1080/08995605.2012.736327
8. Warner CH, Appenzeller GN, Parker JR, Warner CM, Hoge CW. Effectiveness of mental health screening and coordination of in-theater care prior to deployment to Iraq: a cohort study. *Am J Psychiatry.* 2011;168:378-85. [PMID: 21245086] doi:10.1176/appi.ajp.2010.10091303
9. Wingate LR, Van Orden KA, Joiner TE Jr, Williams FM, Rudd MD. Comparison of compensation and capitalization models when treating suicidality in young adults. *J Consult Clin Psychol.* 2005;73:756-62. [PMID: 16173865]
10. 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. *BMJ.* 2003;327:1376. [PMID: 14670880]
11. Farmer KA, Felthous AR, Holzer CE. Medically serious suicide attempts in a jail with a suicide-prevention program. *J Forensic Sci.* 1996;41:240-6. [PMID: 8871383]
12. Kerr DC, DeGarmo DS, Leve LD, Chamberlain P. Juvenile justice girls' depressive symptoms and suicidal ideation 9 years after multidimensional treatment foster care. *J Consult Clin Psychol.* 2014;82:684-93. [PMID: 24731234] doi:10.1037/a0036521
13. Godoy Garraza L, Walrath C, Goldston DB, Reid H, McKeon R. Effect of the Garrett Lee Smith Memorial Suicide Prevention Program on suicide attempts among youths. *JAMA Psychiatry.* 2015;72:1143-9. [PMID: 26465226] doi:10.1001/jamapsychiatry.2015.1933
14. Diamond G, Creed T, Gillham J, Gallop R, Hamilton JL. Sexual trauma history does not moderate treatment outcome in attachment-based family therapy (ABFT) for adolescents with suicide ideation. *J Fam Psychol.* 2012;26:595-605. [PMID: 22709259] doi:10.1037/a0028414
15. Kennard BD, Emslie GJ, Mayes TL, Nakonezny PA, Jones JM, Foxwell AA, et al. Sequential treatment with fluoxetine and relapse-prevention CBT to improve outcomes in pediatric depression. *Am J Psychiatry.* 2014;171:1083-90. [PMID: 24935082] doi:10.1176/appi.ajp.2014.13111460
16. Thompson EA, Eggert LL, Randell BP, Pike KC. Evaluation of indicated suicide risk prevention approaches for potential high school dropouts. *Am J Public Health.* 2001;91:742-52. [PMID: 11344882]
17. Barlow A, Tingey L, Cwik M, Goklish N, Larzelere-Hinton F, Lee A, et al. Understanding the relationship between substance use and self-injury in American Indian youth. *Am J Drug Alcohol Abuse.* 2012;38:403-8. [PMID: 22931073] doi:10.3109/00952990.2012.696757
18. Mullany B, Barlow A, Goklish N, Larzelere-Hinton F, Cwik M, Craig M, et al. Toward understanding suicide among youths: results from the White Mountain Apache tribally mandated suicide surveillance system, 2001-2006. *Am J Public Health.* 2009;99:1840-8. [PMID: 19696377] doi:10.2105/AJPH.2008.154880
19. National Action Alliance for Suicide Prevention Research Prioritization Task Force. U.S. National Suicide Prevention Research Efforts: 2008-2013 Portfolio Analyses. Rockville: National Institute of Mental Health; 2015.
20. Rockett IR, Hobbs GR, Wu D, Jia H, Nolte KB, Smith GS, et al. Variable classification of drug-intoxication suicides across US states: a partial artifact of forensics? *PLoS One.* 2015;10:e0135296. [PMID: 26295155] doi:10.1371/journal.pone.0135296
21. Crosby A, Ortega L, Melanson C. Self-directed Violence Surveillance: Uniform Definitions and Recommended Data Elements. Version 1.0. Atlanta: Centers for Disease Control and Prevention; 2011.
22. Botvin GJ, Griffin KW, Diaz T, Scheier LM, Williams C, Epstein JA. Preventing illicit drug use in adolescents: long-term follow-up data from a randomized control trial of a school population. *Addict Behav.* 2000;25:769-74. [PMID: 11023017]
23. Hawkins JD, Oesterle S, Brown EC, Arthur MW, Abbott RD, Fagan AA, et al. Results of a type 2 translational research trial to prevent adolescent drug use and delinquency: a test of Communities That Care. *Arch Pediatr Adolesc Med.* 2009;163:789-98. [PMID: 19736331] doi:10.1001/archpediatrics.2009.141
24. Spoth RL, Redmond C, Shin C. Randomized trial of brief family interventions for general populations: adolescent substance use outcomes 4 years following baseline. *J Consult Clin Psychol.* 2001;69:627-42. [PMID: 11550729]
25. Wilcox HC, Kellam SG, Brown CH, Poduska JM, Ialongo NS, Wang W, et al. The impact of two universal randomized first- and second-grade classroom interventions on young adult suicide ideation and attempts. *Drug Alcohol Depend.* 2008;95 Suppl 1:S60-73. [PMID: 18329189] doi:10.1016/j.drugalcdep.2008.01.005

**Current Author Addresses:** Dr. Wilcox: Department of Psychiatry and Behavioral Sciences, Johns Hopkins School of Medicine, 550 North Broadway, Room 921, Baltimore, MD 21287. Dr. Kharrazi: Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, 624 North Broadway, Hampton House 606, Baltimore, MD 21205. Ms. Wilson: Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, 624 North Broadway, Suite 648, Baltimore, MD 21205. Dr. Musci: Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, 624 North Broadway, Room 831, Baltimore, MD 21205. Dr. Susukida: Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, 624 North Broadway, Suite 648, Baltimore, MD 21205. Dr. Gharghabi: Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, 624 North Broadway, Hampton House 607, Baltimore, MD 21205. Mr. Zhang: Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, 624 North Broadway, Suite 661, Baltimore, MD 21205. Dr. Wissow: Department of Health, Behavior, and Society, Johns Hopkins Bloomberg School of Public Health, 624 North Broadway, Hampton House 607, Baltimore, MD 21205. Dr. Robinson: Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, 1830 East Monument Street, Suite 8068, Baltimore, MD 21205.

**Author Contributions:** Conception and design: H.C. Wilcox, H. Kharrazi, R.J. Musci, L. Wissow, K.A. Robinson. Analysis and interpretation of the data: H.C. Wilcox, H. Kharrazi, R.F. Wilson, R.J. Musci, R. Susukida, F. Gharghabi, A. Zhang, L. Wissow, K.A. Robinson. Drafting of the article: H.C. Wilcox, H. Kharrazi, R.F. Wilson, R.J. Musci, A. Zhang, L. Wissow, K.A. Robinson. Critical revision of the article for important intellectual content: H.C. Wilcox, R.F. Wilson, R.J. Musci, L. Wissow, K.A. Robinson. Final approval of the article: H.C. Wilcox, H. Kharrazi, R.F. Wilson, R.J. Musci, R. Susukida, F. Gharghabi, A. Zhang, L. Wissow, K.A. Robinson. Statistical expertise: R.J. Musci. Obtaining of funding: H.C. Wilcox, A. Zhang, K.A. Robinson. Administrative, technical, or logistic support: H.C. Wilcox, R.F. Wilson, A. Zhang, K.A. Robinson. Collection and assembly of data: H.C. Wilcox, H. Kharrazi, R.F. Wilson, R.J. Musci, R. Susukida, F. Gharghabi, A. Zhang, L. Wissow, K.A. Robinson.



**Appendix Table 1. Detailed Search Strategies**

#	Search	
<b>PubMed</b>		
1	suicide/prevention[mh]	
2	Suicide, Attempted/prevention[mh]	
3	suicid*[tiab] AND (prevent[tiab] OR prevention[tiab])	
4	1 OR 2 OR 3	
5	clinical trial[pt]	
6	"Non-randomized"[tiab]	
7	Nonrandomized[tiab]	
8	cohort[tiab]	
9	"next study"[tiab]	
10	observational[tiab]	
11	"Case-control"[tiab]	
12	"cohort studies"[mh]	
13	cross-over studies[mh]	
14	prospectiv*[tiab]	
15	registr*[tiab]	
16	restrospectiv*[tiab]	
17	"Comparative Study" [pt]	
18	"propensity score"[tiab]	
19	"propensity Score"[mh]	
20	5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19	
21	4 AND 20	
22	1990:2016[dp]	
23	Eng[la]	
24	4 AND 20 AND 22 AND 23	
<b>Cochrane Library</b>		
#1	MeSH descriptor: [Suicide] explode all trees and with qualifier(s): [Prevention & control - PC]	
#2	suicid*:ti,ab,kw (Word variations have been searched)	
#3	prevent:ti,ab,kw (Word variations have been searched)	
#4	"prevention":ti,ab,kw (Word variations have been searched)	
#5	#1 or (#2 and (#3 or #4))	
Publication Year from 1990 to 2015		
<b>CINAHL, PsycINFO, and ERIC</b>		
S26	S7 AND S23	Limiters - Published Date: 19900101-20151231 Narrow by Language: - English Search modes - Boolean/Phrase
S25	S7 AND S23	Narrow by Language: - English Search modes - Boolean/Phrase
S24	S7 AND S23	Search modes - Boolean/Phrase
S23	S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22	Search modes - Boolean/Phrase
S22	TX propensity score	Search modes - Boolean/Phrase
S21	TX comparative study	Search modes - Boolean/Phrase
S20	TX comparative study	Search modes - Boolean/Phrase
S19	TX retrospective study	Search modes - Boolean/Phrase
S18	TX registry	Search modes - Boolean/Phrase
S17	TX prospectiv*	Search modes - Boolean/Phrase
S16	TX "cross over"	Search modes - Boolean/Phrase
S15	TX case control study	Search modes - Boolean/Phrase
S14	TX observational study	Search modes - Boolean/Phrase
S13	TX cohort study	Search modes - Boolean/Phrase
S12	TX "follow up" OR TX "follow-up" OR TX Followup	Search modes - Boolean/Phrase
S11	TX "next study"	Search modes - Boolean/Phrase
S10	TX "non-randomized"	Search modes - Boolean/Phrase
S9	TX nonrandomized	Search modes - Boolean/Phrase
S8	TX "clinical Trials"	Search modes - Boolean/Phrase
S7	S5 AND S6	Search modes - Boolean/Phrase
S6	S3 OR S4	Search modes - Boolean/Phrase
S5	S1 OR S2	Search modes - Boolean/Phrase
S4	TX Prevention	Search modes - Boolean/Phrase
S3	TX Prevent	Search modes - Boolean/Phrase
S2	TX suicid*	Search modes - Boolean/Phrase
S1	SU Suicide	Search modes - Boolean/Phrase
<b>Campbell Collaboration Library of Systematic Reviews</b>		
suicide AND prevention		

ERIC = Education Resources Information Center.

**Appendix Table 2.** Summary of Intervention Characteristics

Program or Study Name (If Applicable) Author, Year (Reference)	Intervention Type/Purpose	Setting/Population
<b>Adolescent suicide risk screening</b> King et al, 2012 (26)	Screening, follow-up	Emergency department
<b>Attachment-based family therapy</b> Diamond et al, 2010 (27) Diamond et al, 2012 (14)	Psychotherapy, behavioral/skill building	Outpatient
<b>The Collaborative Assessment and Management of Suicidality (CAMS)</b> Jobes et al, 2012 (7)	Assessment, treatment planning, tracking/follow-up	Outpatient
<b>C-CARE/CAST</b> Eggert et al, 2002 (28)	Assessment, behavioral/skill building, education	School
Randell et al, 2001 (29)		School
Thompson et al, 2001 (16)		School and home
Hooven et al, 2010 (30)		
<b>Cognitive therapy for the prevention of suicide attempts</b> Brown et al, 2005 (60)	Psychotherapy	Emergency department
<b>Communities That Care</b> Oesterle et al, 2015 (31)	Community prevention capacity building and planning system	24 U.S. communities
<b>Dialectical behavior therapy</b> Rathus and Miller, 2002 (68)	Psychotherapy, behavioral/skill building	Outpatient
<b>Family-based crisis intervention</b> Wharff et al, 2012 (73)	Behavioral/skill building, safety plan	Emergency department
<b>Family intervention for suicide prevention</b> Asarnow et al, 2011 (59)	Behavioral/skill building, safety plan	Emergency department
<b>Garrett Lee Smith Memorial Suicide Prevention Program (GLS)</b> Godoy Garraza et al, 2015 (13)	Educational (gatekeeper training sessions), other approaches	U.S. counties
Walrath et al, 2015 (32)		
<b>Good Behavior Game (GBG)</b> Wilcox et al, 2008 (25)	Behavioral/skill building	School
<b>HOPE Family Program/ HOPE Health Education Program</b> Lynn et al, 2014 (33)	Educational, behavioral/skill building	Family housing shelters
<b>National Treatment Improvement Evaluation Study</b> Ilgen et al, 2007 (34)	Drug and alcohol treatment	Outpatient and long-term residential programs
<b>Multidimensional treatment foster care</b> Kerr et al, 2014 (12)	Behavioral/skill building	Correctional/juvenile justice
<b>Multisystemic therapy</b> Huey et al, 2004 (65)	Behavioral/skill building	Community, home
<b>Personal growth class</b> Thompson et al, 2000 (35)	Behavioral/skill building	School
<b>Problem-solving treatment</b> Wingate et al, 2005 (9)	Psychotherapy, behavioral/skill building	Military inpatient, outpatient, emergency department
<b>Project Chrysalis</b> Brown and Block, 2001 (36)	Behavioral/skill building , education	School
<b>Promoting CARE</b> Hooven et al, 2012 (37)	Behavioral/skill building, education	School and home

*Continued on following page*

Appendix Table 2—Continued

Program or Study Name (If Applicable) Author, Year (Reference)	Intervention Type/Purpose	Setting/Population
<b>Safe Alternatives for Teens &amp; Youths (SAFETY) Program</b> Asarnow et al, 2015 (38)	Psychotherapy	Emergency department, outpatient
<b>Seattle Social Development Project</b> Hawkins et al, 2005 (39)	Multicomponent, educational/skill building	School
<b>Signs of Suicide (SOS)</b> Aseltine and DeMartino, 2004 (40) Aseltine et al, 2007 (41)	Screening, educational	School
<b>Student Assistance Program</b> Biddle et al, 2014 (42)	Multiple strategies (identify, intervene, refer)	School
<b>Surviving the Teens Suicide Prevention and Depression Program</b> King et al, 2011 (43)	Behavioral/skill building, education	School
<b>Systemic Crisis Intervention Program</b> Gutstein and Rudd, 1990 (44)	Behavioral/skill building	Outpatient
<b>Treatment for Adolescents with Depression Study (TADS)</b> March et al, 2007 (45) March et al, 2009 (46) Vitiello et al, 2009 (47)	Medication/pharmaceutical, psychotherapy (CBT)	Outpatient
<b>Substance Use Outcomes Following Treatment for Adolescents with Depression (SOFTAD)</b> Curry et al, 2011 (48)	Medication/pharmaceutical	Outpatient
<b>Treatment of Adolescent Suicide Attempters (TASA)</b> Brent et al, 2009 (49) Vitiello et al, 2009 (50)	Medication/pharmaceutical, psychotherapy (CBT)	Outpatient
<b>The Coping Cat Program</b> Wolk et al, 2015 (51)	Behavioral/skill building (CBT)	Outpatient
<b>Treatment of Resistant Depression in Adolescents (TORDIA)</b> Asarnow et al, 2011 (52) Emslie et al, 2010 (53) Shamseddeen et al, 2011 (54) Woldu et al, 2011 (55)	Medication/pharmaceutical, psychotherapy (CBT)	Outpatient
<b>US Air Force Suicide Prevention Study</b> Knox et al, 2003 (10)	Multilayered: educational, policy, preventive services	Systemwide on military bases
<b>Youth-Nominated Support Team for Suicidal Adolescents (Version 1) (YST-1)</b> King et al, 2006 (56)	Educational/skill building, follow-up	Inpatient
<b>Youth-Nominated Support Team for Suicidal Adolescents (Version 2) (YST-2)</b> King et al, 2009 (57)	Educational/skill building, follow-up	Inpatient, outpatient
<b>No named prevention program or trial</b> Anestis and Anestis, 2015 (58) Collins and McFarland, 2008 (61) Cooper et al, 2006 (62) Farmer et al, 1996 (11) Fleegler et al, 2013 (63)	Policy/legislation Medication/pharmaceutical Availability of safety-net mental health services by county Multilayered: screening, support, means control Policy/legislation	50 U.S. states Oregon Medicaid patients Suicide attempters residing in Colorado Correctional/prison 50 U.S. states

Continued on following page

Appendix Table 2—Continued

Program or Study Name (If Applicable) Author, Year (Reference)	Intervention Type/Purpose	Setting/Population
Gardner et al, 2010 (64)	Screening, triage, referral	Primary care
Kaminer et al, 2006 (66)	Type of aftercare after cognitive behavioral group therapy	Outpatient
Kennard et al, 2014 (15)	Medication/pharmaceutical, psychotherapy (CBT)	Outpatient
Olfson et al, 2003 (67)	Medication/pharmaceutical	County-level suicide rates
Rotheram-Borus et al, 2000 (69)	Educational/skill building, psychotherapy	Emergency department, outpatient
Rudd et al, 1996 (70)	Behavioral/skill building	Outpatient
Segal et al, 1995 (71)	Recommendation of outpatient treatment or continued intensive inpatient, residential, or day treatment	Emergency department, inpatient
Spirito et al, 1992 (72)	Follow-up interviews	Emergency department, inpatient
Warner et al, 2011 (8)	Screening, care coordination	Primary care, military base

CARE = Care, Assess, Respond, Empower; CAST = Coping and Support Training; CBT = cognitive behavioral therapy; C-CARE = Counselors: Care, Assess, Respond, Empower; HOPE = HIV Outreach for Parents and Early Adolescents.

### Web-Only References

26. King CA, Hill RM, Wynne HA, Cunningham RM. Adolescent suicide risk screening: the effect of communication about type of follow-up on adolescents' screening responses. *J Clin Child Adolesc Psychol*. 2012;41:508-15. [PMID: 22540534] doi:10.1080/15374416.2012.680188
27. Diamond GS, Wintersteen MB, Brown GK, Diamond GM, Gallop R, Shelef K, et al. Attachment-based family therapy for adolescents with suicidal ideation: a randomized controlled trial. *J Am Acad Child Adolesc Psychiatry*. 2010;49:122-31. [PMID: 20215934]
28. Eggert LL, Thompson EA, Randell BP, Pike KC. Preliminary effects of brief school-based prevention approaches for reducing youth suicide-risk behaviors, depression, and drug involvement. *J Child Adolesc Psychiatr Nurs*. 2002;15:48-64. [PMID: 12083753]
29. Randell BP, Eggert LL, Pike KC. Immediate post intervention effects of two brief youth suicide prevention interventions. *Suicide Life Threat Behav*. 2001;31:41-61. [PMID: 11326768]
30. Hooven C, Herting JR, Snedker KA. Long-term outcomes for the Promoting CARE suicide prevention program. *Am J Health Behav*. 2010;34:721-36. [PMID: 20604697]
31. Oesterle S, Hawkins JD, Kuklinski MR, Fagan AA, Fleming C, Rhew IC, et al. Effects of Communities That Care on males' and females' drug use and delinquency 9 years after baseline in a community-randomized trial. *Am J Community Psychol*. 2015;56:217-28. [PMID: 26377418] doi:10.1007/s10464-015-9749-4
32. Walrath C, Garraza LG, Reid H, Goldston DB, McKeon R. Impact of the Garrett Lee Smith youth suicide prevention program on suicide mortality. *Am J Public Health*. 2015;105:986-93. [PMID: 25790418] doi:10.2105/AJPH.2014.302496
33. Lynn CJ, Aciri MC, Goldstein L, Bannon W, Beharie N, McKay MM. Improving youth mental health through family-based prevention in family homeless shelters. *Child Youth Serv Rev*. 2014;44:243-248. [PMID: 25157200]
34. Ilgen MA, Jain A, Lucas E, Moos RH. Substance use-disorder treatment and a decline in attempted suicide during and after treatment. *J Stud Alcohol Drugs*. 2007;68:503-9. [PMID: 17568953]
35. Thompson EA, Eggert LL, Herting JR. Mediating effects of an indicated prevention program for reducing youth depression and suicide risk behaviors. *Suicide Life Threat Behav*. 2000;30:252-71. [PMID: 11079638]
36. Brown KJ, Block AJ. Evaluation of Project Chrysalis: a school-based intervention to reduce negative consequences of abuse. *J Early Adolesc*. 2001;21:325-53. doi:10.1177/0272431601021003004
37. Hooven C, Walsh E, Pike KC, Herting JR. Promoting CARE: including parents in youth suicide prevention. *Fam Community*

- Health*. 2012;35:225-35. [PMID: 22617413] doi:10.1097/FCH.0b013e318250bcbf9
38. Asarnow JR, Berk M, Hughes JL, Anderson NL. The SAFETY Program: a treatment-development trial of a cognitive-behavioral family treatment for adolescent suicide attempters. *J Clin Child Adolesc Psychol*. 2015;44:194-203. [PMID: 25255931] doi:10.1080/15374416.2014.940624
39. Hawkins JD, Kosterman R, Catalano RF, Hill KG, Abbott RD. Promoting positive adult functioning through social development intervention in childhood: long-term effects from the Seattle Social Development Project. *Arch Pediatr Adolesc Med*. 2005;159:25-31. [PMID: 15630054]
40. Aseltine RH Jr, DeMartino R. An outcome evaluation of the SOS suicide prevention program. *Am J Public Health*. 2004;94:446-51. [PMID: 14998812]
41. Aseltine RH Jr, James A, Schilling EA, Glanovsky J. Evaluating the SOS suicide prevention program: a replication and extension. *BMC Public Health*. 2007;7:161. [PMID: 17640366]
42. Biddle VS, Kern J 3rd, Brent DA, Thurkettle MA, Puskar KR, Sekula LK. Student assistance program outcomes for students at risk for suicide. *J Sch Nurs*. 2014;30:173-86. [PMID: 24643756] doi:10.1177/1059840514525968
43. King KA, Strunk CM, Sorter MT. Preliminary effectiveness of Surviving the Teens(®) suicide prevention and depression awareness program on adolescents' suicidality and self-efficacy in performing help-seeking behaviors. *J Sch Health*. 2011;81:581-90. [PMID: 21831072] doi:10.1111/j.1746-1561.2011.00630.x
44. Gutstein SE, Rudd MD. An outpatient treatment alternative for suicidal youth. *J Adolesc*. 1990;13:265-77. [PMID: 2262609]
45. March JS, Silva S, Petrycki S, Curry J, Wells K, Fairbank J, et al. The Treatment for Adolescents With Depression Study (TADS): long-term effectiveness and safety outcomes. *Arch Gen Psychiatry*. 2007;64:1132-43. [PMID: 17909125]
46. March J, Silva S, Curry J, Wells K, Fairbank J, Burns B, et al; Treatment for Adolescents With Depression Study (TADS) Team. The Treatment for Adolescents With Depression Study (TADS): outcomes over 1 year of naturalistic follow-up. *Am J Psychiatry*. 2009;166:1141-9. [PMID: 19723787] doi:10.1176/appi.ajp.2009.08111620
47. Vitiello B, Silva SG, Rohde P, Kratochvil CJ, Kennard BD, Reinecke MA, et al. Suicidal events in the Treatment for Adolescents With Depression Study (TADS). *J Clin Psychiatry*. 2009;70:741-7. [PMID: 19552869]
48. Curry J, Silva S, Rohde P, Ginsburg G, Kratochvil C, Simons A, et al. Recovery and recurrence following treatment for adolescent



- major depression. *Arch Gen Psychiatry*. 2011;68:263-9. [PMID: 21041606] doi:10.1001/archgenpsychiatry.2010.150
49. Brent DA, Greenhill LL, Compton S, Emslie G, Wells K, Walkup JT, et al. The Treatment of Adolescent Suicide Attempters study (TASA): predictors of suicidal events in an open treatment trial. *J Am Acad Child Adolesc Psychiatry*. 2009;48:987-96. [PMID: 19730274] doi:10.1097/CHI.0b013e3181b5dbe4
  50. Vitiello B, Brent DA, Greenhill LL, Emslie G, Wells K, Walkup JT, et al. Depressive symptoms and clinical status during the Treatment of Adolescent Suicide Attempters (TASA) Study. *J Am Acad Child Adolesc Psychiatry*. 2009;48:997-1004. [PMID: 20854770] doi:10.1097/CHI.0b013e3181b5db66
  51. Wolk CB, Kendall PC, Beidas RS. Cognitive-behavioral therapy for child anxiety confers long-term protection from suicidality. *J Am Acad Child Adolesc Psychiatry*. 2015;54:175-9. [PMID: 25721182] doi:10.1016/j.jaac.2014.12.004
  52. Asarnow JR, Porta G, Spirito A, Emslie G, Clarke G, Wagner KD, et al. Suicide attempts and nonsuicidal self-injury in the treatment of resistant depression in adolescents: findings from the TORDIA study. *J Am Acad Child Adolesc Psychiatry*. 2011;50:772-81. [PMID: 21784297] doi:10.1016/j.jaac.2011.04.003
  53. Emslie GJ, Mayes T, Porta G, Vitiello B, Clarke G, Wagner KD, et al. Treatment of Resistant Depression in Adolescents (TORDIA): week 24 outcomes. *Am J Psychiatry*. 2010;167:782-91. [PMID: 20478877] doi:10.1176/appi.ajp.2010.09040552
  54. Shamseddeen W, Clarke G, Wagner KD, Ryan ND, Birmaher B, Emslie G, et al. Treatment-resistant depressed youth show a higher response rate if treatment ends during summer school break. *J Am Acad Child Adolesc Psychiatry*. 2011;50:1140-8. [PMID: 22024002] doi:10.1016/j.jaac.2011.07.022
  55. Woldu H, Porta G, Goldstein T, Sakolsky D, Perel J, Emslie G, et al. Pharmacokinetically and clinician-determined adherence to an antidepressant regimen and clinical outcome in the TORDIA trial. *J Am Acad Child Adolesc Psychiatry*. 2011;50:490-8. [PMID: 21515198] doi:10.1016/j.jaac.2011.01.018
  56. King CA, Kramer A, Preuss L, Kerr DC, Weisse L, Venkataraman S. Youth-Nominated Support Team for Suicidal Adolescents (Version 1): a randomized controlled trial. *J Consult Clin Psychol*. 2006;74:199-206. [PMID: 16551158]
  57. King CA, Klaus N, Kramer A, Venkataraman S, Quinlan P, Gillespie B. The Youth-Nominated Support Team-Version II for suicidal adolescents: a randomized controlled intervention trial. *J Consult Clin Psychol*. 2009;77:880-93. [PMID: 19803568] doi:10.1037/a0016552
  58. Anestis MD, Anestis JC. Suicide rates and state laws regulating access and exposure to handguns. *Am J Public Health*. 2015;105:2049-58. [PMID: 26270305] doi:10.2105/AJPH.2015.302753
  59. Asarnow JR, Baraff LJ, Berk M, Grob CS, Devich-Navarro M, Sudath R, et al. An emergency department intervention for linking pediatric suicidal patients to follow-up mental health treatment. *Psychiatr Serv*. 2011;62:1303-9. [PMID: 22211209] doi:10.1176/appi.ps.62.11.1303
  60. Brown GK, Ten Have T, Henriques GR, Xie SX, Hollander JE, Beck AT. Cognitive therapy for the prevention of suicide attempts: a randomized controlled trial. *JAMA*. 2005;294:563-70. [PMID: 16077050]
  61. Collins JC, McFarland BH. Divalproex, lithium and suicide among Medicaid patients with bipolar disorder. *J Affect Disord*. 2008;107:23-8. [PMID: 17707087]
  62. Cooper SL, Lezotte D, Jacobellis J, Diguiseppi C. Does availability of mental health resources prevent recurrent suicidal behavior? An ecological analysis. *Suicide Life Threat Behav*. 2006;36:409-17. [PMID: 16978095]
  63. Flegler EW, Lee LK, Monuteaux MC, Hemenway D, Mannix R. Firearm legislation and firearm-related fatalities in the United States. *JAMA Intern Med*. 2013;173:732-40. [PMID: 23467753] doi:10.1001/jamainternmed.2013.1286
  64. Gardner W, Klima J, Chisolm D, Feehan H, Bridge J, Campo J, et al. Screening, triage, and referral of patients who report suicidal thought during a primary care visit. *Pediatrics*. 2010;125:945-52. [PMID: 20385642] doi:10.1542/peds.2009-1964
  65. Huey SJ Jr, Henggeler SW, Rowland MD, Halliday-Boykins CA, Cunningham PB, Pickrel SG, et al. Multisystemic therapy effects on attempted suicide by youths presenting psychiatric emergencies. *J Am Acad Child Adolesc Psychiatry*. 2004;43:183-90. [PMID: 14726725]
  66. Kaminer Y, Burleson JA, Goldston DB, Burke RH. Suicidal ideation among adolescents with alcohol use disorders during treatment and aftercare. *Am J Addict*. 2006;15 Suppl 1:43-9. [PMID: 17182419]
  67. Olfson M, Shaffer D, Marcus SC, Greenberg T. Relationship between antidepressant medication treatment and suicide in adolescents. *Arch Gen Psychiatry*. 2003;60:978-82. [PMID: 14557142]
  68. Rathus JH, Miller AL. Dialectical behavior therapy adapted for suicidal adolescents. *Suicide Life Threat Behav*. 2002;32:146-57. [PMID: 12079031]
  69. Rotheram-Borus MJ, Piacentini J, Cantwell C, Belin TR, Song J. The 18-month impact of an emergency room intervention for adolescent female suicide attempters. *J Consult Clin Psychol*. 2000;68:1081-93. [PMID: 11142542]
  70. Rudd MD, Rajab MH, Orman DT, Joiner T, Stulman DA, Dixon W. Effectiveness of an outpatient intervention targeting suicidal young adults: preliminary results. *J Consult Clin Psychol*. 1996;64:179-90. [PMID: 8907098]
  71. Segal HG, King CA, Naylor MW. Psychosocial functioning of severely disturbed adolescents after short-term hospitalization. *Psychiatr Serv*. 1995;46:287-9. [PMID: 7796221]
  72. Spirito A, Plummer B, Gispert M, Levy S, Kurkjian J, Lewander W, et al. Adolescent suicide attempts: outcomes at follow-up. *Am J Orthopsychiatry*. 1992;62:464-8. [PMID: 1497112]
  73. Wharff EA, Ginnis KM, Ross AM. Family-based crisis intervention with suicidal adolescents in the emergency room: a pilot study. *Soc Work*. 2012;57:133-43. [PMID: 23038875]

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