

Psychological Approaches to Suicide Treatment and Prevention

David A. Jobes, Ph.D.^{*}

Josephine S. Au, B.A.

Asher Siegelman, B.A.

Address

^{*}Department of Psychology, The Catholic University of America, 314 O'Boyle Hall,
Washington, DC, 20064, USA
Email: jobes@cua.edu

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Opinion statement

In recent decades, the sub-specialization of “clinical suicidology” emphasizing suicide risk assessment, treatment, training, and the management of suicide-related liability has grown exponentially. This line of thinking had led to the development of suicide-specific treatments that target *suicide* as the focus of care (vs. a primary focus on treating mental disorders). These treatments are being extensively investigated using randomized controlled clinical trials to prove their efficacy and effectiveness. This article features the three main replicated treatments for suicide: Dialectical Behavior Therapy, Cognitive Therapy for Suicide Prevention, and the Collaborative Assessment and Management of Suicidality. In addition, there is a recent surge of brief suicide-focused interventions (1–4 sessions) that include variations of stabilization planning and close examination of suicide attempts as an opportunity to learn about suicidal risk with coping-oriented guidance and support. Within a rapidly evolving contemporary mental health care reality, these suicide-related treatments and interventions hold great promise for the prospect of providing more effective (and potentially life-saving care) for suicidal patients.

Introduction

In the wake of health care reform and dramatic changes in mental health and psychiatric care over recent decades, there has been an increasing focus on the topic

of suicide risk within clinical practice and the professional literature [1•, 2]. This article will examine recent developments in psychological approaches to treating

suicidality within the emerging specialty area of clinical suicidology. The specialized field of clinical suicidology covers areas including suicide risk assessment, clinical treatments for suicide risk, professional training in suicide-related practices, and issues of ethics and risk management related to suicidal risk. In this article, we aim to highlight two major domains within recent clinical treatment research. The first area will describe the

replicated psychological treatments shown to be effective for suicidal risk through rigorous randomized controlled trials (RCTs). The second domain will consider exciting new clinical research focusing on the development of very brief (1–4 sessions) suicide-specific interventions. We will conclude with an integrated perspective on the field and next steps in clinical suicidology within contemporary mental health care.

Evidence-based treatments for suicidal risk

As discussed by Brown and Jager-Hyman [3], there are a number of RCTs for the treatment of suicide that have been conducted over the last three decades. There are many single studies showing non-significant findings along with some studies that show significant findings without needed replication. We will review three treatments with the most established empirical support. These psychological treatments for suicidal risk include the following: Dialectical Behavior Therapy (DBT), Cognitive Therapy for Suicide Prevention (CT-SP), and the Collaborative Assessment and Management of Suicidality (CAMS).

Dialectical behavior therapy

DBT is a form of cognitive-behavioral therapy (CBT) originally designed to treat suicidal and self-harming people who meet criteria for borderline personality disorder [4, 5]. Bohus and colleagues [6] explain that DBT maintains the behavioral treatment components of skills training and change motivation, but there are components that make it distinct from traditional CBT. Specifically, DBT is a change-focused behavioral treatment; the dialectical approach of DBT utilizes an acceptance focus when a patient feels misunderstood and adopts a change focus when a patient needs motivation. The treatment is comprised of three distinct components: (a) skills training through structured individual or group therapy; (b) strengthening of skills and addressing barriers to motivation in individual psychotherapy; and (c) application of skills in everyday life through telephone contact with the psychotherapist. Furthermore, there is extensive team consultation for helping a therapist maintain focus as well as treatment adherence.

Since 1991, DBT has been tested in several RCTs, thus establishing its effectiveness over and above treatment as usual (TAU) for patients who meet criteria for borderline personality disorder (BPD), have engaged in self-injurious behaviors, and/or have made suicide attempts [7•]. However, in an RCT in 2009, DBT was compared with another active, principle-based treatment approach (General Psychiatric Management) designed for people diagnosed with BPD [8]. A total of 180 patients diagnosed with BPD who had engaged in suicidal and non-suicidal self-injurious behaviors (at least twice in the last 5 years) were randomly assigned to one of the treatments. Both treatments produced significant reductions in suicidality and psychiatric symptoms, but there were no significant between-group differences, suggesting that DBT is not the only effective treatment approach for people with BPD who are at risk for

suicide. Additionally, while the validity of DBT for suicidal behavior has been well established, its effectiveness to date has been largely restricted to female samples. This is significant due to the fact that males make up the largest percentage of completed suicides, with approximately 80 % being males [9].

Cognitive therapy for suicide prevention

Cognitive Therapy for Suicide Prevention (CT-SP) is a cognitive-behavioral, suicide-specific, form of psychotherapy with strong empirical validation [10, 11]. The CT-SP approach endeavors to reduce risk factors for suicide and enhance coping with the elimination of suicidal behavior as the primary focus of the treatment [12]. Coping skills training in CT-SP targets patients' patterns of thinking, behavior, and interpersonal interactions that lead to suicidal states, referred to as the *suicidal mode*. A central tenet is that a suicidal person will continue to have stressors and problems that have triggered suicidal behavior in the past, but with effective coping skills, these stressors and problems will no longer function as triggers for suicidal behavior. The primary focus within this approach is to identify proximal triggers that put the patient into his/her suicidal mode. With this emphasis in mind, the goal is to address the most serious deficits the patient has in his/her coping abilities. Hence, patterns of thoughts, behaviors, and interpersonal interactions are addressed to strengthen these deficient areas. Techniques employed at the end of care include a novel relapse prevention strategy that uses guided imagery and the inventive use of a hope kit that serves as a memory aid for averting suicidal behavior.

From an empirical perspective, CT-SP was first investigated using a sample of 120 patients (61 % women) who had attempted suicide and were subsequently recruited from an emergency room following their attempts [10]. The investigators conducted an efficacy-based RCT comparing CT-SP and TAU over 10 individual treatment sessions. At an 18-month follow-up, they found that patients in CT-SP condition were 50 % less likely than patients in TAU to make a repeat suicide attempt. The CT-SP patients were also found to be less depressed and more hopeful as a result of the treatment. In an important replication of the CT-SP intervention, Rudd and colleagues [13•] showed a 60 % between-group decrease in suicide attempts within an RCT with 152 active-duty suicidal soldiers (>87 % men) engaged in their brief cognitive therapy (BCBT) for the treatment of suicidal risk.

Collaborative assessment and management of suicidality

Another suicide-specific intervention with extensive empirical support is the Collaborative Assessment and Management of Suicidality (CAMS) [14, 15]. CAMS is a suicide-specific therapeutic framework that is described as “non-denominational” in that a range of theoretical orientations and clinical techniques can be incorporated into the approach [16]. CAMS adopts a phenomenological approach to understanding a patient's suicidality, which leads to suicide-specific treatment planning that emphasizes the use of an outpatient stabilization plan and the identification and treatment of patient-defined suicidal “drivers” [17]. Within CAMS-guided care, collaboration is the key to enhancing the therapeutic alliance and motivating the patient as a pivotal member of the treatment team. Central to CAMS is the use of a multipurpose

assessment, treatment planning, tracking, and outcome tool called the “Suicide Status Form” (SSF) that serves as a clinical road map and guides this suicide-specific intervention.

There are now seven non-randomized clinical trials [14, 16] and one RCT with 32 suicidal outpatients (62 % women) supporting the use of CAMS [18]. This RCT compared CAMS to enhanced care as usual (E-CAU) and found that CAMS patients improved significantly more in terms of suicidal ideation, overall symptom distress, hope, and patient satisfaction in comparison to E-CAU patients. There are now five current RCTs of CAMS underway around the world that will provide further data about the potential effectiveness of CAMS particularly in relation to self-harm and suicide attempt behaviors.

Brief interventions for suicidal risk

In response to rapid changes in contemporary mental health care delivery, there has been a recent surge of interest in brief suicide-specific clinical interventions [1•]. To fill emerging clinical needs, a cadre of innovative clinical suicidologists has been developing these brief interventions for suicide attempters that last for 1–4 sessions of intensive engagement and care.

Stabilization-oriented interventions

There are various versions of stabilization-oriented clinical interventions that aimed to be the remedy for “no-harm” or “no-suicide” contracting. Some of the more prominent of these are Safety Planning, Crisis Response Planning, and the SSF Stabilization Plan that is used within CAMS. Probably the best known of these interventions is the Safety Planning Intervention (SPI) developed by Stanley and Brown [19]. This intervention was created to increase treatment engagement and to develop suicide-specific coping strategies among a range of suicidal patients seen in a variety of clinical settings. A typical Safety Plan Intervention lasts about 20–45 min, during which the clinician and patient identify warning signs that might precipitate a suicidal crisis. The dyad then proceeds to develop a six-step hierarchical list of internal coping strategies, and external sources of social and professional support should the patients’ suicidal thoughts emerge. Additionally, clinicians are also recommended to evaluate the likelihood of which patients will use the safety plan as well as to incentivize them to do so. The SPI has been adapted in several settings. For instance, it has been tested on veterans presented to EDs and in a psychiatric inpatient setting for suicide-related issues [20, 21]. One recent study has shown that SPI, when combined with a structured follow-up, is related to increased treatment attendance and decreased hospitalization 3 months post-emergency department discharge [22].

In a related line of thinking and clinical research, Bryan and colleagues [23] are studying the use of “Crisis Response Planning” combined with the development of “Reasons for Living” as a brief one-session intervention for suicidal patients. This intervention is being investigated in a RCT with active-duty military service members and reflects a related but elaborated form of suicide-specific stabilization planning within this emerging genre of brief interventions.

Teachable moment brief intervention

O'Connor and colleagues [24] developed the “Teachable Moment Brief Intervention” (TMBI) which aims to foster change during a key window of opportunity following a suicide attempt [25]. The TMBI follows research showing that cueing events are subjected to different interpretations and thus can create the opportunity to increase motivation to change risky health behaviors [24]. The TMBI is partly inspired by the collaborative philosophy of CAMS and the functional analysis approach used for understanding self-harm behaviors in DBT [25]. It focuses on building rapport, identifying factors underlying a suicide attempt, crisis planning, and planning for outpatient mental health services. Preliminary evidence shows that TMBI was well received by patients at a level 1 trauma center and that those in the TMBI group showed a consistent linear trend in their awareness as well as readiness to change when compared to the TAU group. The TMBI is currently being investigated in larger clinical trial research.

Motivational interviewing for suicidal ideation

Motivational interviewing is a patient-centered approach used to foster a patients' intrinsic desire to change their health behaviors by resolving ambivalence and it has recently been adapted for addressing suicide ideation [26–28]. Based on Kovacs and Beck's internal struggle hypothesis [29] (which postulates that suicide is a result of the inner struggle between one's wish to live and wish to die), the goal of the motivational interviewing to address suicide ideation (MI-SI) is to increase patients' motivation to live, so as to reduce their overall risk of suicide [27]. In other words, it carefully directs a patient's motivation to die in the direction of living with the goal of making life more worth living [28]. Researchers of MI believe that discussion of suicide unnecessarily leads patients to thinking about suicide; therefore, they advise clinicians to focus on change talk about living instead of suicide talk [30]. It is also recommended that MI-SI should be used as an adjunct to other treatment instead of as a standalone treatment. The results of an open trial of MI-SI, which is comprised of two sessions that span in 3 days, has shown that patients experienced a reduction of suicide ideation immediately as well as 2 months after treatment when compared to baseline measures [26].

Attempted suicide short intervention program

Another brief intervention that has been recently tested within a RCT is called the Attempted Suicide Short Intervention Program (ASSIP) [31]. The ASSIP is comprised of three sessions, each of which lasts about 60 to 90 min. In the first session, patients are asked to narrate their stories to the clinician that led up to their suicide attempts, which are video recorded and then played back to the dyad in the following session. The goal of this is to reenact the progression of their suicidal crisis in a controlled environment, so that the clinical dyad can create a psycho-educational handout by the end of the second session. In the third session, the clinician presents a case conceptualization that is revised collaboratively with the patient; a list of warnings signs and individualized safety strategies are given to the patient to keep with them.

In a 2-year follow-up of the RCT ($n=120$), the ASSIP group was found to have an 80 % reduction in repeated suicide attempts when compared to the TAU group [31]. Additionally, those in the ASSIP group spent significantly fewer days within psychiatric hospital care.

Conclusions

These are exciting times for the field of clinical suicidology; the field is rapidly evolving with a record number of suicide-focused RCTs underway around the world [32]. Major changes within contemporary health care (e.g., health care reform in the United States) are fostering significant innovations in mental health care delivery, with a particular emphasis on managing suicide risk [1•]. It follows that there is an increasing emphasis on least-restrictive, evidence-based, and cost-effective suicide-specific clinical care. The sheer economics of clinically dealing with suicide and suicide-related morbidity is a major force that is leading to changes in caring for suicidal patients. As discussed elsewhere [33], an evolving “stepped-care” model for treating suicidal risk may well emerge in the coming years that creates a continuum of clinical care ranging from the paraprofessional and peer-based support, to suicide-specific care involving brief interventions, as well as suicide-specific outpatient, partial, and respite clinical care. Likewise, there is an emerging interest in stratifying the risk of different suicidal states with the potential for matching different kinds and doses of treatments to different suicidal states [34, 35]. Given the known high risk of suicide that follows inpatient discharge [36], inpatient psychiatric care will increasingly need to embrace the use of suicide-specific interventions during an inpatient stay with an emphasis on safety planning and post-discharge means-restriction along with thoughtful disposition planning that bridges a patient to effective outpatient care. There may be value in further tailoring suicidal treatments in gender-specific ways. In the coming years, we are likely to see more use of suicide-specific group modalities [37] and the increasing use of technology applications for clinically monitoring, managing, and even treating suicidal risk [33, 38].

When we reflect on the evidence-base for effectively treating suicidality, we are struck by some remarkably common themes that unite the treatments and interventions described in this review. For example, all of the interventions we have discussed employ various means for helping a suicidal patient recognize the when, how, where, and why they become suicidal. Once the patient is therapeutically “trained” to recognize the nature and occurrence of their suicidal risk, they are similarly taught to use suicide-specific coping skills and techniques to help avert suicidal behaviors. All these interventions tend to be non-adversarial and collaborative in nature, emphasizing the importance of empathy, understanding, and empathic validation of a patient’s suicidal state. All the described interventions in this article endeavor to inspire, harness, and channel the *patient’s* motivation, so as to better cope with their suicidal impulses and to decrease the suicidal risk therein. Finally, for the most part, all these interventions either directly or implicitly attend to existential aspects inherent to the suicidal struggle with a marked emphasis on the psychological importance

of hope and the pursuit of a life worth living. Given the increasing number of suicide-focused treatment investigations that are now underway, we look forward to the promise of suicidal patients receiving more effective evidence-based clinical care in the years to come.

Compliance with Ethical Standards

Conflict of Interest

David A. Jobes reports grants from NIMH, DOD, and AFSP; he receives book royalties from the American Psychological Assoc Press, The Guilford Press, and e-learning royalties from Empathos Resources. Dr. Jobes is Co-Owner of CAMS-care, LLC. Josephine S. Au and Asher Siegelman declare that they have no conflict of interest.

Human and Animal Rights Informed Consent

No human or animal studies performed by the authors:

This article does not contain any studies with human or animal subjects performed by any of the authors.

References and Recommended Reading

Papers of particular interest, published recently, have been highlighted as:

- Of importance

1. • Jobes DA, Bowers ME. Treating suicidal risk in a post-healthcare reform era. *J Aggress Confl Peace Res.* 2015;7:167–78.
This article provides a brief introduction to evidence-based treatments for suicidal patients and illustrates multiple advantages/benefits in utilizing these treatments. A significant overview of CAMS and CAMS research is provided.
2. Jobes DA, Rudd MD, Overholser JC, Joiner Jr TE. Ethical and competent care of suicidal patients: contemporary challenges, new developments, and considerations for clinical practice. *Prof Psychol.* 2008;39:405.
3. Brown GK, Jager-Hyman S. Evidence-based psychotherapies for suicide prevention: future directions. *Am J Prev Med.* 2014;47:S186–94.
4. Linehan M. *Cognitive-behavioral treatment of borderline personality disorder.* New York: Guilford Press; 1993.
5. Linehan MM, Armstrong HE, Suarez A, Allmon D, Heard HL. Cognitive-behavioral treatment of chronically parasuicidal borderline patients. *Arch Gen Psychiatry.* 1991;48:1060–4.
6. Bohus M, Haaf B, Stiglmayr C, Pohl U, Böhme R, Linehan M. Evaluation of inpatient dialectical-behavioral therapy for borderline personality disorder—a prospective study. *Behav Res Ther.* 2000;38:875–87.
7. • Linehan MM, Korslund KE, Harned MS, Gallop RJ, Lungu A, Neacsiu AD, et al. Dialectical behavior therapy for high suicide risk in individuals with borderline personality disorder: a randomized clinical trial and component analysis. *JAMA Psychiatry.* 2015;72:475–82.
This article highlights the consistent efficacy of DBT for treating suicidal women with BPD. It also provides an explanation of the treatment utility of distinct components in the DBT protocol.
8. McMain SF, Links PS, Gnam WH, Guimond T, Cardish RJ, Korman L, et al. A randomized trial of dialectical behavior therapy versus general psychiatric management for borderline personality disorder. *JAMA Psychiatry.* 2009;166:1365–74.
9. Currier GW, Brown GK, Brenner LA, Chesin M, Knox KL, Ghahramanlou-Drapeau CW, et al. U.S.A. Suicide 2012: Official Final Data. American Association of Suicidology. October 18, 2014. Available at <http://www.suicidology.org>. Accessed 20 Jul 2015
10. 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.
11. Wenzel A, Brown GK, Beck AT, editors. *Cognitive therapy for suicidal patients: scientific and clinical applications.* Washington, DC: American Psychological Association; 2009.

Relationship Between Antidepressant Medication Treatment and Suicide in Adolescents

Mark Olfson, MD, MPH; David Shaffer, MD; Steven C. Marcus, PhD; Ted Greenberg, MPH

Context: A decade of increasing antidepressant medication treatment for adolescents and corresponding declines in suicide rates raise the possibility that antidepressants have helped prevent youth suicide.

Objective: To evaluate the relationship between regional changes in antidepressant medication treatment and suicide in adolescents from 1990 to 2000.

Design: Analysis of prescription data from the nation's largest pharmacy benefit management organization, national suicide mortality files, regional sociodemographic data from the 1990 and 2000 US Census, and regional data on physicians per capita.

Participants: Youth aged 10 to 19 years who filled a prescription for antidepressant medication and same-aged completed suicides from 588 three-digit ZIP code regions in the United States.

Main Outcome Measures: The relationship between regional change in antidepressant medication treatment and suicide rate stratified by sex, age

group, regional median income, and regional racial composition.

Results: There was a significant adjusted negative relationship between regional change in antidepressant medication treatment and suicide during the study period. A 1% increase in adolescent use of antidepressants was associated with a decrease of 0.23 suicide per 100,000 adolescents per year ($\beta = -.023$, $t = -5.14$, $P < .001$). In stratified adjusted analyses, significant inverse relationships were present among males ($\beta = -.032$, $t = -3.81$, $P < .001$), youth aged 15 to 19 years ($\beta = -.029$, $t = -3.43$, $P < .001$), and regions with lower family median incomes ($\beta = -.023$, $t = -3.73$, $P < .001$).

Conclusions: An inverse relationship between regional change in use of antidepressants and suicide raises the possibility of a role for using antidepressant treatment in youth suicide prevention efforts, especially for males, older adolescents, and adolescents who reside in lower-income regions.

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OVER THE past several years, there has been a steady decline in suicide rates for adolescents in the United States.^{1,2} Despite this trend, youth suicide remains an important public health concern. It is the third-leading cause of death among older adolescents aged 15 to 19 years and the fourth-leading cause among younger adolescents aged 10 to 14 years.¹

Several factors have been considered as possible causes of the recent decline in adolescent suicide. These include a reduction in the use of drugs and alcohol,³ a mandate for catalytic converters that lower automobile carbon monoxide emissions (used in self-asphyxiation),⁴ the economic boom in the United States during the 1990s,⁵ and the introduction of new firearms security regula-

tions in several states.⁶ A link between firearms in the home and suicide is supported by findings from epidemiological, case-control, and prospective studies.⁷

Recent increase in antidepressant medication treatment for adolescents in the United States⁸⁻¹⁰ and in other industrialized countries¹¹⁻¹⁵ provides a possible complementary explanation for the recent decline in suicide by adolescents. Because most youth who commit suicide have a psychiatric disorder at the time of their death^{16,17} and because the newer antidepressant medications are effective in treating adolescent major depression^{18,19} and several anxiety disorders,²⁰⁻²³ it is possible that the recent growth in antidepressant treatment has contributed to the decline in youth suicide. We explore this possibility by examining changes from 1990 to 2000 in rates of antidepressant

From the Department of Psychiatry, New York State Psychiatric Institute, College of Physicians and Surgeons of Columbia University, New York (Drs Olfson and Shaffer and Mr Greenberg); and University of Pennsylvania School of Social Work, Philadelphia (Dr Marcus).

METHODS

Four sources of data were used to examine regional variation in trends in the relationship between antidepressant medication treatment and suicide rates: (1) prescription data from a large pharmacy benefit management organization, (2) national suicide mortality files from the Centers for Disease Control and Prevention, (3) regional geographic characteristics from the US Census Bureau, and (4) information on the geographic distribution of physicians from the Area Resource File.²⁴

ANTIDEPRESSANT RATES

Rates of antidepressant medication treatment for each 3-digit ZIP code region were calculated from data provided by AdvancePCS, Irving, Tex, the nation's largest pharmacy benefit service organization. AdvancePCS provided complete pharmacy data for approximately 340 000 adolescents for a 1-month period in 1989 and approximately 720 000 adolescents for a corresponding 1-month period in 2001. The datasets include the national drug code, patient age, patient sex, encrypted identification number, and the 3-digit ZIP code of the filling pharmacy for each prescription. Mail-order prescriptions were excluded from the analysis, because the filling "pharmacy" was unlikely to be within the geographic region of the patient.

Person-level antidepressant rates per 1000 patients receiving medication were calculated, stratified by sex and 2 age groups: 10 to 14 years and 15 to 19 years. A count of adolescents receiving medication in each group served as the denominator for antidepressant medication treatment rates. The mean number of adolescents receiving medication per region was 518 (1989) and 1086 (2000), and the median was 322 (1989) and 713 (2000).

SUICIDE RATES

Rates of suicide were calculated from the Centers for Disease Control and Prevention's Compressed Mortality Files.²⁵ These data provide underlying cause of death (4-digit *International Classification of Diseases, Ninth Revision* code) for all deaths occurring in the United States stratified by county of residence, sex, and age group, and population estimates from the US Census Bureau. Data were pooled to provide stable estimates of mortality due to suicide (*International Classification of Diseases, Ninth Revision*, codes 950.00-959.99) for the 2 time periods, 1985 to 1989 and 1995 to 1999. Suicide rates for each county were calculated by age group and sex.

County-level suicide rates were converted to 3-digit ZIP code region rates using a ZIP code-to-county correspondence file.²⁶ A population-based weighted suicide rate was computed when more than one county fell within a ZIP code region.

GEOGRAPHICAL CHARACTERISTICS

Data from the US Census Bureau and Area Resource File²⁴ were used to characterize each 3-digit ZIP code region in 1990 and 2000. Specifically, median household income and percentage white population were extracted from census Summary Tape File 3B,²⁷ and the number of psychiatrists, child psychiatrists, and pediatricians per capita for each region in 1990 and 2000 were extracted from the Area Resource File.²⁴ These variables were used in the analysis to control for and stratify by regional sociodemographic characteristics.

STATISTICAL ANALYSIS

For ease of interpretation, we refer to the earlier time point as 1990 and the more recent point as 2000 for all comparisons. Only ZIP code regions containing at least 100 total prescriptions ($N=588$) are included in the analyses. The included regions contain 86.6% of the total US population. Compared with excluded regions ($n=324$), included regions were more populous (mean population: 372 166 vs 104 133) and had a slightly lower percentage white population (80.9% vs 83.3%), a higher family median income (\$41 600 vs \$36 600), and lower suicide death rate per 100 000 adolescents (6.0 vs 7.0) in 2000.

We first computed overall rates and 95% confidence intervals of antidepressant medication treatment and suicide for 1990 and 2000 and for the change in rates between the 2 time points. Adjusted linear regression models were then used to assess the association between antidepressant medication treatment (independent variable) and suicide (dependent variable) accounting for regional racial composition, median income, and physicians per capita for each year and change over time, as appropriate. Similar analyses are presented stratified by sex, age group, median regional income, and racial composition. Two-tailed, unpaired t tests were used for comparisons. The Cook's D statistic was used to remove extreme outliers ($D>0.4$) from the regression analyses. No more than 1 ZIP code region was removed from any model. Separate models examined suicide by firearms and by all other causes of suicide. A further post hoc analysis examined change in tricyclic antidepressant medication treatment in relation to suicide.

RESULTS

ANTIDEPRESSANT MEDICATION TREATMENT AND SUICIDE

In 1990 and in 2000, there was a significant positive relationship between regional antidepressant medication treatment and suicide, indicating that regions with high rates of antidepressant medication treatment also tend to have high suicide rates. Significant associations were observed for most sex, age, race, and income strata (**Table**).

TIME TRENDS

A significant negative relationship was observed between 1990 and 2000 for changes in the regional rates of overall antidepressant medication treatment and changes in the regional suicide rates after adjusting for change in percentage white population, median income, and number of physicians per capita (Table). A significant negative adjusted trend association was observed in stratified analyses of male children; children aged 15 to 19 years; and in lower-income regions. The strength of the relationship between change in use of antidepressants and change in suicide rate was similar in firearms ($\beta=-.012$, $t=3.56$, $P<.001$) and nonfirearms ($\beta=-.010$, $t=4.38$, $P<.001$) suicide.

The rate of adolescents filling prescriptions for tricyclic antidepressant medications was low in 1990 (1.2%) and 2000 (0.8%). In a post hoc analysis limited to regions with 1 or more antidepressant prescription, change in all types of antidepressant prescriptions was negatively related to change in suicide rate ($\beta=-.016$, $t=3.19$,

Association Between Regional Antidepressant Medication Treatment and Suicide Rate in 588 Children Aged 10 to 19 Years*

Variable	Antidepressant Rate per 1000 Medication Users			Suicide Rate per 100 000 Population†			Adjusted β (P Value)		
	1990	2000	Change	1990	2000	Change	1990	2000	Change
Total	11.54	73.15	61.61	6.51	6.00	-0.51	.050 ($t = 4.67, P < .001$)	.014 ($t = 4.28, P < .001$)	-.023 ($t = 5.14, P < .001$)
Sex									
Male	12.02	74.49	62.47	10.26	9.11	-1.15	.081 ($t = 4.36, P < .001$)	.026 ($t = 4.02, P < .001$)	-.032 ($t = 3.81, P < .001$)
Female	10.54	72.16	61.62	2.45	2.08	-0.37	.028 ($t = 3.54, P < .001$)	.006 ($t = 3.28, P = .001$)	-.005 ($t = 1.42, P = .16$)
Age, y									
10-14	10.00	60.96	50.96	1.46	1.72	0.26	.019 ($t = 3.07, P = .002$)	.006 ($t = 2.46, P = .01$)	.000 ($t = 0.09, P = .92$)
15-19	12.62	83.68	71.06	10.94	9.80	-1.14	.112 ($t = 5.54, P < .001$)	.031 ($t = 4.56, P < .001$)	-.029 ($t = 3.43, P < .001$)
White population									
Low	11.06	67.31	56.25	6.06	5.77	-0.29	.055 ($t = 3.74, P < .001$)	.017 ($t = 4.51, P < .001$)	-.016 ($t = 3.50, P < .001$)
High	12.02	78.98	66.96	6.97	6.24	-0.73	.048 ($t = 3.15, P = .002$)	.010 ($t = 1.67, P = .12$)	-.026 ($t = 3.12, P = .002$)
Median income									
Low	10.89	67.66	56.77	6.57	6.62	0.05	.024 ($t = 1.37, P = .17$)	.016 ($t = 3.60, P < .001$)	-.023 ($t = 3.73, P < .001$)
High	12.19	78.63	66.44	6.45	5.39	-1.06	.068 ($t = 5.44, P < .001$)	.011 ($t = 2.13, P = .03$)	-.010 ($t = 1.73, P = .08$)

*Antidepressant medication treatment and suicide data are mean rates per 3-digit ZIP code region. Adjusted β values control for percentage white population, median income, and number of per capita physicians (pediatricians, child psychiatrists, and psychiatrists) by ZIP code region in 2000.

†Population based on row category.

$P = .002$), but change in the rate of tricyclic antidepressant medication treatment was not related to the change in suicide rate ($\beta = -.010, t = 0.53, P = .60$).

COMMENT

In cross-sectional analyses, increased regional antidepressant medication treatment is linked to higher suicide rates. Although this relationship may reflect antidepressant-triggered suicide,²⁸ clinical and forensic studies cast doubt on this interpretation.²⁹⁻³¹ Communities with high rates of suicide (and presumably high rates of severe psychiatric illnesses) may simply tend to use more antidepressant medications than communities with low rates of suicide.

In accord with most studies of European countries,^{11,12,15,32,33} an increase in antidepressant medication treatment was inversely related to the rate of suicide. In our study, a 1% increase in adolescent use of antidepressants was associated with a decrease of 0.23 suicide per 100 000 adolescents per year. This inverse time trend was not observed for tricyclic antidepressants. In contrast to the positive findings from clinical trials of treating adolescent depression with selective serotonin reuptake inhibitors, the findings with tricyclic antidepressants have been disappointing.³⁴ Compared with tricyclic antidepressants, selective serotonin reuptake inhibitors are associated with greater medication adherence^{35,36} and are less dangerous when taken in overdose.³⁷

A relationship between antidepressant medication treatment and suicide is exceedingly difficult to study with clinical experimental methods. Pooled analyses of depressed adult patients from clinical trials reveal statistically similar rates of suicide in participants receiving placebo and antidepressants.^{38,39} Although such findings raise uncertainty regarding whether antidepressant medications can reduce suicide risk, the exclusion of individuals with a serious risk of suicide, short follow-up periods, high subject attrition, and the small number of

suicides in clinical trials complicate interpretation of these findings.^{40,41}

In the current study, significant inverse trends in antidepressant medication treatment and suicide rates were evident for older adolescents and males but not younger adolescents and females. Compared with younger adolescents who commit suicide, older adolescents who commit suicide are more likely to have a diagnosable disorder,^{42,43} including depression,^{17,43} and so these patients may be more likely to benefit from antidepressants. Previous research also indicates that compared with females, males are at lower risk of suicide attempts but at much greater risk of suicide.⁴⁴ With the availability of more effective antidepressant treatments for young people, gender differences in the case fatality rate may have created more clinical opportunities to lower the risk of suicide in males than females. In this regard, it may be worth exploring whether selective serotonin reuptake inhibitor-mediated suppression of impulsive aggressive behavior⁴⁵ reduces suicidal behavior in high-risk males.^{46,47}

An inverse time trend was evident for adolescents residing in lower-income regions but not higher-income regions. Lower-income communities may have higher base rates of psychiatric disorder⁴⁸ and a greater unmet need for mental health services.⁴⁹ Increasing mental health treatment in these communities may selectively reach a proportionately larger number of youth at high risk for suicide.

We are unable to control for several potentially important risk factors (eg, substance use and firearms access) and protective factors (eg, psychotherapy and catalytic converters) that might confound the observed time trend relationships. A more rigorous test of the hypothesis that antidepressant medication treatment has contributed to declining youth suicide would involve simultaneous examination of these important factors.

The current study has several other limitations. Sampling adolescents receiving antidepressant medication rather than the general population may distort relation-

ships between rates of antidepressant medication treatment and suicide rates. Regional variation in the proportion of the population in the pharmacy database may introduce further measurement error. However, the pharmacy database is quite large, covering 75 million members in 2000. An absence of diagnostic data prevents analysis by clinical indication of the antidepressant medications. Further research is also needed to determine whether the findings are specific to antidepressants or whether similar correlations exist for other psychotropic medications or their interaction with antidepressants. Most important, the findings are open to ecologic challenge because they relate regional rather than individual characteristics.

The relationship between suicide and mental status is not simple, and merely expanding access to antidepressant medications is unlikely to ensure the abolition or even a continued rapid decline in adolescent suicide rates. Nevertheless, the current findings are consistent with suicide risk reduction policies that seek to improve the identification and psychopharmacological treatment of young people with major depression and other antidepressant-responsive psychiatric disorders.

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Corresponding author: Mark Olfson, MD, Department of Psychiatry, New York State Psychiatric Institute, College of Physicians and Surgeons of Columbia University, 1051 Riverside Dr, New York, NY 10032 (e-mail: olfsonm@child.cpmc.columbia.edu).

REFERENCES

- Anderson RN. Deaths: leading causes for 2000. *Natl Vital Stat Rep*. 2002;50:1-85.
- Vital Statistics of the United States, 1991-Mortality*. Vol. II (part A). Hyattsville, Md: US Department of Health and Human Services; 1996.
- Brickmayer J, Hemenway D. Minimum-age drinking laws and youth suicide, 1970-1990. *Am J Public Health*. 1999;89:1365-1368.
- Mott JA, Wolfe I, Alverson CJ, Macdonald SC, Bailey CR, Ball LB, Moorman LE, Somers JH, Mannino DM, Redd SC. National vehicle emissions policies and practices and declining US carbon monoxide-related mortality. *JAMA*. 2002;288:988-995.
- Lester BY. Learnings from Durkheim and beyond: the economy and suicide. *Suicide Life Threat Behav*. 2001;31:15-31.
- Shah S, Hoffman RE, Wakew L, Marine WM. Adolescent suicide and household access to firearms in Colorado: results of a case-control study. *J Adolesc Health*. 2000;26:157-163.
- Brent DA. Firearms and suicide. *Ann N Y Acad Sci*. 2001;932:225-239.
- Rushon JL, Whitmire JT. Pediatric stimulant and selective serotonin reuptake inhibitor prescription trends: 1992 to 1998. *Arch Pediatr Adolesc Med*. 2001;155:560-565.
- Zito JM, Safer DJ, Dos Reis S, Gardner JF, Soeken K, Boles M, Lynch F. Rising prevalence of antidepressants among US youths. *Pediatrics*. 2002;109:721-727.
- Olfson M, Marcus SC, Weissman MM, Jensen PS. National trends in the use of psychotropic medications by children. *J Am Acad Child Adolesc Psychiatry*. 2002;41:514-521.
- Carlsten A, Waern M, Ekedahl A, Ranstam J. Antidepressant medication and suicide in Sweden. *Pharmacoepidemiol Drug Saf*. 2001;10:525-530.
- Isacsson G. Suicide prevention—a medical breakthrough? *Acta Psychiatr Scand*. 2000;102:113-117.
- Hall WD, Mant A, Mitchell PB, Rendle VA, Hickie IB, McManus P. Association between antidepressant prescribing and suicide in Australia, 1991-2000: trend analysis. *BMJ*. 2003;326:1008.
- Middleton N, Gunnell D, Whitley E, Dorling D, Frankel S. Secular trends in antidepressant prescribing in the UK, 1975-1998. *J Public Health Med*. 2001;23:262-267.
- Rihmer Z, Appleby L, Rihmer A, Belso N. Decreasing suicide in Hungary [letter]. *Br J Psychiatry*. 2000;177:84.
- Brent D, Perper J, Moritz G, Allman C, Friend A, Roth C, Schweers J, Balach L, Baugher M. Psychiatric risk factors for adolescent suicide: a case-control study. *J Am Acad Child Adolesc Psychiatry*. 1993;32:521-529.
- Shaffer D, Gould MS, Fisher P, Trautman P, Moreau D, Kleinman M, Flory M. Psychiatric diagnosis in child and adolescent suicide. *Arch Gen Psychiatry*. 1996;53:339-348.
- Emslie GJ, Heiligenstein JH, Wagner KD, Hoog SL, Ernest DE, Brown E, Nilsson M, Jacobson JG. Fluoxetine for acute treatment of depression in children and adolescents: a placebo-controlled, randomized clinical trial. *J Am Acad Child Adolesc Psychiatry*. 2002;41:1205-1215.
- Keller MB, Ryan ND, Strober M, Klein RG, Kutcher SP, Birmaher B, Hagino OR, Koplewicz H, Carlson GA, Clarke GN, Emslie GJ, Feinberg D, Geller B, Kusumakar V, Papthodorou G, Sack WH, Sweeney M, Wagner KD, Weller EB, Winters NC, Oakes R, McCafferty JP. Efficacy of paroxetine in the treatment of adolescent major depression: a randomized, controlled trial. *J Am Acad Child Adolesc Psychiatry*. 2001;40:762-772.
- Geller DA, Hoog SL, Heiligenstein JH, Ricardi RK, Tamura R, Kluszynski S, Jacobson JG. Fluoxetine treatment for obsessive-compulsive disorder in children and adolescents: a placebo-controlled clinical trial. *J Am Acad Child Adolesc Psychiatry*. 2001;40:773-779.
- March JS, Biederman J, Wolkow R, Safferman A, Mardekian J, Cook EH, Cutler NR, Dominguez R, Ferguson J, Muller B, Riesenberger R, Rosenthal M, Sallee FR, Wagner KD, Steiner H. Sertraline in children and adolescents with obsessive-compulsive disorder: a multicenter randomized controlled trial. *JAMA*. 1998;280:1752-1756.
- The Research Unit on Pediatric Psychopharmacology Anxiety Study Group. Fluvoxamine for the treatment of anxiety disorders in children and adolescents. *N Engl J Med*. 2001;344:1279-1285.
- Rynn MA, Siqueland L, Rickels K. Placebo-controlled trial of sertraline in the treatment of children with generalized anxiety disorder. *Am J Psychiatry*. 2001;158:2008-2014.
- Health Resources and Services Administration, Bureau of Health Professions. *Area Resource File (ARF) System* [database]. Fairfax, Va: Quality Resource Systems, Inc; 2000.
- National Center for Health Statistics. Compressed Mortality File, 1985-1989, 1994-1998 [database]. Hyattsville, Md: US Department of Health and Human Services; 1998.
- Office of Social and Economic Data Analysis Web site. Zip-Code to County Correspondence File. Columbia: University of Missouri. Available at: http://mcdc2.missouri.edu/sastools/sas_formats/Contents. Accessed October 24, 2001.
- CACI. *Sourcebook America* [CD-ROM]. Arlington, Va: ESRI Business Information Solutions; 2002.
- King RA, Riddle MA, Chappell PB, Hardin MT, Anderson GM, Lombroso P, Schall L. Emergence of self-destructive phenomena in children and adolescents during fluoxetine treatment. *J Am Acad Child Adolesc Psychiatry*. 1991;30:179-186.
- Isacsson G, Homgren P, Druid H, Bergman U. The utilization of antidepressants—a key issue in the prevention of suicide: an analysis of 5281 suicides in Sweden during the period 1992-1994. *Acta Psychiatr Scand*. 1997;96:94-100.
- Tollefson GD, Rampey AH, Beasley CM, Enas GG, Potvin JH. Absence of a relationship between adverse events and suicidality during pharmacotherapy for depression. *J Clin Psychopharmacol*. 1994;14:163-169.
- Muller-Oerlinghausen B, Berghofer A. Antidepressants and suicidal risk. *J Clin Psychiatry*. 1999;60(suppl 2):94-99.
- Barbui C, Campomori A, D'Avanzo B, Negri E, Garattini S. Antidepressant drug use in Italy since the introduction of SSRIs: national trends, regional differences, and impact on suicide rates. *Soc Psychiatry Psychiatr Epidemiol*. 1999;34:152-156.
- Gunnell D, Middleton N, Whitley E, Dorling D, Frankel S. Why are suicide rates rising in young men but falling in the elderly? a time-series analysis of trends in England and Wales, 1950-1998. *Soc Sci Med*. 2003;57:595-611.