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Original Contribution

Social Inequalities in Suicide: The Role of Selective Serotonin Reuptake Inhibitors

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We aimed to examine the relationship between socioeconomic status (SES) and suicide associated with the introduction and diffusion of selective serotonin reuptake inhibitors (SSRIs). Negative binomial regression was used to estimate county-level suicide rates among persons aged 25 years or older using death certificate data collated by the National Center for Health Statistics from 1968 to 2009; SES was measured using the decennial US Census. The National Health and Nutrition Examination Survey and the Medical Expenditure Panel Survey were used to measure SSRI use. Once SSRIs became available in 1988, a 1% increase in SSRI usage was associated with a 0.5% lower suicide rate. Prior to the introduction of SSRIs, SES was not related to suicide. However, with each 1% increase in SSRI use, a 1–standard deviation (SD) higher SES was associated with a 0.6% lower suicide rate. In 2009, persons living in counties with SES 1 SD above the national average were 13.6% less likely to commit suicide than those living in counties with SES 1 SD below the national average—a difference of 1.9/100,000 adults aged ≥25 years. Higher SSRI use was associated with lower suicide rates among US residents aged ≥25 years; however, SES inequalities modified the association between SSRI use and suicide.

history of medicine; selective serotonin reuptake inhibitors; social epidemiology; social inequality; socioeconomic status; suicide; United States

Abbreviations: MEPS, Medical Expenditure Panel Study; NHANES, National Health and Nutrition Examination Survey; SES, socioeconomic status; SSRI, selective serotonin reuptake inhibitor.

Approximately 37,000 deaths each year in the United States are due to suicide (1). It is the tenth most prominent cause of death, killing 3 times as many people as homicide, and in 2009 it accounted for approximately 1.5% of all-cause mortality among persons over age 10 years (1). The likelihood of committing suicide is distributed differently by sex, age, and race/ethnicity, with higher rates of suicide being reported among men, older persons, adolescents and young adults, and whites. However, the American Association for Suicidology does not list socioeconomic status (SES) as an associated risk factor (2). Of the few studies that have examined social determinants of suicide, many have focused on age, unemployment, and marital dissolution as triggers for suicide (3–6). In the latest review, Wray et al. (4) noted that no published studies have emerged linking SES and suicide in the United States. However, recent analysis of trends in South Korea suggests that broad class-based inequalities in suicide have existed since the 1990s and may be growing (7, 8), with similar trends emerging in US suicide data (9).

Why might social inequalities in suicide be emerging or changing? According to one theory, socioeconomic inequalities in health emerge in part because people marshal all of the resources at their disposal, including knowledge, money, power, prestige, and beneficial social connections, to secure access to effective preventive and therapeutic advances (10). When preventions are available, people with greater socioeconomic resources are better able to access and more effectively use health-promoting resources than those with fewer socioeconomic resources (11–14). Similarly, those who live in higher-SES areas are more likely to hear about, have access to, and visit institutions that provide new life-saving innovations (15–17).

At the individual level, it has been estimated that 90% of all suicides occur among persons with existing psychiatric

illnesses, particularly depression (18). Selective serotonin reuptake inhibitors (SSRIs) have been associated with reductions in the number and severity of depressive symptoms in adults, thereby potentially decreasing the likelihood of suicidal thoughts as well as subsequent suicidal behavior (19). Indeed, a recent systematic review suggested that SSRIs may reduce the risk of suicide by as much as 40% for persons aged 25 years or older (20). There has been a substantial push towards using SSRIs to treat depression: One report estimates that 1 in 10 Americans currently use antidepressants, including SSRIs (21). Concurrent with the increase in SSRI use has been a decline in age-adjusted suicide rates, which decreased from a high of 13.0/100,000 persons in 1986 to a low of 10.4/100,000 persons in 2000, though they have been increasing again of late (22). Similar ecological findings from around the world have led researchers to conclude that an increase in SSRI use is associated with reductions in suicide (23–26).

The role of socioeconomic inequalities may then relate to the provision of SSRI treatments if there are inequalities in how people seek help and the type of help they receive. Although suicidal behaviors can be effectively prevented through accurate diagnosis of suicidal symptomatology and treatment of underlying psychiatric disorders, only 64% of suicidal persons seek professional help (27). Of those who do seek help, SES is predictive of the type of help that people seek when contemplating suicide, with persons in higher-SES positions being more likely to seek help from psychiatric professionals (28). Furthermore, many of those who seek help do so from health-care providers who cannot adequately address their underlying mental health problems or prescribe SSRIs (29, 30). However, once people do obtain professional help, SES does not influence who receives SSRIs (31). Because of the unequal distribution of mental health services across disparate segments of the population, treatment of underlying psychiatric conditions with SSRIs is more common among persons of high SES than among their low-SES counterparts (32).

We tested the following hypotheses using data from the National Death Index for suicide and data from the US Census to create county-level indicators of SES. First, because of an increase in the preventability of suicide through the use of SSRIs, we expected to observe a significant reduction in the overall suicide rate following the introduction of SSRIs in 1988. Second, we hypothesized that there would be a significant increase in the impact of SES on suicide following the widespread dissemination of SSRIs, with rates of deaths attributable to suicide decreasing most dramatically in higher-SES areas.

METHODS

Data

We analyzed county-specific mortality rates calculated using mortality rates derived from 42 years of death certificates and midyear population counts derived from the US Census (33–35). We identified persons who died from suicide using *International Classification of Diseases* categories indicating death due to intentional self-harm (*International Classification of Diseases*, Eighth and Ninth revisions, codes E950–E959; *International Classification of Diseases*, Tenth Revision, codes X60–X84 and Y87.0). Deaths were compiled according to county of residence; nonresident US citizens were excluded from analysis. Individual age (in 10-year age groups), sex, and race were recorded on death certificates. We included information on 99% of counties in the continental United States and Hawaii ($n = 3{,}110$). We excluded counties whose borders were substantially altered during the study period. We limited our sample to adults aged 25 years or more, because the use of SSRIs has not been related to a decrease in suicide risk for younger persons (36) and because SSRIs are not clearly effective in treating depression among persons under age 25 years (37–39). We included information for blacks and whites, but we excluded data on persons of "other" races because of a lack of comparability in racial categories over time. We weighted the analyses using the 2000 standard US population. The analytical sample incorporated 6.23 billion person-years (Table 1).

Covariates

For the independent variable of interest, we created an aggregate measure of SES for each county in the United States using Census data from 1970, 1980, 1990, and 2000. Our measure of SES was based on 5 distinct variables: the proportion of individuals in each county with fewer than 9 years of education; the proportion of individuals in each county with more than 12 years of education; the proportion of individuals in each county with white-collar occupations; the proportion of families at or above the federally defined poverty level; and the proportion of households with access to a telephone (40). Use of principal-components analysis provided a single-factor solution, with 1 dominant eigenvalue and factor weights of 0.90, 0.97, 0.72, 0.74, and 0.86, respectively. We employed principal-components analysis to ensure that all 5 variables were capturing a single underlying construct. We linearly interpolated data to estimate this aggregate SES measure for intercensal years.

To assess SSRI use, we relied on 2 data sets to estimate population-weighted rates of race-, age-, region-, and sex-specific SSRI usage for persons aged 25 years or above. For 1996–2009, we used data from the Medical Expenditure Panel Survey (MEPS), which was designed to be representative within census regions and which interviewed 13,000–22,000 subjects per year, with response rates ranging from 62.8% to 78.0%. In the survey, respondents list prescription medications they have taken over the course of the past year; further information about type, dosage, and expenditure on prescription medications is collected from respondents' pharmacies (41). Because MEPS data were not available prior to 1996, we used complementary data from 2 waves (1988–1991 and 1991–1994) of the National Health and Nutrition Examination Survey (NHANES) (response rate = 86%) (42). To record SSRI use, NHANES interviewers asked respondents (numbering approximately 8,000 per wave) to show their current prescription medication bottles. We averaged data from the 2 NHANES waves to estimate a result for 1991 and further interpolated results at the national level to estimate SSRI usage in 1995; we set SSRI use prior to 1988 to zero. SSRI use increased rapidly between the NHANES and MEPS assessments; therefore, we

Table 1. Numbers of Suicides per Person-Year and Estimated Percentage of Persons Using Selective Serotonin Reuptake Inhibitors in Each Year, United States, 1968–2009[a]

Year	Estimated SSRI Use, %	No. of Suicides	No. of Person-Years	Crude Suicide Rate per 100,000 Adults Aged ≥25 Years
1968	0	18,546	106,230,670	17.46
1969	0	19,098	107,425,900	17.78
1970	0	19,790	108,492,600	18.24
1971	0	20,036	110,196,550	18.18
1972	0	20,558	112,584,090	18.26
1973	0	20,357	114,597,890	17.76
1974	0	20,638	116,567,770	17.70
1975	0	21,610	118,495,090	18.24
1976	0	21,388	120,640,690	17.73
1977	0	22,285	122,916,050	18.13
1978	0	21,469	125,326,460	17.13
1979	0	21,233	127,862,980	16.61
1980	0	20,893	129,813,330	16.09
1981	0	21,646	132,730,840	16.31
1982	0	22,364	135,143,200	16.55
1983	0	22,604	137,497,690	16.44
1984	0	23,353	139,816,720	16.70
1985	0	23,381	142,065,910	16.46
1986	0	24,803	144,433,160	17.17
1987	0	24,847	146,663,450	16.94
1988	0.43	24,479	148,731,560	16.46
1989	0.43	24,623	150,734,000	16.34
1990	0.43	25,247	152,138,190	16.59
1991	0.52	25,228	155,146,300	16.26
1992	0.61	24,912	157,449,810	15.82
1993	0.61	25,280	159,594,750	15.84
1994	0.61	25,150	161,702,410	15.55
1995	2.36	25,466	163,903,230	15.54
1996	4.11	25,479	166,098,880	15.34
1997	4.74	25,243	168,084,950	15.02
1998	5.22	25,316	169,836,690	14.91
1999	5.35	22,393	171,478,250	13.06
2000	5.85	22,482	172,665,810	13.02
2001	6.82	23,586	174,739,300	13.50
2002	7.63	24,375	176,465,660	13.81
2003	7.69	24,280	178,158,410	13.63
2004	8.29	24,783	180,053,440	13.76
2005	8.50	25,051	182,174,610	13.75
2006	8.26	24,185	183,394,590	13.19
2007	7.62	25,206	185,493,080	13.59
2008	7.97	26,408	187,490,230	14.09
2009	8.28	26,936	189,829,170	14.19
Total	2.44	977,007	6,234,864,360	15.67

Table continues

Table 1. Continued

Abbreviation: SSRI, selective serotonin reuptake inhibitor.

[a] Data were obtained from the National Center for Health Statistics Compressed Mortality File (1968–2009), the National Health and Nutrition Examination Survey (1988–1994), and the Medical Expenditure Panel Survey (1996–2009).

provide trends in SSRI use using NHANES data (see Web Figure 1, available at http://aje.oxfordjournals.org/) and further examined the sensitivity of the results to data source.

Gun ownership is often considered to be a prime determinant of suicide risk (43); we incorporated the national gun ownership rate using data from Gallup polls (Gallup, Inc., Washington, DC) conducted from 1968 to 2009, which asked respondents whether they had a gun in their house (44). Finally, because financial crises are often marked by suicide as households face economic hardship (45), we marked years with stock market crashes, defined as broad double-digit declines in stock prices. We examined the sensitivity of results using annual county-level unemployment rates. All analyses were completed using Stata 13/IC (StataCorp LP, College Station, Texas).

Analysis

For descriptive analyses (shown in Figure 1), we calculated yearly age-, race-, and sex-standardized suicide rates, using direct standardization on cell-specific death and midyear population counts; we used linear regression on aggregate rates to obtain descriptive trends using the following equation: rate = $\beta_0 + \beta_1$year + β_2SSRI use. We relied on negative binomial regression to predict suicide rates in a multivariate context. Negative binomial regression assumes that data are gamma-distributed with $E(y) = \lambda$, and the model is fitted using maximum-likelihood estimation: $\ln(\lambda) = \boldsymbol{X\beta}$. A negative binomial is preferable to Poisson regression when data are overdispersed ($\alpha > 0$), which occurs when the outcome's variance is larger than the mean (46). Age-, sex-, and race-specific population counts for each county were used to capture the population at risk of suicide. Both descriptive and multivariate analyses were weighted to the 2000 US population. Because of repeat measurement at the county level, we used Huber-White clustered standard errors (47). For ease of interpretation, we provide mortality rate ratios and their 95% confidence intervals. A mortality rate ratio of 1.05 suggests that 1 unit of change in SES is associated with a 5% increase in suicide risk.

We expected suicide rates to decrease following the introduction of SSRIs in January 1988 (48). We constructed a baseline model (model 1) adjusting for gun ownership, financial crises, age, sex, race, SES, and SSRI use. To examine

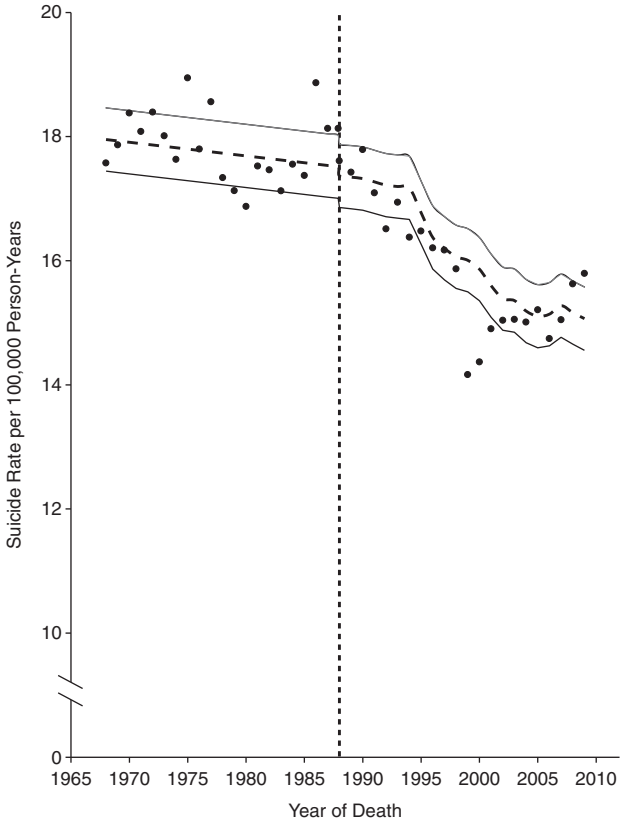

Figure 1. Yearly age-, sex-, and race-adjusted suicide rates (black dots) and yearly trends reflecting selective serotonin reuptake inhibitor (SSRI) usage (long-dashed line) with 95% confidence intervals (solid lines), United States, 1968–2009. The year of SSRI introduction (1988) is indicated by the vertical dashed line. Data were obtained from the National Center for Health Statistics Compressed Mortality File.

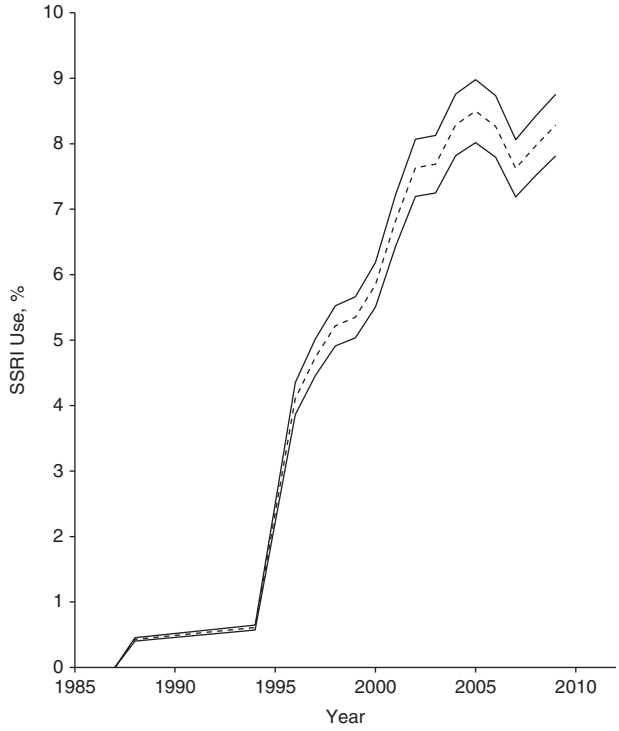

Figure 2. Selective serotonin reuptake inhibitor (SSRI) use among persons aged 25 years or more (dashed line) and its 95% confidence interval (solid lines), United States, 1985–2009. Data were obtained from the National Health and Nutrition Examination Survey (1991–1994) and the Medical Expenditure Panel Survey (1996–2009).

how SES changed, we then included a term for interaction between SES and SSRI use (model 2), which separated SES-related associations existing prior to the introduction of SSRIs (when SSRI use was set to 0) from those existing when SSRI use was increasing. To better clarify results from these models, we estimated population averages in graphical analyses. To compare the fit of negative binomial models, we used the Akaike Information Criterion (49).

RESULTS

Figure 1 illustrates changes in age-, sex-, and race-adjusted suicide rates over a period of 42 years. We found that prior to 1988, deaths attributable to suicide were decreasing slightly ($P < 0.05$) at a rate of −0.07 per 100,000 adults aged ≥25 years. With the introduction and increasing use of SSRIs, the number of suicides declined more rapidly at a rate of −0.022 per 100,000 adults aged ≥25 years for every 1% increase in SSRI use ($P < 0.05$).

Figure 2 provides estimated trends in yearly SSRI use. First, SSRI use was zero in 1987, before SSRIs were made available. Once SSRIs were introduced, we observed a slow increase in SSRI use until 1994. This relatively slow climb was followed by a period of rapid increase in SSRI use in the mid- to late 1990s. This rapid rise then tapered off somewhat and peaked at 8.5% in 2005, having declined somewhat since.

To capture the association between SES and suicide and determine the extent to which this relationship depended on SSRI utilization, we used negative binomial regression models (Table 2). Model 1 shows that SSRI use was associated with a reduction in suicide: A 1% increase in SSRI use was associated with a 0.5% decrease in suicide risk. Assessed over the entire period (1968–2009), SES showed a protective association with suicide; however, this result did not test whether that association had changed with the changing availability of SSRIs. As a result, we next incorporated an interaction term that multiplied SES by SSRI use (model 2), resulting in a better-fitting model. We found that prior to the advent of SSRIs, SES was not significantly associated with suicide ($P = 0.086$). However, once SSRIs became available, the protective association of SES with deaths attributable to suicide increased by 0.6% ($1 - 0.994 \times 100$) for each 1% increase in SSRI use.

We used the results shown in model 2 of Table 2 to obtain population averages estimating the relative impact of SSRI use in counties with SES 1 standard deviation above the

Table 2. Mortality Rate Ratio for Suicide According to Use of Selective Serotonin Reuptake Inhibitors and Socioeconomic Status, United States, 1968–2009[a,b]

Risk Measure	Model 1[c]		Model 2[d]	
	MRR	95% CI	MRR	95% CI
Per year	0.994	0.993, 0.996[e]	0.995	0.993, 0.996[e]
SSRI use, per 1% increase	0.995	0.993, 0.997[e]	0.998	0.995, 1.000[f]
SES, per 1-SD increase	0.965	0.940, 0.990[g]	0.979	0.955, 1.003
SSRI use × SES			0.994	0.992, 0.997[e]

Abbreviations: AIC, Akaike Information Criterion; CI, confidence interval; MRR, mortality rate ratio; SD, standard deviation; SES, socioeconomic status; SSRI, selective serotonin reuptake inhibitor.

[a] Data were obtained from the National Center for Health Statistics Compressed Mortality File.

[b] Analyses were weighted to the 2000 US population. Exposure was modeled using the midyear population. All models additionally adjusted for individual race, sex, and age; gun ownership rates; and stock market crashes. *P* values were derived from *z* tests.

[c] Model 1: $\ln(\lambda) \sim$ year + SSRI + SES + covariates (race, sex, age, gun ownership rates, and stock market crashes); AIC = 387,097.

[d] Model 2: $\ln(\lambda) \sim$ year + SSRI + SES + (SES × SSRI) + covariates (same as those in model 1); AIC = 387,064.

[e] $P < 0.001$.

[f] $P = 0.032$.

[g] $P = 0.007$.

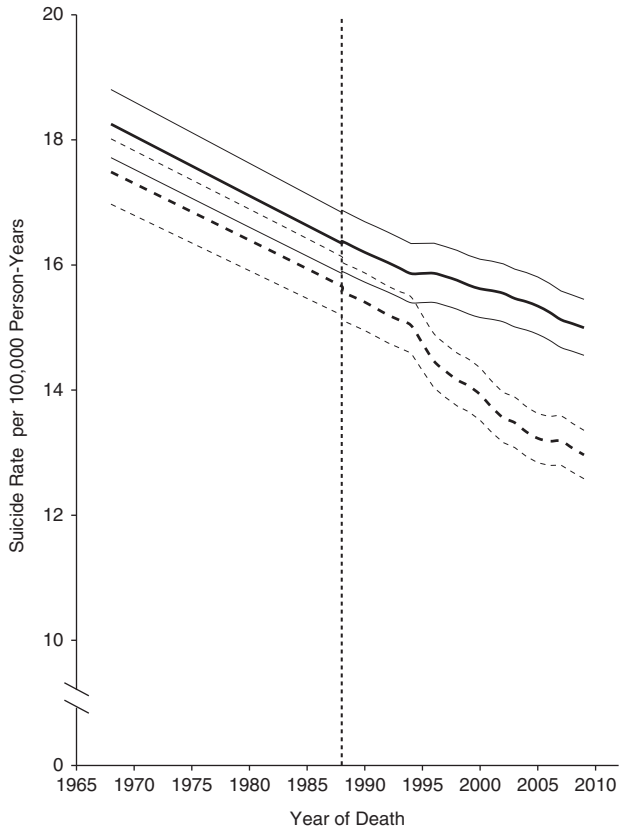

Figure 3. Suicide rates for persons living in counties with a socioeconomic status 1 standard deviation above the national average (thick black dashed line) and 1 standard deviation below the national average (thick black solid line), with associated 95% confidence intervals (matching thin dashed and solid lines, respectively), United States, 1968–2009. The year of selective serotonin reuptake inhibitor introduction (1988) is indicated by the vertical dashed line. Data were obtained from the National Center for Health Statistics Compressed Mortality File.

population average and counties with SES 1 standard deviation below the population average. As Figure 3 shows, prior to 1988 there was no significant association between SES and suicide, but upon the distribution of SSRIs, there was a substantial decrease in suicide in high-SES counties and no decrease in lower-SES counties. By 2009, this resulted in a suicide risk that was 13.6% lower in counties with SES 1 standard deviation above the population average than in counties with SES 1 standard deviation below: a difference of 1.9 fewer suicides per 100,000 adults aged ≥25 years. Sensitivity analyses adjusting for yearly unemployment rates and using national-level SSRI usage rates derived solely from NHANES data did not change these conclusions; specifically, the association of the static measure of SES with suicide remained nonsignificant, while the interaction between SES and SSRI use remained significant.

DISCUSSION

We linked age-, race-, sex-, and geographic area-specific data on SSRI use to population-level death certificate data on suicides in the United States for the period 1968–2009 to examine how social inequalities in suicide emerged in relation to the timing of the introduction and dissemination of SSRIs to treat depression and prevent suicide. First, we demonstrate a significant decline in suicide rates following the advent of SSRIs and their widespread use: SSRI use was associated with decreases in suicide rates. Second, we found that socioeconomic inequalities played an increasingly important role in the population patterning of deaths attributable to suicide. In 2009, residents of counties with SES 1 standard deviation above the population mean faced a 13.6% lower risk of suicide than residents of counties with SES 1 standard deviation below the mean; this was not the case in 1988, when persons of all SES levels faced similar risks of suicide.

Limitations

Our study had some limitations. We relied on aggregate county-level data for analysis and could not examine individual-specific behaviors that might also affect risk of suicide, such as alcohol intake or use of psychotherapy, nor could we causally link SSRI use to the broad reduction in suicide rates. However, our results support prior work showing that increases in SSRI use are accompanied by decreases in suicide rates (50). Suicide, though it is one of the top 10 causes of death in the United States, remains relatively rare; thus, studying the role of treatment requires very large

samples. Though they were ecological in nature, our data were uniquely powered to study suicide, SSRI use, and SES.

These data included suicide counts generated from death certificates, which are susceptible to misclassification if religious or traditional values lead to underreporting of suicide (4). In such cases, misclassification is likely to be stable over time. To account for these results, suicides would have to have been increasingly underreported in counties with higher SES, beginning in the late 1980s—an unlikely scenario.

We could not causally identify which individuals were taking SSRIs, whether SSRI users were less likely to commit suicide, or the types of clinical problems for which people were being prescribed SSRIs. Examining causality, investigators in 1 forensic case-control study in Sweden noted that the toxicology of suicide victims was weighted towards non-SSRI antidepressants (51), though a prospective case-control study in Canada found no difference in suicide between SSRI users and those using other antidepressants (52). One way to examine causality might be to consider the impact of SSRI use in places where mental health services are available versus places where they are not, under the theory that SSRIs will be more effectively used in places where appropriate health care is available. A 2009 study which examined regional distributions in the availability of mental health care in the United States found that although service accessibility was not good overall, it was passable in 6 states and "failing outright" in 6 states (53). If we limit our analysis to these 12 states, SSRI use has no relationship with suicide in states with failing mental health systems (mortality rate ratio = 0.995, $P = 0.128$) but a strong relationship in states where mental health services are passable (mortality rate ratio = 0.972, $P < 0.001$). We are not aware of any other reason why SSRI treatment, SES, and suicide might be linked, nor are we aware of any reason why SES would not be linked to suicide prior to 1988.

One alternative explanation that we could not directly test is that decreases in the prevalence of depression, unrelated to treatment, have been concentrated in higher-SES counties. None of the evidence on this issue has suggested that the prevalence of depression has declined (54–56). In the MEPS data, the number of persons receiving mental health care for depression *increased* by 74% from 1999 to 2009 (57). Tracking the experience of depression over time is made difficult by changes in how people understand and report depression, partly because of interest in effective treatment. Crucially, direct-to-consumer advertising has encouraged people to label ordinary feelings of sadness as depression, thereby increasing rates of diagnosed depression in the current era. This is one reason we look to suicide as an indicator of population health; however, it also highlights the need for future research examining secular trends in depression rates.

Data on SSRI usage at the county level were not available, leading us to use regional (MEPS) or national (NHANES) rates as the next best approximation. At the same time, switching data sources could have introduced bias. It was therefore important to examine whether the 2 approaches gave consistent results. We observed a rapid rise in SSRI use between 1991 and 1994 when using NHANES data and in 1996 when we began using MEPS data, though neither data set included measures for 1995. In our data, NHANES (which has measured SSRI usage biennially since 1999/2000, in addition to the 1988–1991 and 1991–1994 surveys) showed an explosion in SSRI usage similar to that of MEPS (Web Figure 1). This rapid rise is further supported by SSRI prescription data, which show a slow uptake between 1988 and 1993, a period when the number of prescriptions remained relatively stable (approximately 10 million), and then a rapid increase in the mid-1990s, so that nearly 21 million SSRI prescriptions were filled in the United States in 1996 (50). Use of NHANES data, rather than the MEPS data presented here, does not change conclusions.

SSRI treatment and SES

Depression, a driving force behind suicidal behaviors, is a psychiatric disorder that remains underdiagnosed and undertreated in the United States (28). This condition is typically treated using a variety of approaches such as psychotherapy and pharmacology, including but not limited to SSRI antidepressants (58). SSRI treatment is not the only treatment available for depression; trained psychotherapists should evaluate patients and provide a full range of options. However, recent research has highlighted the effectiveness of SSRI treatment in preventing suicide (19, 20, 59, 60). Our results support this view, showing that following the widespread introduction of SSRIs for treatment of depression in 1988, suicide rates among adults aged 25 years or older decreased.

We found that SSRI use increased rapidly until peaking in 2005, with 8.5% of the US population aged ≥25 years reporting use. Such a pattern is similar to that of suicide trends, which hovered around 10.7 per 100,000 US population in the early 2000s and had risen to 12.0 per 100,000 by 2010 (22). The rise in suicide since 2006 may represent significant stress during the financial crisis of 2008–2009, which was accounted for in our models. Also likely, this increase may represent a significant change in Medicaid policy, which, though focused on increasing coverage, caused Medicaid prescription volumes and payments to rapidly drop in 2006 and recover slowly thereafter (61).

Broad SSRI treatment is unlikely to be a good way to prevent suicide. Many people experience side effects when using SSRIs: 59% of users report such side effects, including drowsiness, weight gain, insomnia, and tremors (62). SSRI use during pregnancy has been linked to increased risk of neonatal morbidity (63). SSRI use has been linked to an increase in suicidality in younger populations (36), though this link is in dispute (64, 65). Finally, some users experience symptoms of withdrawal when stopping SSRI treatments (66). We estimate that 8% of the US population aged ≥25 years, approximately 9 million people, are currently taking SSRI antidepressants. Future attempts to reduce suicide rates should focus on targeting persons at greatest risk of suicide and those who respond best to SSRI treatment.

Prior research has posited that when effective prevention methods are found, people and groups with more resources will secure access to those services in a timelier and more effective manner than those with fewer resources (11, 13, 67). Many people who commit suicide have sought professional help in the months leading up to their death, yet few who are seen by health-care professionals, including physicians, are

prescribed SSRIs or referred to mental health professionals for treatment (29, 30). When seeking help for depression, persons with greater financial resources tend to access mental health professionals more often than other sources of medical and nonmedical care (28). We found support for the theory that SES-based disparities in suicide arose with the widespread dispersal of SSRIs, which were concentrated in areas of higher SES.

Public health interventions, better medical treatments, and improving social conditions have lengthened life and improved health in the United States, yet social inequalities in all-cause (68) and cause-specific (13, 14, 17, 67) mortality are rapidly increasing. Social inequalities are both inequitable and inefficient: They delay the elimination of disease and cause such diseases to disproportionately impact the most vulnerable. To avoid this, we need engaged research programs that focus on understanding the emergence of social inequalities in disease, and we further need to actively attack social inequalities when life-saving technologies are introduced and distributed. Indeed, we need to recognize that social inequalities can arise or worsen not *despite* human intervention but rather *because* of it (11).

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