

# Racial Differences in Antidepressant Treatment Preceding Suicide in a Medicaid Population

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**Objective:** African Americans have less use of antidepressants than whites, suggesting racial differences in the diagnosis and treatment of mood disorders. This study assessed whether this racial disparity is present among patients with a very high risk of severe mood disorders—that is, those with completed suicides. **Methods:** Completed suicides that occurred between 1986 and 2004 were identified by examining records of Tennessee Medicaid/TennCare enrollees aged 18 to 84 years who had no serious medical illness or chronic psychosis. Use of antidepressants in the 365 days before the suicide was ascertained from filled prescriptions. Unconditional logistic regression was used to adjust for racial differences in demographic characteristics and somatic comorbidity. **Results:** The study included 127 African Americans and 1,379 whites who completed suicide. African Americans had significantly reduced odds of receiving treatments for mood disorders in the year preceding the suicide: 29% of African Americans had filled an antidepressant prescription, compared with 51% of whites (adjusted odds ratio=.43, 95% confidence interval=.26–.71,  $p<.001$ ). In contrast, there was no significant difference between the two racial groups in the proportions filling prescriptions for antipsychotic medications (13% of African Americans and 11% of whites). These findings persisted after the analysis controlled for other comorbidities linked with suicide, including alcohol or substance abuse, seizure disorders, borderline personality disorder, and serious neurological conditions. **Conclusions:** Although there are several other potential explanations, the study findings provide indirect evidence that there is underdiagnosis or undertreatment of African Americans with serious mood disorders. Further research on this question in African-American populations is essential. (*Psychiatric Services* 58:1317–1323, 2007)

The adverse clinical, social, and economic consequences of major depression are well known (1). Furthermore, it is recognized that depression remains substantially un-

dertreated—that is, “the vast majority of patients with chronic major depression are misdiagnosed, receive inappropriate or inadequate treatment, or are given no treatment at all” (1). Thus

research to identify factors associated with undertreatment is crucial.

African-American race may be associated with underdiagnosis and undertreatment. Data from prospective epidemiological studies using careful examination of respondents with structured, validated instruments indicate a very similar prevalence of serious mood disorders among African Americans and whites (2,3). Despite this, studies of medical care utilization have shown that compared with whites, African Americans are half as likely to have outpatient office visits that result in a depression diagnosis or to receive antidepressant pharmacotherapy (4, 5). Also, antidepressant use is lower among African Americans when they self-report depression (6) or when a physician diagnosis suggests depressive symptoms (7).

However, the medical care utilization studies suggesting underdiagnosis and undertreatment of depression among African Americans may include many patients with other mental disorders or with less serious mood disorders. A substantial fraction of the antidepressants prescribed in outpatient practice are for indications other than depression (8). Similarly, the treatment of depressive symptoms in outpatient practice, the majority of which is provided by non-mental health specialists, may include a heterogeneous spectrum of depressive clinical presentations. This suggests that one potential explanation of the medical care utilization studies is the more frequent use of antidepressants in white populations

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for less serious mood symptoms or for other problems. Thus there is a need for data on whether the recognition and treatment of depression differs according to race among patients with serious mood disorders.

Completed suicides offer an opportunity to address this question. Nearly all adults with completed suicides have major psychiatric illness, predominantly serious mood disorders (9). There is no compelling evidence that suicide has a different etiology among African Americans than among whites. This would argue that in a population-based series of suicides, after the exclusion of patients with nonaffective psychoses, the prevalence of mood disorders should not vary according to race. This, in turn, would suggest that, absent racial differences in the diagnosis and treatment of depression, the prevalence of antidepressant therapy preceding the suicide should not vary according to race.

We thus conducted a study of completed suicides among persons enrolled in Tennessee's Medicaid program. These data permitted us to identify a population-based series of completed suicides and to assess antecedent antidepressant therapy. The study population had the further advantage of equal financial access to medical care, which eliminated one potential confounder present in studies conducted in the general population.

## Methods

### *Population and sources of data*

The study was conducted in the Tennessee Medicaid/TennCare population from 1986 to 2004, during which time the need for treatment of mood disorders has been generally recognized (1). A research database for this population permitted identification of completed suicides with linkage to prior medication use and both somatic and mental comorbidity (10). Medicaid, the joint federal-state program that finances medical care for qualifying low-income persons (10,11), now accounts for 12.4% of total national health care expenditures (12) and includes disproportionate numbers of African Americans and persons from other minority groups (10,12,13). In 1994 Tennessee Medicaid was expanded by means of a federal waiver

to include persons with low-to-moderate income who lacked health insurance but did not meet federal Medicaid eligibility requirements (the TennCare enrollees) (14,15).

TennCare files utilized by the study included those for enrollment, pharmacy, inpatient admissions, outpatient visits, and nursing homes. The enrollment file is a central registry of all enrollees, which has been linked with death certificates for Tennessee residents (10). It includes both demographic information and the beginning and ending dates of periods of enrollment. The pharmacy file records all outpatient and nursing home prescriptions filled at the pharmacy; there is now agreement that such files are one of the best sources of information on longitudinal drug use in large populations (16–18). The inpatient file records hospital admissions; the outpatient file records visits to emergency rooms, hospital outpatient departments, outpatient surgical facilities, and physicians; and the nursing home file identifies nursing home stays. The inpatient and outpatient files included up to five diagnoses, coded according to the *ICD-9-CM* system.

### *Qualifying suicides*

The study included decedents 18 to 84 years of age of African American or white race whose death certificates indicated a completed suicide during the study period (*ICD-9* codes E950–E958 or E980–E988 for 1986–1998 and *ICD-10* codes X60–X84 or Y10–Y34 for 1999–2004) and who were enrolled in Medicaid/TennCare on the date of the suicide (the death date or date that terminal medical care began). The primary analysis included the codes for injuries of undetermined intent because in Tennessee these are thought to predominantly consist of suicides (personal communication, Health Department, Bureau of Vital Statistics, 2006) and because there is evidence that African-American suicides may be more likely to be coded into this category (19). A secondary analysis that excluded codes indicating undetermined intent also was performed.

The study group was further restricted to persons with at least 365 days of enrollment before the suicide

(which allowed ascertainment of comorbidity and use of medications) and with no evidence of a pregnancy during this period (which might have inhibited use of antidepressants). We also excluded patients with serious somatic illnesses, including stroke, heart failure, cancer, HIV, renal failure, liver failure, and dementia and those with an organ transplant. We also sought to exclude persons with recognized chronic psychotic illness, defined as those who had an inpatient or physician diagnosis indicating psychosis (other than a mood disorder) or any use of antipsychotic medications in the first 90 days of the year preceding the date of the suicide.

### *Study variables*

Study variables included the decedent's demographic characteristics as of the date of death, including age, gender, residence in a Standard Metropolitan Statistical Area, and type of Medicaid/TennCare enrollment. They also included information on somatic illness, mental illness, and use of psychotropic medications during the 365 days preceding the suicide.

Somatic illnesses examined included several diseases linked with increased risk of suicide. Also examined were medications prescribed for common comorbidities. The former included seizure disorders (defined as a diagnosis of epilepsy, diagnoses indicating recurrent afebrile seizures, or chronic use of an anticonvulsant not used for mood disorder) and other serious neurological illnesses (Huntington's chorea, multiple sclerosis, and cerebral palsy). We also identified patients with diagnoses indicating a possible suicide attempt in the past year as well as other injuries or poisoning. Medications examined included those for analgesia or treatment of musculoskeletal disorders, antimicrobials, medications for gastrointestinal disorders, cardiovascular and antidiabetic medications, as well as other nonpsychiatric medications. We also identified hospital admissions, emergency department visits, and other outpatient encounters with nonpsychiatric diagnoses.

Medical care encounters for mental illness were identified from the primary diagnosis for hospital admis-

sions and outpatient visits, including emergency department visits and other outpatient encounters. Mood disorders were classified as bipolar disorders, linked to particularly elevated risk of suicide (9), or as other mood disorders. The latter included schizoaffective psychosis, major depression, dysthymia, and other mood disorders. Patients with borderline or antisocial personality disorders were identified because this group is thought to have elevated suicide risk (9). Other indicators of mental comorbidity included a diagnosis of an anxiety state, a diagnosis of other mental illness, or an inpatient admission for mental illness.

Psychotropic medications examined in this study were those with plausible use among patients at high risk of suicide. These included antidepressants (tricyclic antidepressants, monoamine oxidase inhibitors, serotonin reuptake inhibitors, serotonin-norepinephrine reuptake inhibitors,

and atypical antidepressants; in one analysis these were classified according to whether the dosage used is considered adequate to treat depression [20–22]), lithium and other mood stabilizers (valproic acid, divalproex, carbamazepine, gabapentin, or lamotrigine in the absence of a seizure disorder or isolated seizure), and antipsychotic medications.

### Analysis

The rates of suicide among African Americans and whites were calculated by using as a denominator the age- and sex-specific annual mid-year (July 1) Medicaid/TennCare enrollment. To improve comparability with other populations, the numerator for these rates included suicides with evidence of chronic psychosis.

For African Americans and whites with completed suicides, we compared the proportions with prescriptions for the psychotropic drugs examined in this study. The proportions

were compared for the two racial groups by calculating odds ratios, using whites as the reference category. Unconditional logistic regression was used to control for potential differences in demographic characteristics and somatic comorbidity. We determined a priori that the regression model would include demographic characteristics (age, gender, calendar year, residence in a Standard Metropolitan Statistical Area, and enrollment linked to disability), as well as indicators of frequency of medical care encounters (an inpatient or outpatient encounter in the past year or past 90 days), serious somatic illness (nonpsychiatric hospitalization in the prior year), or somatic symptoms for which an antidepressant might be prescribed (gastrointestinal illness). These variables were in the model because they were plausibly associated with suicide or prescription of an antidepressant medication. The other study variables (Table 1) were as-

**Table 1**

Characteristics of Tennessee Medicaid/TennCare enrollees who completed suicides between 1986 and 2004

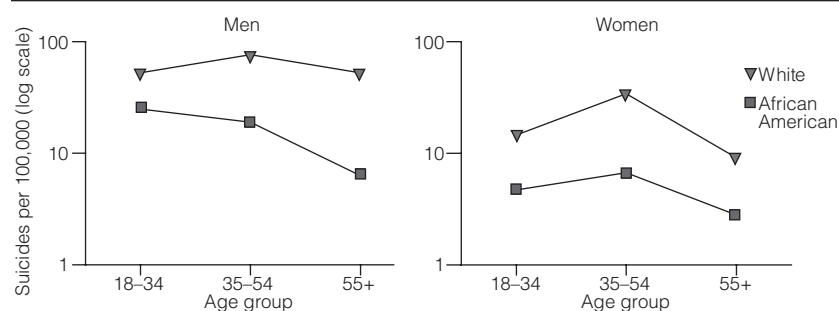
Variable	African American (N=127)		White (N=1,379)		p <sup>a</sup>
	N	%	N	%	
Age (M±SD)	33.4±13.6		42.4±14.1		<.001
Male	79	62	955	69	.124
Residence in Standard Metropolitan Statistical Area	111	87	681	49	<.001
Neighborhood's income in the lowest quartile	51	40	261	19	<.001
Disabled or blind	61	48	683	50	.818
Uninsured	19	15	472	34	<.001
Enrolled in Aid to Families With Dependent Children or other Medicaid	47	37	224	16	<.001
Suicide date before 1995	39	31	237	17	<.001
Medical care encounters in the past 365 days <sup>b</sup>					
Any medical care (includes filled prescription)	107	84	1,255	91	.016
Inpatient or outpatient encounter	99	78	1,227	89	<.001
Inpatient or outpatient encounter, past 90 days	71	56	1,007	73	<.001
Medications in past 365 days <sup>b</sup>					
Any prescription medication	93	73	1,186	86	<.001
Any medication, not psychotropic	83	65	1,158	84	<.001
Analgesics or other musculoskeletal drugs	58	46	965	70	<.001
Antimicrobials	52	41	841	61	<.001
Gastrointestinal medications	36	28	676	49	<.001
Cardiovascular medications	34	27	496	36	.053
Other medications	56	44	896	65	<.001
Inpatient hospitalization, somatic <sup>b</sup>	23	18	386	28	.020
Emergency department visit, somatic <sup>b</sup>	65	51	800	58	.152
Other outpatient, somatic <sup>b</sup>	88	69	1,186	86	<.001
Seizure disorder <sup>b</sup>	5	4	124	9	.078
Injury or poisoning, unlikely to be a suicide attempt <sup>b</sup>	25	20	427	31	.013
Injury or poisoning consistent with a suicide attempt <sup>b</sup>	9	7	262	19	.001
Serious neurological disorder <sup>b</sup>	0	—	14	1	.519

<sup>a</sup> The p values were calculated by continuity-corrected chi square or t test.

<sup>b</sup> Standardized to the age distribution of the entire study population by the direct method

**Figure 1**

Rates of completed suicide between 1986 and 2004 among Tennessee Medicaid/TennCare enrollees, by sex and race



sessed in a single alternative model but ultimately not included in the analysis because they were either not significant or did not materially affect estimated odds ratios (change of >10%). Diagnosed mental illnesses were not included in the model because these are likely to be on the causal pathway for the decision to prescribe an antidepressant.

All statistical analyses were performed with SAS 9.1. All *p* values are two sided. The study analysis used anonymized files without personal identifiers and thus was classified as exempt by the Vanderbilt Committee for the Protection of Human Subjects.

## Results

In the study population, whites had a greater rate of suicide than African Americans (Figure 1). For each age group, compared with the rates for African-American men and African-American women, respectively, the rates were increased more than twofold for white men and threefold for white women. Among men, the rates were highest among persons aged 35 to 54 years for whites (77 per 100,000) and among persons aged 18 to 34 years for African Americans (25 per 100,000). Among women, rates were highest for the age group 35 to 44 years both for whites (34 per 100,000) and for African Americans (seven per 100,000).

The analysis of antidepressant use in the 365 days before the suicide completion included 1,506 persons with completed suicides: 127 African Americans and 1,379 whites. Compared with whites who completed suicide, African Americans who completed sui-

cide were younger (mean age of 33 years versus 42 years) and more likely to live in urban areas and in low-income neighborhoods (Table 1). Nearly one-half of African Americans and whites who completed suicide were enrolled in Medicaid/TennCare because of disability. Among the remaining persons, enrollment for African Americans most often was through Aid to Families With Dependent Children, or Temporary Assistance for Needy Families, whereas that for whites was from TennCare's supplemental coverage for the uninsured.

Most of the study group had had medical care encounters in the year preceding the suicide (Table 1). After the analysis adjusted for age, 84% of African Americans and 91% of whites had some encounter; 78% and 89%, respectively, had either an inpatient admission or outpatient visit; and 73% and 86%, respectively, had filled a medication prescription. In the 90 days preceding the suicide, 56% of African Americans and 73% of whites had either an inpatient admission or outpatient visit.

The study group had substantial somatic comorbidity in the year preceding the suicide (Table 1). Sixty-five percent of African Americans and 84% of whites had filled prescriptions for nonpsychotropic medications, most commonly analgesics or other drugs for musculoskeletal disorders, antimicrobials, gastrointestinal medications, and cardiovascular medications. For a somatic diagnosis, 18% of African Americans and 28% of whites had an inpatient admission; 51% and 58%, respectively, had an emergency room visit; and 69% and 86%, respec-

tively, had other outpatient encounters. Four percent of African Americans and 9% of whites had evidence of a seizure disorder; however, fewer than 1% had serious neurological disorders linked with increased risk of suicide. Twenty percent of African Americans and 30% of whites had a prior injury or poisoning, and 7% and 19%, respectively, had had medical care for an injury consistent with a possible suicide attempt.

The study group also had a high prevalence of medical care for mental illness in the year preceding the suicide (Table 2). Thirty-seven percent of African Americans and 49% of whites had inpatient admissions or outpatient visits indicating psychiatric disorders. Twenty-five percent of African Americans and 33% of whites had diagnoses of mood disorders; 13% and 14%, respectively, had diagnoses of alcohol or substance abuse; 5% and 13%, respectively, had a diagnosis of anxiety state; and 13% and 19%, respectively, had other mental illness diagnoses. Nineteen percent of each group had an inpatient psychiatric admission in the year preceding the suicide.

In the multivariate analysis, African Americans had significantly reduced odds of receiving treatments for mood disorders in the year preceding the suicide (Table 3). During this period 29% of African Americans had filled an antidepressant prescription, compared with 51% of whites (adjusted odds ratio [OR]=.43, *p*<.001). For lithium or other mood stabilizers the respective proportions were 2% and 12% (OR=.25, *p*=.01). In contrast, there was no significant difference in the proportions filling prescriptions for antipsychotics (13% of African Americans and 11% of whites). African Americans also had reduced odds for use of antidepressants and mood stabilizers in the 90 days preceding the suicide.

We conducted several alternative analyses that restricted the study group to either exclude patients who may have had a non-mood disorder etiology for the suicide or to reduce demographic differences between African Americans and whites (Table 4). Even after excluding patients with evidence of substance abuse, bipolar



**Table 2**

Inpatient admissions, outpatient visits, and mental health diagnoses of Tennessee Medicaid/TennCare enrollees in the 365 days preceding suicide<sup>a</sup>

Variable	African American (N=127)		White (N=1,379)		p
	N	%	N	%	
Any inpatient admission or outpatient visit	47	37	676	49	.013
Any mood disorder	32	25	455	33	.081
Bipolar disorder	3	2	110	8	.023
Major depression or other unipolar mood disorder	30	24	414	30	.188
Alcohol or substance abuse	17	13	193	14	.859
Borderline or antisocial personality disorder	0	—	14	1	.519
Anxiety state	6	5	179	13	.013
Other mental illness	17	13	262	19	.122
Inpatient psychiatric admission	24	19	262	19	.906

<sup>a</sup> Proportions standardized to the age distribution of the entire study population by the direct method. A person may be included in multiple categories.

disorder, or seizure or other serious neurological disorders, African Americans had significantly reduced odds of receiving an antidepressant. Similarly, findings were not materially altered in subgroup analyses of persons who were disabled, who were younger than 45 years, who had inpatient or outpatient care in the 90 days preceding suicide, whose suicide took place in 1995 or later, who had a code for cause of death indicating undetermined intent, or for whom analysis was restricted to antidepressant use in dosages considered adequate to treat depression.

## Discussion

In the Tennessee Medicaid population whites had higher rates of suicide

than blacks, a finding consistent with national data in which white adults have an approximately 2.5-fold increased rate of suicide (23). The racial differential was greater in the Medicaid population, particularly for older persons and women; however, this greater difference is consistent with recent data from the Metropolitan Atlanta area (24). Our study population did not show the increase in rates with age for men that is present in the national data (25); however, this difference may be explained in part by our exclusion of persons with serious medical illnesses, or it may be related to the lower income levels of the Medicaid enrollees.

The primary purpose of our study was to use completed suicides to as-

sess possible racial differences in the diagnosis and treatment of serious mood disorders. It began with the premise that nearly all adults in the United States with completed suicides have major psychiatric illness, predominantly mood disorders (9). Thus we identified all deaths coded as definite or possible suicides in a defined population. From these, we then excluded persons with diagnosed psychoses, the other major factor in completed suicides. We then sought to control for other potential etiologies through multivariate and stratified analyses. Thus our finding of substantial racial differences in antidepressant use preceding suicide is consistent with racial differences in the diagnosis and treatment of serious

**Table 3**

Use of antidepressants, mood stabilizers, and antipsychotics preceding the suicide among Tennessee Medicaid/TennCare enrollees

Variable	African American (N=127) <sup>a</sup>		White (N=1,379) <sup>a</sup>		Adjusted OR <sup>b</sup>	95% CI	p
	N	%	N	%			
365 days preceding suicide							
Antidepressant	37	29	703	51	.43	.26–.71	<.001
Lithium or other mood stabilizer	5	4	165	12	.25	.09–.72	.01
Antipsychotic	17	13	152	11	1.33	.71–2.49	.375
90 days preceding suicide							
Antidepressant	24	19	552	40	.39	.22–.67	<.001
Lithium or other mood stabilizer	3	2	110	8	.18	.04–.77	.021
Antipsychotic	8	6	110	8	1.11	.52–2.39	.789

<sup>a</sup> Proportions were adjusted for age by the direct method.

<sup>b</sup> Adjusted in a multivariate model that included age, gender, calendar year, residence in a Standard Metropolitan Statistical Area, enrollment linked to disability, hospitalization in the prior year, any medical care encounter (excluding medications) in the past year or 90 days, and gastrointestinal medications in the past year. Reference category is white.

**Table 4**

Adjusted odds ratios for antidepressant use in 365 days preceding suicide among Tennessee Medicaid/TennCare enrollees, within subgroups of the study population<sup>a</sup>

Variable	OR	95% CI	p <sup>b</sup>
Excluding alcohol or substance abuse	.44	.26–.75	.003
Excluding bipolar disorder	.43	.26–.72	.001
Excluding seizure disorder or other serious neurological conditions	.45	.27–.74	.002
Restricted to enrollees who are disabled	.33	.17–.65	.001
Restricted to persons <45 years of age	.65	.37–1.15	.142
Restricted to persons with an inpatient or outpatient encounter in the 90 days preceding suicide	.46	.26–.80	.006
Restricted to suicides occurring in 1995 and later	.40	.22–.73	.006
Excluding deaths with cause coded as undetermined intent	.54	.32–.93	.025
Adequate antidepressant dosage	.53	.31–.89	.016

<sup>a</sup> Reference category is white.

<sup>b</sup> The p values were not adjusted for multiple comparisons.

mood disorders. However, there are several other potential explanations for the study findings.

A leading alternative explanation for the study findings is a greater prevalence among African Americans of non-mood disorder etiologies for suicide. Some support for this possibility is provided by data suggesting that there are non-Western populations in which the majority of persons with suicides do not have mood or other major mental disorders (26). However, we found no evidence that racial differences in other disorders associated with increased risk of suicide explained the study findings. The overall prevalence of diagnosed alcohol or substance abuse was 13% and did not differ materially according to race. The prevalence of seizure disorders, borderline personality disorder, and serious neurological disorders was low and did not differ materially according to race. The differences in antidepressant use persisted when the study group was restricted to persons without either diagnosed alcohol or substance abuse or serious neurological disorders. Nevertheless, given that the study could not directly assess the decedents before the date of the suicide, it is possible that other risk factors for suicide were present and that these differed according to race.

A second potential alternative explanation is that African Americans

may be more likely to receive non-pharmacological treatment for mood disorders. Given the greater prevalence of mistrust of the traditional medical care system reported among African Americans (27), alternative treatment outside the health care system, such as pastoral counseling, is likely to be more frequent among African Americans than among whites. These factors also could reduce the likelihood that African Americans would fill an antidepressant prescription, which could also partially account for the racial differences we observed.

A third alternative explanation for the study findings is that barriers impeded African Americans' access to appropriate medical care. However, because the study's Medicaid enrollees had relatively complete medical care coverage with no copayment or deductible, financial barriers are unlikely to explain our results. The study data provide further evidence that nonfinancial barriers related to general medical care do not explain the racial differences in antidepressant treatment. More than 80% of both races had had at least one medical encounter in the year preceding the suicide. When the analysis was restricted to persons with a medical care encounter in the 90 days preceding the suicide, the findings were essentially unchanged. However, it remains possible that cultural and eth-

nic factors specifically related to mental health care constituted a barrier to access to appropriate care (28).

Although the study findings are consistent with either underdiagnosis or undertreatment of African Americans with serious mood disorders, our data per se cannot define the relative contribution of each of these factors. However, the literature suggests that underdiagnosis plays an important role. There is evidence that the presentation and interpretation of the symptoms of mental disorders differ according to race and that this may affect clinical diagnosis (29). Kales and colleagues (30) have demonstrated that if psychiatrists are presented with a standard set of symptoms, their subsequent diagnosis and treatment decisions are not affected by race of the patient.

There were other study limitations. The definition of suicides was based upon the cause of death listed on the death certificate and thus potentially is subject to misclassification. Although it is considered unlikely that deaths from unintentional injuries would be coded as suicides, there is more likely to be underreporting of true suicides (19). Because there is concern that this type of misclassification occurs more frequently for African Americans (19), our primary analysis included deaths from unintentional injuries of undetermined intent. However, a secondary analysis that excluded the undetermined-intent deaths had similar findings.

The Medicaid enrollees studied were disproportionately from low-income groups and cannot be considered representative of the U.S. population. Nevertheless, they are generally a high-risk population, particularly for mental illness (31–34) and thus are important in their own right. However, the study population in Tennessee may not be representative of Medicaid enrollees in other states.

## Conclusions

This study found that in a population-based series of completed suicides, African Americans were substantially less likely than whites to receive antidepressant therapy before the suicide. Although there are several other potential explanations for the study

findings, each of which merits further investigation, the findings provide indirect evidence that there is underdiagnosis or undertreatment of African Americans with serious mood disorders. Given the importance of the recognition and appropriate treatment of depression, further research on this question in African-American populations is essential.

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The authors report no competing interests.

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