

# Sexual Orientation and Suicidality

## A Co-twin Control Study in Adult Men

Richard Herrell, MS; Jack Goldberg, PhD; William R. True, PhD, MPH; Visvanathan Ramakrishnan, PhD; Michael Lyons, PhD; Seth Eisen, MD; Ming T. Tsuang, MD, DSc, PhD

**Background:** Several recent studies have found a higher lifetime prevalence of suicide attempts in homosexual males compared with heterosexual control subjects or population rates. These studies used either convenience samples, most without controls, or population-based samples in which confounding factors such as depression and substance abuse were not measured.

**Methods:** This study used twins from the population-based Vietnam Era Twin Registry, Hines, Ill. An analytic sample of 103 middle-aged male-male twin pairs from the registry was identified in which one member of the pair reported male sex partners after age 18 years while the other did not. Four lifetime symptoms of suicidality as measured by the Diagnostic Interview Schedule were analyzed: thoughts about death, wanting to die, thoughts about committing suicide, and attempted suicide. A composite measure of reporting at least one suicidality symptom was also assessed.

**Results:** Same-gender sexual orientation is significantly associated with each of the suicidality measures.

Unadjusted matched-pair odds ratios follow: 2.4 (95% confidence interval [CI], 1.2 - 4.6) for thoughts about death; 4.4 (95% CI, 1.7 - 11.6) for wanted to die; 4.1 (95% CI, 2.1 - 8.2) for suicidal ideation; 6.5 (95% CI, 1.5 - 28.8) for attempted suicide; and 5.1 (95% CI, 2.4 - 10.9) for any of the suicidal symptoms. After adjustment for substance abuse and depressive symptoms (other than suicidality), all of the suicidality measures remain significantly associated with same-gender sexual orientation except for wanting to die (odds ratio, 2.5 [95% CI, 0.7 - 8.8]).

**Conclusions:** The substantially increased lifetime risk of suicidal behaviors in homosexual men is unlikely to be due solely to substance abuse or other psychiatric comorbidity. While the underlying causes of the suicidal behaviors remain unclear, future research needs to address the inadequacies in the measurement of both sexual orientation and suicidality in population-based samples.

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**I**N THE 24 YEARS since the declassification of homosexuality as a pathological characteristic by the American Psychiatric Association, physicians, psychiatrists, psychologists, social workers, school counselors, and others have argued that the experience of being gay—in particular, growing up as an adolescent aware of homosexual feelings in the face of stigmatization and in the absence of social support—may be a risk factor for developing psychopathology.<sup>1-6</sup> Studies have reported inconsistent findings of higher lifetime prevalence rates of depressive symptoms, alcohol and other drug abuse, and suicidal behavior in homosexual compared with heterosexual samples.<sup>7</sup>

Several researchers have argued that homosexual adolescents are particularly vulnerable to suicidal ideation and suicide attempts.<sup>8-16</sup> Studies using volunteer or convenience samples that measured the

lifetime prevalence of suicide attempts in gay and bisexual adolescents found percentages ranging from 20% to 39%, with a median of 31%.<sup>10,11,15,17-19</sup> By comparison, the population-based prevalence estimate of lifetime suicide attempts from the Epidemiologic Catchment Area study<sup>20</sup> was 2.9%, with 1.5% in men, 3.4% in those aged 18 to 24 years, and 4.0% in those aged

*See also pages  
883, 885, and 887*

25 to 44 years. Studies have identified risk factors for self-injury in gay youth, including intrapsychic conflict over nonconformist sexuality, nondisclosure of sexual orientation to others, gender nonconformity, and interpersonal conflicts including personal attacks within the family and at school.<sup>8,10,12,14,15,21,22</sup> These samples were

*The affiliations of the authors appear in the acknowledgment section at the end of the article.*

## SUBJECTS AND METHODS

### THE VET REGISTRY

The VET Registry comprises male-male twin pairs born between 1939 and 1957, both of whom served in the US military during the period from 1965 to 1975, either in Vietnam or elsewhere. Assembled in 1987, it consists of 4774 twin pairs who were identified from computerized records maintained by the US Department of Defense and who responded to an initial mail and telephone survey. The basic characteristics of the VET sample are as follows: the average birth year of the registry twins is 1949; 91% are non-Hispanic white and 5.6%, African American; 30% are high school graduates and 41% have some college or vocational training; and 93% were employed full time or part time at interview. The history of the development of this sample and its characteristics have been previously published.<sup>43,44</sup>

### THE HARVARD TWIN STUDY OF SUBSTANCE ABUSE

The VET Registry was used to investigate the genetic and nongenetic contributions to substance abuse as part of the Harvard Twin Study of Substance Abuse.<sup>45</sup> This study administered the Diagnostic Interview Schedule, Version III, Revised (*DIS-III-R*) to the registry twins by telephone interview in 1992. The *DIS-III-R* ascertains the symptoms of psychiatric disorders in a structured interview following the criteria of *DSM-III-R*.<sup>46-49</sup> Presumptive diagnoses were made by computer algorithm for the *DIS-III-R* version as of November 7, 1989. Approximately 3400 twin pairs completed the survey.

### MEASUREMENT OF SEXUAL ORIENTATION AND SUICIDALITY

Much research on same-gender sexuality and on sexuality in general fails to distinguish different dimensions of a complex phenomenon. The National Health and Social Life Survey, the only national probability sample of sexual behavior conducted in the United States, is a notable exception in survey research. It distinguishes 3 dimensions of sexual orientation: (1) sexual behavior (ie, the gender of partners in sexual activity), (2) desire and attraction toward the other or the same gender; and (3) sexual self-identity as a heterosexual or homosexual as a social role (ie, as "straight," "gay," "lesbian," or, in many homosexual youth today, "queer").<sup>50</sup> The questions included in the Harvard

Twin Study of Substance Abuse<sup>44</sup> about same-gender sexuality asked subjects only about the behavioral dimension, ie, their history of sexual partners in adulthood by gender. The VET Registry twins were asked the following: Have you ever had sexual relations with a man at any time since you were 18 years old? In total, 120 individuals (about 2%) in the VET Registry reported any adult same-sex partners, ie, any adult same-gender sexuality. While this proportion is smaller than the estimate of 4.9% measured by the National Health and Social Life Survey for American adult men, it is within the range of all recent estimates from probability samples, and formal policies prohibiting military service by homosexuals may have reduced this percentage.<sup>50,51</sup> Those who reported any adult same-gender sexuality were additionally asked if they have had mostly same- or mostly other-sex partners. Of the 120 men who reported they had any same-sex partners in adulthood, 103 were discordant with their twin brothers on this measure. For the purposes of this analysis, "same-gender sexual orientation" and "same-gender sexuality" refer to respondents who reported any adult same-gender partners.

Suicidality was measured by the 4 questions used in the *DIS-III-R* to assess suicidal thoughts and behaviors as part of the symptomatology of depression: (1) Has there ever been a period of 2 weeks or more when you thought a lot about death—your own, someone else's, or death in general? (2) Has there ever been a period of 2 weeks or more when you felt like you wanted to die? (3) Have you ever felt so low you thought about committing suicide? (4) Have you ever attempted suicide? Each of these variables was coded dichotomously for lifetime occurrence. We also constructed a new variable defined as the positive response to at least 1 of the suicidality symptoms.

### MEASUREMENT OF CONFOUNDING FACTORS

Four types of variables were considered as potential confounding factors for the association of homosexual orientation and measures of suicidality: (1) demographic factors, (2) zygosity, (3) military service factors, and (4) psychiatric comorbidity with drug and/or alcohol abuse and depression. As noted above, the co-twin control method inherently controls for age, race, and zygosity. Other demographic variables considered include household income, education, and religious affiliation at military enlistment. Military service variables include branch of service, year of enlistment, duration of military service, aptitude test score at enlistment, Vietnam service, and an index of combat exposure.<sup>52</sup>

recruited primarily through support groups or social service agencies.

Based on these studies, an influential and controversial summary chapter<sup>2</sup> prepared for the Surgeon General's Report on Youth Suicide concluded that gay youth are particularly at increased risk for attempted and completed suicide. Other researchers maintain that these samples are nonrepresentative groups of homosexual adolescents and that the key factors of importance in risk for attempted or completed suicide are extant psychopathologic characteristics, especially alcohol and other drug abuse and dependence, and depression.<sup>23-26</sup> Several studies have found a higher prevalence of alcohol

and other drug abuse in homosexual men compared with heterosexual men.<sup>27-35</sup> According to this view, these factors are responsible for greater rates of suicidal behaviors in homosexual males.

Public, congressional, and media inquiries about rates of suicide in gay and lesbian youth led to the convening of a workshop in 1994 cosponsored by the American Association of Suicidology, the Centers for Disease Control and Prevention, and the National Institute of Mental Health. The report from this conference recommended that stronger research designs were needed to study the relationship between sexual orientation and suicidality.<sup>26,36</sup> It notably called for probability samples, stan-

A key set of potential confounding factors involves psychiatric comorbidity associated with completed suicide and suicide attempts, particularly affective disorder, alcohol abuse and dependence, and drug abuse and dependence.<sup>20,53,54</sup> Lifetime diagnoses of abuse and dependence on alcohol and other drugs were obtained using the *DIS-III-R*. A dichotomous variable was created for each of these diagnoses indicating the presence or absence of lifetime abuse or dependence.

The *DIS-III-R* includes a set of 19 symptoms in 9 symptom groups that are used for the diagnosis of major depressive episode. These measures permit the assessment both of individual lifetime symptoms and of the patterns of co-occurrence to make presumptive diagnoses of *DSM-III-R* disorders. One of these symptom groups relates to suicidal thoughts and behaviors. Since measures of suicidality form one of the symptom groups for the diagnosis of major depressive episode, it is conceptually inappropriate and, in some individuals, circular to use the formal *DIS-III-R* or *DSM-III-R* diagnosis of depression as a confounding factor when examining the association between sexual orientation and suicidality outcomes. To avoid this problem, we constructed a count variable of depressive symptom groups excluding the suicidal symptom group that ranges from 0 to 8. This variable represents the number of symptom groups reported by a subject for the worst period of depression he reported.

#### STATISTICAL ANALYSIS

Initial analysis examined the simple prevalence (in percentage with 95% confidence interval [95% CI]) of each of the 4 measures of suicidality for all men participating in the Harvard Twin Study of Substance Abuse. Four groups of men were defined on the basis of concordance on the measure of sexual orientation within pairs: (1) men in pairs concordant for no adult same-gender sexuality; (2) men with no adult same-gender partners in pairs discordant for adult same-gender sexuality; (3) men with any same-gender partners in pairs discordant for adult same-gender sexuality; and (4) men in pairs concordant for adult same-gender sexuality.

The magnitude of the association between sexual orientation and each of the suicidality measures was then assessed using matched-pair odds ratios (ORs) and 95% CIs. Formal co-twin control analysis selects only those twin pairs discordant for adult same-gender partners (n = 103 pairs, 206 individuals). Conditional logistic regression analysis for matched pairs was used to examine the effects of demographic, military service, and psychiatric comorbidity

factors on the association between sexual orientation and suicidality.<sup>55</sup> None of the demographic or military service variables demonstrated a confounding influence on the association of sexual orientation with any of the suicidality measures; consequently the results from these adjusted analyses are not presented. We also examined the data for evidence of a different association between sexual orientation and suicidality according to zygosity using tests for interaction terms in conditional logistic regression models. None of these tests indicate a difference between monozygotic (n = 48 pairs) and dizygotic twins (n = 55 pairs) in the associations of interest. The 2 types of twins are pooled in all analyses presented here.

Multivariate conditional logistic regression models were also used to assess the effects of psychiatric comorbidity factors (alcohol abuse and dependence, drug abuse and dependence, and count of depressive symptom groups excluding suicidality). An initial set of models was constructed that contains just the variable for sexual orientation and the 3 individual psychiatric comorbidity variables entered alone. Next, 3 models were fit that contain the sexuality variable and each of the comorbidity variables one at a time. This approach permits assessment of the confounding influence of the comorbidity measures on the association between sexual orientation and suicidality as well as the independent association of each comorbidity variable with suicidality. Finally, a full model was fit that examines the effects of sexual orientation and all 3 psychiatric comorbidity variables on suicidality.

The association between same-gender sexuality and the 5 suicidality measures was also assessed controlling for the other psychiatric diagnoses measured by the *DIS-III-R*, including antisocial personality, bipolar disorder, dysthymia, generalized anxiety disorder, mania, panic disorder, and posttraumatic stress disorder. There was no indication of confounding by these diagnoses, and these factors were not included in the final multivariate models.

Models were also fit using 2 indicator variables to represent same-gender sexuality, ie, one for those reporting mostly same-gender partners in adulthood and one for those reporting mostly other-gender partners. The results of these analyses do not differ in direction or magnitude from the analyses using a single variable for any same-gender partners in adulthood, but the estimates become unstable (ie, SEs become large because of small sample numbers). Consequently, only the results from models using the single dichotomous sexuality measure are reported here. All statistical analyses were done with the SAS procedures (SAS Institute, Cary, NC) MCSTRAT (SAS version 5) and PHREG (SAS version 6).

dard measures of suicidal behaviors and sexual orientation, and attention to the role of factors that may confound the association between sexual orientation and suicidal behaviors. Since that time, 5 studies have measured sexual orientation and suicidal behaviors in unselected, population-based samples and have confirmed significantly higher rates of suicidality in homosexual youth.<sup>37-41</sup> None of these studies, however, assessed the potential confounding effects of substance abuse and depression.

The analysis presented here uses data from the Vietnam Era Twin (VET) Registry of adult male-male twin pairs to examine the association between sexual orientation and the lifetime prevalence of measures of

suicidality employing the co-twin control method. This method can be viewed as a variant of a matched-pair study that selects twins discordant on a trait, such as sexual orientation, and then examines factors potentially associated with that trait, such as suicidality. Co-twins serve as exceptionally well-matched controls, removing or substantially reducing the effects of genetics, age, and race, as well as many unmeasured factors, such as pre-adult home environment, schools, religious upbringing, and so forth. This sample and method permit addressing concerns of the workshop by using an unselected, population-based sample in which the critical confounding factors were assessed with the most widely used

**Table 1. Lifetime Prevalence of Suicidal Symptoms According to No vs Any Adult Same-Gender Partner Experience of the Twin Pair\***

Symptom	Percentage and 95% CI† of Individuals With Symptom Present							
	Pairs Concordant for No Adult Same-Gender Partners (n = 6434)		Pairs Discordant for No vs Any Adult Same-Gender Partners				Pairs Concordant for Any Adult Same-Gender Partners (n = 16)	
	%	95% CI	No Same-Gender Partners (n = 103)		Any Same-Gender Partners (n = 103‡)		%	95% CI
			%	95% CI	%	95% CI		
Thought about death	21.9	20.9-22.9	30.1	21.7-40.0	47.6	37.7-57.6	50.0	25.5-74.5
Wanted to die	6.7	6.1-7.3	9.7	5.0-17.5	26.2	18.3-36.0	25.0	8.3-52.6
Suicidal ideation	15.3	14.4-16.2	25.2	17.4-34.9	55.3	45.2-65.0	56.3	30.6-79.2
Suicide attempt	2.2	1.9-2.6	3.9	1.3-10.2	14.7	8.7-23.4	18.8	5.0-46.3

\*CI indicates confidence interval.

†Fleiss quadratic method.

‡n = 102 for suicide attempts.

instrument in psychiatric epidemiology, the Diagnostic Interview Schedule.<sup>42</sup>

## RESULTS

### PREVALENCE OF SYMPTOMS

The prevalence of suicidal symptoms varied by the specific symptom examined and by whether the individual had any adult same-gender partners (**Table 1**). In twins concordant for no adult same-gender partners, the lifetime prevalence was highest for thoughts about death (21.9%; n = 1409) and lowest for suicide attempts (2.2%; n = 142). In twins discordant for adult same-gender partners, 49 men (47.6%) with same-gender partners reported a period of thinking about death compared with 31 (30.1%) of their discordant brothers; 27 (26.2%) report a period of wanting to die compared with 10 (9.7%); 57 (55.3%) report suicidal ideation compared with 26 (25.2%); and 15 (14.7%) report a suicide attempt compared with 4 (3.9%). The few pairs concordant for adult same-gender partners (n = 16 men or 8 pairs) display the highest levels of symptom prevalence, but small sample numbers make these estimates unstable.

### ASSOCIATION OF SEXUAL ORIENTATION AND MEASURES OF SUICIDALITY

**Table 2** presents the results from the co-twin control analysis of same-gender sexual orientation and the measures of suicidality in the 103 twin pairs (n = 206 men) discordant for sexual orientation. Each of the 5 sections in this table contains an analysis of 1 of the 5 measures of suicidality: (1) thought about death, (2) wanted to die, (3) suicidal ideation, (4) suicide attempt, and (5) presence of at least one lifetime suicidal symptom. The first column displays the unadjusted ORs for the association of same-gender sexual orientation and suicidality. It also displays the unadjusted association of suicidality in the analytic sample of 103 pairs with each of the potential confounding factors (alcohol abuse and dependence, drug abuse and dependence, and the count of lifetime depressive symptoms, exclusive of the suicide symptom group). The next 4 columns give ORs from conditional logistic

regression models for the sexuality-suicidality association after either single factor (models 1-3) or multifactor adjustment (model 4). Reading across the rows of the table shows the effect of the confounding factors on the sexuality-suicidality association as well as the magnitude of the association of the confounding factors with suicidality.

#### Thought About Death

There is a significant increase in the lifetime prevalence of thoughts about death among those twins who report a same-gender sexual orientation compared with their co-twins who do not (Table 2) (OR, 2.4 [95% CI, 1.2 - 4.6]). Neither alcohol (OR, 1.6 [95% CI, 0.6 - 4.1]) nor drug abuse (OR, 2.5 [95% CI, 0.8 - 8.0]) displays a significant association with thoughts about death in these twins. However, the count of nonsuicidal depressive symptom groups is significantly associated with thoughts about death (OR, 1.4 [95% CI, 1.1 - 1.8]). The magnitude of the association between same-gender sexual orientation and thoughts about death is unchanged after adjustment for the effects of either abuse of alcohol or other drugs (models 1 and 2). However, the strength of the association is diminished after adjusting for the effects of depressive symptoms (model 3), which itself remains associated with the sexuality measure. There remains a 2-fold increase in thoughts about death among twins with a same-gender sexual orientation even after the simultaneous inclusion of alcohol, drugs, and depressive symptoms in the model (model 4). There is also a persistent association of the count of depressive symptom groups (excluding suicidality) with thoughts about death.

#### Wanted to Die

There is a strong unadjusted association between same-gender sexual orientation and a period of wanting to die (OR, 4.4 [95% CI, 1.7 - 11.6]). While alcohol abuse or dependence is not significantly associated with wanting to die, both drug abuse and depressive symptoms exhibit significant unadjusted associations. In the single factor adjusted analysis, the strength of the association between same-gender sexual orientation and wanting to die

**Table 2. Same-Gender Sexual Orientation and Measures of Suicidality\***

Factor	Unadjusted OR (95% CI)	Factor-Adjusted OR (95% CI)			
		Model 1†	Model 2‡	Model 3§	Model 4
<b>Thought About Death</b>					
Same-gender sexual orientation	2.4 (1.2-4.6)	2.4 (1.2-4.8)	2.2 (1.2-4.3)	1.9 (1.0-4.0)	2.1 (1.0-4.5)
Alcohol abuse or dependence	1.6 (0.6-4.1)	1.0 (0.3-2.9)			0.6 (0.2-2.4)
Drug abuse or dependence	2.5 (0.8-8.0)		2.0 (0.6-6.8)		1.6 (0.4-6.6)
Depressive symptoms¶	1.4 (1.1-1.8)			1.4 (1.0-1.8)	1.4 (1.0-1.8)
<b>Wanted to Die</b>					
Same-gender sexual orientation	4.4 (1.7-11.6)	4.4 (1.6-12.1)	3.0 (1.0-9.3)	3.5 (1.2-10.1)	2.5 (0.7-8.8)
Alcohol abuse or dependence	1.5 (0.5-4.2)	1.0 (0.3-3.7)			0.7 (0.1-3.6)
Drug abuse or dependence	10.0 (1.3-78.0)		3.3 (0.3-34.8)		4.0 (0.3-53.2)
Depressive symptoms¶	1.4 (1.1-1.8)			1.3 (1.0-1.6)	1.3 (1.0-1.7)
<b>Suicidal Ideation</b>					
Same-gender sexual orientation	4.1 (2.1-8.2)	4.1 (2.0-8.2)	3.8 (1.9-7.9)	3.7 (1.8-7.5)	3.6 (1.7-7.5)
Alcohol abuse or dependence	1.6 (0.7-3.5)	1.6 (0.6-4.2)			1.7 (0.5-5.4)
Drug abuse or dependence	5.5 (1.2-24.8)		4.3 (0.8-24.0)		3.9 (0.7-23.6)
Depressive symptoms¶	1.2 (1.0-1.5)			1.1 (1.0-1.4)	1.2 (1.0-1.4)
<b>Suicide Attempt</b>					
Same-gender sexual orientation	6.5 (1.5-28.8)	5.6 (1.2-25.7)	6.2 (1.4-27.7)	25.0 (1.1-564.8)	...
Alcohol abuse or dependence	5.0 (0.6-42.8)	2.6 (0.2-40.6)			...
Drug abuse or dependence	3.0 (0.3-28.8)		1.9 (0.1-42.9)		...
Depressive symptoms¶	1.2 (0.9-1.5)			1.6 (0.9-2.9)	...
<b>Any Suicidal Symptoms (Lifetime)</b>					
Same-gender sexual orientation	5.1 (2.4-10.9)	5.1 (2.4-11.1)	5.4 (2.4-12.5)	5.4 (2.2-13.4)	7.9 (2.4-26.6)
Alcohol abuse or dependence	1.5 (0.6-3.7)	1.0 (0.3-3.3)			0.4 (0.1-2.7)
Drug abuse or dependence	4.0 (1.1-14.2)		4.9 (1.0-24.7)		7.5 (1.0-55.1)
Depressive symptoms¶	1.5 (1.2-2.1)			1.6 (1.1-2.3)	1.8 (1.1-2.7)

\*OR indicates odds ratio; CI, confidence interval; and ellipses, not estimable.

†Sexual orientation and alcohol abuse.

‡Sexual orientation and drug abuse.

§Sexual orientation and depressive symptoms.

||Sexual orientation, alcohol abuse, drug abuse, and depressive symptoms.

¶Depressive symptoms excluding suicidality (range, 0-8).

remains significant but is reduced after controlling for either drug abuse (which itself is no longer significant) or depressive symptoms. However, after adjusting for all 3 potential confounding factors, same-gender sexual orientation is not significantly associated with wanting to die (OR, 2.5 [95% CI, 0.7 - 8.8]). In the multivariable model, abuse of alcohol and other drugs is not significant while the count of nonsuicidal depressive symptoms remains associated with wanting to die.

### Suicidal Ideation

There is more than a 4-fold increase in suicidal ideation (OR, 4.1 [95% CI, 2.1 - 8.2]) among the twins reporting a same-gender sexual orientation compared with their co-twins discordant on this measure. There is also more than a 5-fold unadjusted association between drug abuse and suicidal ideation (OR, 5.5 [95% CI, 1.2 - 24.98]). The count of depressive symptoms has a significant but modest unadjusted relation with suicidal ideation, but alcohol abuse displays no significant association. Single factor adjustment slightly decreased the association between same-gender sexual orientation and suicidal ideation, but it still is significant. Although the full multivariable model shows a reduced OR for

same-gender sexual orientation, it nevertheless remains significantly elevated (OR, 3.6 [95% CI, 1.7 - 7.5]).

### Suicide Attempt

Twins reporting a same-gender sexual orientation are 6.5 times more likely to report having attempted suicide than their co-twins (95% CI, 1.5 - 28.8). Alcohol abuse, drug abuse, and depressive symptoms all have OR above 1.0, but they have wide CIs that include unity, reflecting the relative rarity of attempting suicide. The results of the single factor adjusted analysis are unstable, with wide CIs, but continue to demonstrate a strong independent association between same-gender sexual orientation and attempting suicide; a model that includes more than a single adjustment factor cannot be estimated given the small number of events for this symptom.

### Any Suicidal Symptoms—Lifetime

The composite measure of any suicidal symptom is associated with same-gender sexual orientation in the unadjusted analysis (OR, 5.1 [95% CI, 2.4 - 10.9]). Similarly, in the unadjusted analysis both drug abuse and

depressive symptoms, but not alcohol abuse, are significantly related to suicidal symptoms. This pattern of association persists in the single factor and multifactor adjusted analysis. The multivariable adjusted OR for same-gender sexual orientation and any suicidality measure is 7.9 (95% CI, 2.4 - 26.6).

#### COMMENT

These data demonstrate a substantially increased lifetime prevalence of suicidal symptoms in male twins reporting a same-gender sexual orientation (those with histories of same-gender partners in adulthood) compared with co-twins who report no same-gender partners. The magnitude of the association for thoughts about death, suicidal ideation, suicide attempts, and the composite measure of any suicidal symptoms is independent of the potential confounding effects of drug and alcohol abuse and nonsuicidal depressive symptoms. Like the most recent studies using probability samples, this sample was selected without reference to sexual orientation and therefore does not suffer from the selection bias that has been at the heart of criticism of much prior research on this subject.<sup>23-26</sup> Additionally, for the first time to our knowledge the potential confounding effects of substance abuse and depression have been accounted for in a multivariate analysis.

Nevertheless, interpretation of the results of this analysis requires consideration of several potential limitations. Data were collected by telephone interview, and the respondents may have been unwilling to reveal same-gender sexuality as well as depressive symptoms to the interviewers. If the same men who were unwilling to discuss same-gender sexuality were also reluctant to discuss suicidal symptoms or if willingness to talk about these 2 subjects differed within individuals, the observed effects could be biased. Furthermore, these data are subject to bias from the recall of symptoms and behaviors over the life course in a sample of middle-aged men. However, previous research has documented the comparability of face-to-face and telephone interviews in psychiatric epidemiology.<sup>56,57</sup> A second concern is that persons declining to respond to the survey could have biased the results. Since the analysis depends on twin pairs, however, a comparable group of pairs with opposite characteristics would have had to decline to participate to account for the associations reported here.

The generalizability of this sample is constrained by 2 considerations. First, it is a sample of Vietnam era veterans who are predominantly white. However, the reporting of same-gender sexual orientation is only slightly less than that reported by Laumann et al.<sup>50</sup> Second, it is a sample of middle-aged men and may not generalize to youth. Since males at greatest risk for suicidal behaviors are adolescents and the elderly, this sample may have differed in youth from those at greatest risk, possibly possessing factors protective against having completed suicide at a young age.

The few questions about histories of same-gender behavior used in the survey are limited strictly to the behavioral dimension. By any definition this is a suboptimal measure. While behavior is clearly part of sexuality, other

dimensions such as desire and identity may also be crucial for adequately specifying the relationship between sexuality and outcomes such as suicidality, especially during adolescence when sexual identity is being formed. (Age at suicide attempt was not measured in this survey and is clearly of interest. In 2 studies in which adult homosexual men were asked about lifetime prevalence of suicide attempts, all but a few attempts occurred in adolescence.<sup>28,34</sup>) The underlying causes of suicide attempts in homosexual youth remain unclear and cannot be examined in this study. The most comprehensive study of gay youth to date found they are not confused about their sexuality but often are confused how to express it in a hostile social environment.<sup>18</sup> The fact that an independent effect remains after controlling for factors typically comorbid with suicidality (alcohol, other drugs, and depression) and for the factors controlled by the co-twin method suggests the importance of social factors.

The suicidal symptom questions also have less detail than would be ideal for the purposes of the current study. In addition to age at attempt, the lethality of suicide attempts and whether multiple attempts were made are also of considerable interest but unavailable in this data set.<sup>58</sup>

The interpretation of the causal and temporal role of probable psychological and social stress surrounding same-gender sexuality, alcohol abuse, drug abuse, and depressive symptoms influencing suicidality also remains unclear. Does substance abuse confound the relationship between distress over same-gender sexuality and suicidal symptoms, or is it part of the causal path? With the purely cross-sectional data on lifetime symptoms, it is not possible to infer a temporal order. Arguing that other psychopathologic processes commonly precede suicide attempts or that suicide more commonly occurs in persons with extant psychopathology does not address the origin of those disorders. In general, we found that the unadjusted estimates were higher than the estimates adjusted for alcohol and drug abuse. If abuse of alcohol and other drugs is a consequence of the same psychological stress over nonnormative sexuality, the unadjusted analysis may be a more valid estimate of the association. It is not possible adequately to address these questions with cross-sectional data.

In spite of these limitations, the results of the unadjusted analysis presented here are consistent with data available from previous studies in which published data present ORs or permit calculating them. In the 1960s, Saghir and Robins<sup>34</sup> recruited a small, selected sample of 124 men, 89 (72%) of whom were homosexual. The point estimate of the OR from their data indicates that homosexual men were more than 5 times as likely to report having attempted suicide than nonhomosexuals, although the small sample size and small number of attempts in the data result in an unstable result (95% CI, 0.3 - 100.8). Bell and Weinberg,<sup>28</sup> based at the Kinsey Institute, used a much larger, although still selected, sample (1023 men; 686 [67%] homosexual), also created in the 1960s. The OR estimated from their data for lifetime prevalence of suicide attempts is 7.4 (95% CI, 4.1 - 13.1). Among the 5 recent probability samples, 2 studies report ORs or data from which ORs can be estimated.

Bagley and Tremblay<sup>37</sup> selected a probability sample in 1991 and 1992 of 18- to 27-year-old men in Calgary (n = 750) in which 69 (9.2%) reported sexual contact with men. The OR for homosexuality (measured by behavior or self-identification) and lifetime prevalence of suicide attempts in their study is 6.2 (95% CI, 1.4 - 26.3). Remafedi et al<sup>41</sup> used the 1987 Adolescent Health Survey database, administered to a probability sample of adolescents in grades 7 through 12 in Minnesota. The OR for sexual orientation (measured by self-identification) and lifetime suicide attempts in the male students is 7.1 (95% CI, 3.1 - 16.5). The results from the current study are thus consistent with these earlier findings in spite of different sampling designs and selection criteria. The effect is also relatively constant across different birth cohorts spanning more than 30 years. The mean birth year for the Saghir and Robins<sup>34</sup> and the Bell and Weinberg<sup>28</sup> studies is about 1935, and the interviews were conducted in the 1960s. The VET sample has a mean birth year of 1949 and the interviews were conducted in the early 1990s. The men in the Bagley and Tremblay<sup>37</sup> sample were in their 20s in the early 1990s when the interviews were conducted. The mean birth year of the male subsample used by Remafedi et al<sup>41</sup> is 1972. There does not appear to be a reduction in the association over these birth cohorts that one might expect given social change in recent years. An explanation for the consistency of these ORs might be that the social changes have had less impact during adolescence than later in the life course.

In conclusion, reports of lifetime measures of suicidality are strongly associated with a same-gender sexual orientation. These effects cannot be explained by abuse of alcohol and other drugs, nonsuicidal depressive symptoms, or the numerous unmeasured genetic and nongenetic familial factors accounted for in the co-twin control design. The estimated effects are furthermore consistent with other studies in different populations using differing study designs. Future research should be conducted in other population-based samples and should use measures better designed to address the associations considered here.

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From the Division of Epidemiology-Biostatistics, School of Public Health, University of Illinois at Chicago (Mr Herrell and Drs Goldberg and Ramakrishnan); the Vietnam Era Twin Registry, Health Services Research and Development Program, Department of Veterans Affairs Hospital, Hines, Ill (Drs Goldberg and Ramakrishnan); the School of Public Health, St Louis University (Dr True), the Research Service, St Louis VAMC (Drs True and Eisen), the Division of General Medical Sciences, Department of Medicine, Washington University School of Medicine (Dr Eisen), St Louis, Mo; the Department of Psychology, Boston University (Dr Lyons), the Harvard Institute of Psychiatric Epidemiology and Genetics (Drs Lyons and Tsuang), the Harvard Medical School, Department of Psychiatry at Massachusetts Mental Health Center (Drs Lyons and Tsuang), Boston, Mass.

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Corresponding author: Richard Herrell, Division of Epidemiology and Biostatistics, School of Public Health, University of Illinois at Chicago, 2121 W Taylor St (m/c 922), Chicago, IL 60615.

Reprints: Jack Goldberg, PhD, Vietnam Era Twin Registry, PO Box 1389, Hines, IL 60141.

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