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Mental Disorder as a Risk Factor for Human Immunodeficiency Virus Infection in a Sample of Veterans

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People who suffer from mental disorders are at increased risk for becoming infected with HIV. There have been no studies that show whether particular psychiatric disorders present an increased risk for HIV infection in samples of nonpatients. This article uses data from the 1992 National Survey of Veterans to determine if veterans with post-traumatic stress disorder (PTSD), or with other mental or emotional problems, are at increased risk for HIV infection. The results indicate that the combination of PTSD and substance abuse increased the risk of HIV infection by almost 12 times over those without either. This is evidence of a particular psychiatric disorder increasing risk for HIV. Although cross-sectional, these data allow some conjecture about the timing of the onset of PTSD in relation to HIV infection. These results present powerful evidence that mentally ill persons such as those with PTSD, who may be underserved for health services including AIDS prevention efforts, should be targeted as an at-risk group.
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It has been estimated (Holmberg, 1996) that there are 700,000 prevalent AIDS cases in the U.S., with nearly 41,000 new HIV infections annually. Incidence rates are highest among intravenous drug users (IVDU), and male cases outnumber female by almost 6 to 1. Hispanic and African Americans have disproportionately high rates (Ford et al., 1994).

Persons with mental disorders have been shown to have disproportionately high HIV infection rates (Cournos et al., 1994; Sitzman et al., 1995). Among a sample of homeless men with serious mental illness, Susser found an HIV prevalence rate of nearly 20% (Susser et al., 1993). In a sample of dually diagnosed patients, 23% were HIV positive (Silberstein et al., 1994). The association between mental disorder and HIV is sufficiently compelling to search for specificity in the types of disorder that present the greatest risk for infection.

Three explanations for the association between mental disorder and HIV can be proposed. Substance abuse, a known risk factor for HIV and highly prevalent among persons with mental disorders, may explain the association. For example, episodes of depression among IV drug users increase injection frequency (Latkin and Wallace, 1993), increasing the likelihood of unsafe injection practices. Second, features of mental disorder could directly increase the odds of infection. For example, disinhibition, poor impulse control, or social instability could increase risk for HIV infection (Sacks et al., 1992; Volavka et al., 1992). Finally, persons with mental disorders are disproportionately represented in groups difficult to target for AIDS prevention efforts such as the homeless and very poor (Susser et al., 1993). The co-aggregation of mental disorders and HIV infection in these groups could result in a spurious association.

It is unlikely that any one explanation accounts for the association between mental disorder and HIV. However, regardless of whether the mentally ill are at risk due to comorbid substance use, mental disorder alone, or because they are members of at-risk groups, they are a consistently underserved population. While more likely to mention psychiatric symptoms to physicians (Robbins et al., 1991), and more likely to seek services, only a small proportion obtain treatment specifically for mental illness, and treatment rates are lowest and most limited among the poor (Leaf et al., 1988).

For the mentally ill in treatment, HIV/AIDS education is not a standard part of psychiatric services (Kalichman et al., 1994), for either patients or staff (Birenbaum, 1995), due in part to the fact that the sexual lives of psychiatric patients are often overlooked (Carmen and Brady, 1990). In addition, substance treatment programs have been reluctant to educate clients about, for example, clean needles, because it is viewed as contradictory to a policy of abstinence.

An inherent difficulty in studying the role of mental disorder in HIV infection is the lack of longitu-

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dinal data. Much data to date has been cross-sectional (Lyketsos and Federman, 1995), making temporal sequence difficult to establish. Persons infected with HIV are at higher risk of developing reactive depression, AIDS-related dementia, and other neuro-psychiatric sequelae (Lyketsos et al., 1995): cross-sectional associations may reflect the consequences of, rather than risk for, infection.

Although lifetime rates of mental disorders in the U.S. have been estimated at 30% to 50% (Kessler et al., 1994), HIV rates are relatively low; 0.8% to 6.4% (Holmberg, 1996). Thus, even large samples will have few cases with both conditions, limiting both confidence in findings and the ability to examine specificity in the association between mental disorder and HIV.

To date, mental disorders have been implicated as a risk for HIV; however, no specific disorder has been identified as increasing risk (Sitzman et al., 1995). This article examines the association of mental disorders, in particular posttraumatic stress disorder (PTSD) with HIV/AIDS in a large epidemiologic sample of U.S. veterans.

Although veterans as a group do not suffer more from most mental disorders than the general population (Norquist, 1990), they do have higher rates of combat-related PTSD (Kulka, 1990). In addition, veterans are frequently socioeconomically disadvantaged and make up a substantial proportion of the homeless (Rosenheck et al., 1994). Thus, a veteran sample is a unique opportunity to examine the association between specific mental disorders and HIV infection.

Methods

Data were taken from the 1992 National Survey of Veterans (NSV), conducted as part of an ongoing effort by the Department of Veterans Affairs (VA) to monitor characteristics of the veteran population, their service needs, and utilization of VA benefits. Veterans gave verbal consent for the interview, which was administered by telephone to veterans living in the community.

The sample was drawn from two sources. Random digit dialing of U.S. and Puerto Rican telephone numbers was used to identify veterans living in contacted households, and a random sample of veterans was drawn from three VA computerized databases; the VA Compensation and Pension File, for veterans receiving payments for service-connected disabilities; the patient treatment file, which lists all patients discharged from VA hospitals in 1992; and the outpatient VA clinic file, which listed all patients seen in outpatient clinics in the VA system in 1992. Veterans were considered eligible for the study if they received an honorable discharge and were not on active duty at the time of the interview. Of the total sample of 11,645, 5,529 were from the household sample and 6,116 were from VA databases.

The dependent variable of interest in the present analyses was a self-reported history of a positive HIV test or AIDS. Veterans were asked "Have you ever been told by a doctor that you had a positive test for HIV, or that you had AIDS?" Independent variables of interest were a self-reported history of substance abuse, PTSD, or other mental disorder ("Have you ever been told by a doctor that you had. . ."). Other variables included age, race, sex, income, education, and period of military service.

Logistic regression models were used to determine a) the association between a reported positive HIV test or AIDS and sociodemographic characteristics; b) the association between substance abuse, PTSD, or other mental problems and HIV/AIDS; c) whether the association between PTSD, other mental problems, and HIV status was explained by substance abuse; and d) the interaction between substance abuse and PTSD in predicting HIV/AIDS.

Results

Table 1 indicates the distribution of sociodemographic and psychiatric status variables for the sample, stratified on HIV status. Forty-three subjects (.37%) reported being HIV positive or having AIDS. They were more likely to be minority (p = .0001), not have health insurance (p = .0001), be divorced or single (p = .0001), and have lower income (p = .0001). There were no gender, education, or age differences in the rate of self-reported HIV status.

Of the 766 veterans who reported a diagnosis of drug or alcohol abuse, 11 (1.44%) were HIV positive. Of the 775 who reported a history of PTSD, 8 (1.03%) were HIV positive. Of the 1,045 with other mental or emotional problems 8 (0.77%) were HIV positive. Comorbidity was common: 26.7% of those with PTSD were also drug or alcohol abusers; 23.93% of those with other mental illnesses were substance abusers; and 40.52% of those with PTSD had another mental disorder (other than substance abuse).

Table 2 indicates the unadjusted HIV rates among each of the three groups. Those with substance abuse were 4.9 times more likely to be HIV positive than those without substance abuse (p = .0001). Those with PTSD were 3.17 times more likely to be HIV positive than those without PTSD (p = .002), and those with other mental or emotional problems were 2.38 times more likely to be HIV positive than those without (p = .024).

TABLE 1
Sociodemographic Characteristics of Those with and without HIV+ Tests/AIDS, 1992 National Survey of Veterans

Variable		Sample without HIV+ test/ AIDS n	%	Sample with HIV+ test/ AIDS n	%	p[b]
Gender						
	Males	11074	95.95	42	97.67	.5670
	Females	467	4.05	1	2.33	
Ethnicity						
	White	9669	83.78	19	44.19	.0001
	Black	1101	9.54	17	39.53	
	Hispanic	467	4.05	7	16.28	
	Other	304	2.63	0	0	
Insurance						
	None	1533	13.28	14	32.56	.0001
	Private	3825	33.14	6	13.95	
	Public and Private	3406	29.51	4	9.3	
	Public	2548	22.08	13	30.23	
	Unknown	229	1.98	6	13.95	
Period of service[a]						
	WWII	4064	35.21	6	13.95	.0040
	Korea	2629	22.78	8	18.6	.5150
	Pre-Vietnam	3001	26	9	20.93	.4490
	Vietnam	3960	34.31	15	34.88	.9370
	Post-Vietnam	2318	20.08	15	34.88	.0160
	Persian Gulf	442	3.83	2	4.65	.7790
	Other	1291	11.19	3	6.98	.3820
Marital status						
	Married	8550	74.21	13	30.23	.0001
	Widowed	580	5.03	4	9.3	
	Divorced	1500	13.05	10	23.26	
	Never married	892	7.74	16	37.21	
Income						
	$0 to $10,000	2513	23.03	23	54.76	.0001
	$10,000 to $20,000	2663	24.4	11	26.19	
	$20,000 to $40,000	3158	28.94	7	16.67	
	$40,000+	2578	23.63	1	2.38	
Education						
	< High School	2297	20.01	12	27.91	.1740
	High School	3218	28.03	11	25.58	
	Some college	3845	33.49	17	39.53	
	College or +	2121	18.47	3	6.98	

[a]Numbers add to more than the total sample size because veterans could have served in multiple periods.
[b]*p* values are determined from chi-square tests for independence.

Logistic regression models assessed the association between HIV, PTSD, and other mental problems. An analysis of the association between PTSD and HIV indicated that those with comorbid substance abuse were at higher risk; therefore, an interaction term was fit between substance abuse and PTSD (Table 3). Those with PTSD alone were not at increased risk; those with substance abuse alone were 2.43 times more likely to be HIV positive. Those with both PTSD and substance abuse were 11.50 times more likely to be HIV positive than those with no PTSD or substance abuse.

A similar interaction term between substance abuse and other mental or emotional problems was not significant (Table 4). Although the risk to those with both substance abuse and other non-PTSD mental illnesses was elevated (OR = 5.83), it was not significantly different from the risk to those who were only substance abusers (OR = 4.19, p = .0015).

TABLE 2
Univariate Associations between Psychiatric Diagnoses and HIV Infection/AIDS, 1992 National Survey of Veterans

Diagnosis	Number with disorder	HIV+ (%)	OR[a]	p[b]
Substance abuse	766	11 (1.44)	4.91	.0001
PTSD	775	8 (1.03)	3.17	.0020
Other mental illness	1045	8 (.77)	2.38	.0240

[a]OR refers to odds ratio
[b]*p* values calculated from a Wald chi-square test for H_0: OR=1

Discussion

Veterans in this sample who reported PTSD and comorbid substance abuse were at exponentially increased risk for HIV infection. This analysis is one of the first to indicate that a particular mental disorder may present a risk for HIV infection.

Because HIV is associated with neuro-psychiatric sequelae, an etiologic hypothesis should rule out the possibility that an association is due to consequences of infection. Although the data are cross-sectional, we have some ability to determine the sequence of PTSD and HIV infection. The majority of veterans with PTSD in this sample (92.3%) served in the Vietnam War or before. Assuming that PTSD was associated with military service, and that the virus was introduced into the U.S. population in approximately 1976 (Commenges and Etcheverry, 1993), 3 years after combat in Vietnam ended, it is likely that PTSD predated HIV infection.

It is not possible to ascertain if the onset of substance abuse predated HIV infection. However, at least for Vietnam veterans, the widespread availability of illicit drugs to soldiers serving in Vietnam suggests that substance use may have begun concurrent with military service and the onset of PTSD (Blank, 1985). The mean age of onset for substance abuse is in the 20s (DSM-IV; APA, 1996), suggesting that for all but recent veterans the onset of substance abuse predated the introduction of HIV into the U.S.

The associated features of PTSD paint a plausible picture for HIV risk. A sense of foreshortened future, a vague affinity for dangerous situations, and substance abuse are common (Blank, 1985; Rosenheck, 1985). This may lead to risky behavior, both sexual and substance-related, such as infrequent condom use or frequent sharing of drug injection equipment.

Another explanation for the association between HIV and PTSD is socioeconomic status, a proxy for availability of mental health and HIV prevention services. The HIV positive veterans in this sample were primarily African American and Hispanic men with low incomes and without health insurance. Of those who reported HIV, only 54.9% reported ever

TABLE 3
The Association between HIV Infection/AIDS and Comorbid PTSD and Substance Abuse, 1992 National Survey of Veterans

Disorder	n	HIV+	HIV+/1000 people	OR[a]	p[b]
None	10114	31	3.1	1.00	
PTSD alone	569	1	1.8	0.57	0.58
Substance abuse alone	539	4	7.4	2.43	0.09
Both PTSD and substance abuse	205	7	34.1	11.50	0.08

[a]OR refers to odds ratio
[b]p values calculated from a Wald chi-square test for H_0: OR=1

TABLE 4
The Association between HIV Infection/AIDS and Comorbid Mental Disorders and Substance Abuse, 1992 National Survey of Veterans

Disorder	n	HIV+	HIV+/1000 people	OR[a]	p[b]
None	10027	28	2.8	1.00	
Substance abuse alone	517	6	11.7	4.19	.0015
Mental illness alone	801	4	5.0	1.80	.2728
Both mental illness and substance abuse	252	4	16.1	5.83	.7597

[a]OR refers to odds ratio
[b]p values calculated from a Wald chi-square test for H_0: OR=1

having received treatment for HIV. This percentage is likely a combination of recent AIDS symptoms requiring treatment (95% of those who had ever been treated were treated in 1992, the year of the survey) and reduced access to medical care.

Although the association between other mental disorders and HIV was not statistically significant after controlling for substance abuse, the odds ratio was elevated. It is likely that there was not enough power to detect a statistically significant association. We therefore suggest that the potential risk to other psychiatric patients not be dismissed.

There are several limitations to these data. First, of the 17 medical problems asked about, the HIV question had the highest refusal rate (.3% compared with .1% for other conditions). It is likely that both HIV infection and mental illness are under-reported. In addition, the self-report nature of the data also required that a respondent had been tested for HIV or evaluated for mental illness. As mentioned above, many people never seek specialty mental health services. Rates of HIV testing are low even among high risk populations, and among those who are tested, many do not return for results. Both of these factors could serve to underestimate associations. Finally, due to the cross-sectional nature of the data, the association between PTSD and HIV may be underestimated by selective mortality–those at greatest risk may have died before the interview.

Despite the limitations, the analyses suggest that PTSD combined with substance abuse may be highly lethal. However, much remains to be known. For example, results are difficult to generalize to women, because women make up a small proportion of veterans. However, PTSD is not rare in the general population (7.8%–9.2%; Breslau and Davis, 1992; Kessler et al., 1994), suggesting that women with PTSD may also be at higher risk for HIV infection. Further research should also investigate whether other comorbid conditions, such as personality disorders, increase or modify the risk found here.

The risk of HIV infection among the mentally ill in this sample is high (OR = 2.38, p = .024). Although largely explained by comorbid substance abuse, this finding suggests that psychiatric treatment efforts that include HIV prevention efforts might help identify patients in need of substance abuse care and give AIDS prevention information to all psychiatric patients regardless of comorbid substance abuse. As increasing numbers of AIDS patients come from the population of mentally ill, with limited economic and social resources, demands for publicly funded AIDS care will increase. Increasing prevention efforts and identification of HIV positive individuals among the mentally ill may help curb the epidemic in this vulnerable population.

Conclusions

PTSD with comorbid substance abuse confers significantly increased risk for HIV infection. In addition, other mental disorders also increase risk. We suggest that psychiatric patients be targeted by clinicians for HIV prevention and treatment efforts and that further research be done to determine the effectiveness of traditional prevention efforts in mentally ill populations, whether mental disorders increase risk in the absence of substance abuse, the mechanisms of these effects, and the role of psychiatric comorbidity.

References

American Psychological Association (1996) *Diagnostic and Statistical Manual of Mental Disorders* (4th ed). Washington, D.C. Author.

Birenbaum R (1995) Psychiatrists campaign to attract colleagues to treat HIV-disease patients. *Can Med Assoc J* 153:647–649.

Blank A (1985) The unconscious flashback to the war in Viet Nam veterans: Clinical mystery, legal defense, and community problem. In S Sonnenberg, AS Blank, JA Talbott (Eds), *The Trauma of War: Stress and recovery in Viet Nam veterans.* Washington D.C.: American Psychiatric Press.

Breslau N, Davis GC (1992) Posttraumatic stress disorder in an urban population of young adults: Risk factors for chronicity. *Am J Psychiatry* 149:671–675.

Carmen E, Brady SM (1990) AIDS risk and prevention for the chronic mentally ill. *Hosp Community Psychiatry*, 41:652–657.

Commenges D, Etcheverry B (1993) An empirical Bayes approach to the estimation of the incidence curve of HIV infection. *Stat Med* 12:1317–1324.

Cournos F, Guido JR, Coomaraswamy S, Meyer-Bahlburg H, Sugden R, Horwath E (1994) Sexual activity and risk of HIV infection among patients with schizophrenia. *Am J Psychiatry* 151:228–232.

Ford K, Rubinstein S, Norris A (1994) Sexual behavior and condom use among urban, low-income, African-American and Hispanic youth. *AIDS Educ Prev* 6:219–229.

Holmberg S (1996) The estimated prevalence and incidence of HIV in 96 large metropolitan areas. *Am J Public Health* 86: 642–654.

Kalichman SC, Kelly JA, Johnson JR, Balto M (1994) Factors associated with risk for HIV infection among chronic mentally ill adults. *Am J Psychiatry* 151:221–227.

Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshleman S, Wittchen HU, Kendler KS (1994) Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States. Results from the National Comorbidity Survey. *Arch Gen Psychiatry* 51:8–19.

Kulka RA, Schlenger WE, Fairbank JA, Hough RL, Jordan BK, Marmar CR, Weiss DS (1990) *Trauma and the Vietnam War Generation: Report of findings from the National Vietnam Veterans Readjustment Study*. New York: Brunner/Mazel.

Latkin C, Wallace M (1993) Depression as an antecedent of frequency of intravenous drug use in an urban, non-treatment sample. *Int J Addict* 28:1601–1621.

Leaf PJ, Bruce ML, Tischler GL, Freeman DH, Weissman MM, Meyers JK (1988) Factors affecting the utilization of specialty and general medical mental health services. *Med Care* 26:9–26.

Lyketsos CG, Federman EB (1995) Psychiatric disorders and HIV infection: Impact on one another. *Epidemiol Rev* 17:152–164.

Lyketsos CG, Fishman M, Treisman G (1995) Psychiatric issues and emergencies in HIV infection. *Emerg Med Clin North Am* 13:163–177.

Norquist GH, RL Golding JM, Escobar JI (1990) Psychiatric Disorder in male veterans and nonveterans. *J Nerv Ment Dis* 178: 328–335.

Robbins LN, Locke BZ, Regier DA (1991) An overview of psychiatric disorders in America. In LN Robbins, DA Regier (Eds), *Psychiatric disorders in America: The epidemiologic catchment area study*. New York: The Free Press.

Rosenheck R (1985) Malignant post-Vietnam stress syndrome. *Am J Orthopsychiatry* 55:166–176.

Rosenheck R, Fontana A, Leda C (1994) The proportion of veterans among homeless men. *Am J Public Health* 84:466–469.

Sacks M, Dermatis H, Looser-Ott S, Perry S (1992) Seroprevalence of HIV and risk factors for AIDS in psychiatric inpatients. *Hosp Community Psychiatry* 43:736–737.

Silberstein C, Galanter M, Marmor M, Lifshutz H, Krasinski K, Franco H (1994) HIV-1 among inner city dually diagnosed inpatients. *Am J Drug Alcohol Abuse* 20:101–113.

Sitzman BT, Burch EA, Jr., Bartlett LS, Larutia G (1995) Rates of sexually transmitted diseases among patients in a psychiatric emergency service. *Psychiatric Services* 46:136–140.

Susser E, Valencia E, Conover S (1993) Prevalence of HIV infection among psychiatric patients in a New York City men's shelter. *Am J Public Health* 83:568–570.

Volavka J, Convit A, O'Donnell J, Douyen R, Evangelista C, Czobor P (1992) Assessment of risk behaviors for HIV infection among psychiatric inpatients. *Hosp Community Psychiatry* 43:482–485.