

# Association Between Diabetes and Mental Disorders in Two American Indian Reservation Communities

LUOHUA JIANG, PHD<sup>1</sup>  
 JANETTE BEALS, PHD<sup>1</sup>  
 NANCY R. WHITESSELL, PHD<sup>1</sup>

YVETTE ROUBIDEAUX, MD, MPH<sup>2</sup>  
 SPERO M. MANSON, PHD<sup>1</sup>  
 FOR THE AI-SUPERPPF TEAM\*

A rapidly growing body of research exists on the association between diabetes and mental disorders (1–6). Yet, limited information is available regarding mental disorders among ethnic minorities with diabetes, particularly American Indians. We examined the association of mental disorders and diabetes in two American Indian populations using data from a large community-based psychiatric epidemiological study.

## RESEARCH DESIGN AND METHODS

The American Indian Service Utilization, Psychiatric Epidemiology, Risk and Protective Factors Project (AI-SUPERPPF) was conducted in two American Indian reservation communities. The methods are described in greater detail in a previous report (7) and on the study's Web site (<http://www.uchsc.edu/ai/ncaianmhr/research/superppf.htm>). Data were collected between 1997 and 1999 from enrolled members of Southwest and Northern Plains tribes. To allow direct comparisons to the National Comorbidity Survey (8), only those who were aged 15–54 years at the time of sampling were included. For confidentiality purposes, we use the general descriptors of Northern Plains and Southwest rather than specific tribal names. Among those located and determined eligible, 76.8% in the Northern Plains and 73.7% in the

Southwest tribes agreed to participate ( $n = 3,084$ ; 1,638 Northern Plains and 1,446 Southwest).

Self-reported diabetes status was assessed by the question “Did a doctor, medicine man, or other health care professional ever tell you that you had diabetes?” Psychiatric disorders were assessed with the UM-CIDI (University of Michigan version of the Composite International Diagnostic Interview) (8), adapted by an earlier study for use in American Indian communities (9). The UM-CIDI provided diagnoses based on DSM-III-R criteria; in addition, the investigators carefully analyzed subsequent changes in diagnostic criteria, adding items to accommodate the assessment of DSM-IV disorders. Here, we focused on the three most common DSM-IV disorders among American Indians (10): depressive disorder (major depressive episode/dysthymic disorder), posttraumatic stress disorder (PTSD), and alcohol dependence. As described elsewhere (11), we used a simplified definition of major depressive episode that has been shown to better match clinician judgments in this population.

Inferential analyses were conducted in STATA statistical software (12) using sample and nonresponse weights to account for differential selection probabilities and for nonresponse biases (13). Participants with unknown diabetes sta-

tus due to missing data were excluded from all analyses ( $n = 51$ ). Multiple logistic regression models were used to examine the association between diabetes and mental disorders, controlling for tribe, sex, age, education, employment status, and marital status. To calculate estimates reflecting the differential patterns across lifetime and current mental disorders, three-category mental disorder variables were used in the regression models (two dummy indicators, one for former [lifetime but not past year] diagnosis and one for current [past year] diagnosis).

**RESULTS**— The weighted mean age of this sample was 34 years, and 53% were women. The overall prevalence of diabetes was 7.7%. The prevalence of depressive disorder, PTSD, and alcohol dependence were former diagnosis —4.0, 10.0, and 6.1%, respectively, and current diagnosis —5.4, 5.0, and 7.3%, respectively. For age and sex distributions of diabetes and mental disorders, please see the online appendix (available at <http://dx.doi.org/10.2337/dc07-0097>).

Unadjusted and adjusted associations between diabetes and mental disorders are summarized in Table 1. In the unadjusted models, diabetes was significantly associated with former diagnoses of all three mental disorders. Former depressive disorder and alcohol dependence remained significantly associated with increased likelihood of diabetes after adjusting for sociodemographic characteristics and other disorders (odds ratio [OR] = 1.84,  $P = 0.045$ ; OR = 2.17,  $P = 0.002$ , respectively). However, the association between PTSD and diabetes was no longer significant (OR = 0.97,  $P = 0.876$ ).

**CONCLUSIONS**— We found that two common mental disorders, depressive disorder and alcohol dependence, were associated with a significantly elevated likelihood of diabetes in these two American Indian tribal communities, after controlling for sociodemographic variables and other disorders. Our results are relatively consistent with previous obser-

From the <sup>1</sup>American Indian and Alaska Native Programs, University of Colorado at Denver and Health Sciences Center, Aurora, Colorado; and the <sup>2</sup>Department of Family and Community Medicine, College of Medicine, The University of Arizona, Tucson, Arizona.

Address correspondence and reprint requests to Luohua Jiang, American Indian and Alaska Native Programs, MS F800, P.O. Box 6508, Aurora, CO 80045-0508. E-mail: [luohua.jiang@uchsc.edu](mailto:luohua.jiang@uchsc.edu).

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\*A list of the AI-SUPERPPF Team members can be found in the APPENDIX.

Additional information for this article can be found in an online appendix at <http://dx.doi.org/10.2337/dc07-0097>.

**Abbreviations:** AI-SUPERPPF, American Indian Service Utilization, Psychiatric Epidemiology, Risk and Protective Factors Project; PTSD, posttraumatic stress disorder.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

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**Table 1—Unadjusted and adjusted association between diabetes and common DSM-IV disorders**

	Diabetes prevalence [% (95% CI)]	Unadjusted [OR (95% CI)]	Adjusted [OR (95% CI)]*
Overall (n = 3,033)	7.7 (6.9–8.7)		
Depressive disorder			
No diagnosis (n = 2,736)	7.4 (6.5–8.4)	1.00	1.00
Former diagnosis (n = 121)	14.4 (9.2–22.0)	2.11 (1.24–3.60)‡	1.84 (1.01–3.34)†
Current diagnosis (n = 162)	9.2 (5.5–15.1)	1.28 (0.72–2.27)	0.86 (0.44–1.67)
PTSD			
No diagnosis (n = 2,437)	7.2 (6.3–8.3)	1.00	1.00
Former diagnosis (n = 291)	12.0 (8.7–16.3)	1.75 (1.19–2.58)‡	0.97 (0.62–1.50)
Current diagnosis (n = 145)	7.8 (4.3–13.8)	1.08 (0.56–2.09)	0.74 (0.36–1.51)
Alcohol dependence			
No diagnosis (n = 2,550)	7.0 (6.0–8.0)	1.00	1.00
Former diagnosis (n = 174)	18.4 (13.2–25.0)	3.02 (1.98–4.60)§	2.17 (1.34–3.50)‡
Current diagnosis (n = 201)	10.1 (6.5–15.4)	1.50 (0.90–2.50)	1.28 (0.71–2.32)

\*Adjusted by tribe, sex, age, education, employment status, marital status, and the other mental disorder variables under consideration in this study. †P < 0.05; ‡P < 0.01; §P < 0.001.

valuations showing links between diabetes and mental disorders (1–6).

Limitations of this study include lack of information on the relative onset of diabetes and mental disorders, precluding assessment of temporal precedence. Additionally, diagnoses of diabetes were by self-report only, and no information on the manner of diagnosis or type or severity of the illness was obtained. Finally, given the limited age range of this study (15–54 years), further studies on this topic are needed regarding older populations.

Despite these limitations, this study adds to the sparse literature on diabetes and mental disorders in ethnic minorities and provides insights into the nature and extent of the comorbidity of these conditions in American Indian tribal populations. Diabetes has been a serious public health problem in for American Indians for decades (14,15). A better understanding of the association between diabetes and mental disorders will help in designing more effective interventions for diabetes prevention and treatment in this special population.

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