

NICOTINE DEPENDENCE AND DEPRESSION AMONG METHADONE MAINTENANCE PATIENTS

Thomas J. Meyer, PhD, MS, Melissa M. Lin, MS, and Lawrence S. Brown, Jr, MD, MPH
Newark, New Jersey and Harlem, New York

There recently has been increasing interest at substance abuse treatment centers in smoking cessation treatment. Because a history of depression has been shown in other populations to complicate cessation efforts, the relationship between depression and nicotine dependence was tested in 726 methadone patients. Elevated odds of nicotine dependence given depression were found with three of four depression measures. Additional research is recommended to determine whether smoking cessation treatment will be more successful for methadone patients with a history of depression if it also addresses depression. (*J Natl Med Assoc.* 1996;88:800-804.)

Key words • nicotine dependence • depression
• methadone • smoking cessation

Very high rates of cigarette smoking (>80%) have been found among patients in methadone treatment.¹⁻⁴ Tobacco-related deaths also have been documented among opiate users.⁵ There recently has been increasing interest at substance abuse treatment centers in smoking cessation programs to reduce health risks to patients,⁶⁻⁸ including pilot tests of cessation programs with

methadone patients.⁹ Nicotine dependence, as described by the *Diagnostic and Statistical Manual (DSM-III-R and DSM-IV)*,^{10,11} generally involves difficulty in abstaining from smoking and can lead to interference with employment and social situations if smoking is not allowed. Given the increasing spread of smoking restrictions in the workplace and social disapproval of smoking, a comprehensive approach to substance abuse patient rehabilitation including treatment of nicotine addiction could improve patient employment and social outcomes as well as health. Moreover, Sees and Clark¹² found in a survey at VA and community treatment centers that 70% of opiate users wished to quit smoking tobacco.

A number of recent studies have found a positive association between increased rates of or history of depressive symptoms on the one hand, and greater nicotine dependence, smoking, or difficulty with quitting on the other.¹³⁻¹⁷ This association has taken on clinical significance as evidence has accumulated that both behavioral and pharmacological treatment of potential depressive symptoms can facilitate smoking cessation among those with a history of depression.^{18,19} Such relationships cannot be assumed to hold for all populations; Salive and Blazer²⁰ found in a longitudinal study of persons ≥ 65 years that current baseline depression, as measured by the CES-D, strongly predicted success rather than failure at smoking cessation among older women. Despite its potential importance to the health of opiate users and to their rehabilitation to smoke-free environments, the nature of the relationship between depression and nicotine dependence among patients with a history of opiate dependence has not been reported previously. Therefore, we tested that relationship in a secondary data analysis from a larger study of methadone maintenance treatment outcomes.

From the Department of Psychiatry, New Jersey Medical School, University of Medicine and Dentistry of New Jersey, Newark, New Jersey and the Addiction Research and Treatment Corporation and the Department of Medicine, Harlem Hospital Center, College of Physicians and Surgeons, Columbia University, New York. This work was supported by a National Institute on Drug Abuse grant #R18-DA06142. Requests for reprints should be addressed to Dr Lawrence S. Brown, Jr, Division of Medical Services, Evaluation and Research, Addiction Research and Treatment Corp, 22 Chapel St, Brooklyn, NY 11201.

METHODS

Detailed data collection procedures and the properties of the measures have been reported previously.²¹ This was a patient sample recruited from six methadone maintenance clinics in New York City from May 1991 to June 1993. Eligibility criteria for the study participants included: at least 18 years of age, at least 1 year history of opiate use, study entry 2 to 4 weeks following enrollment in the methadone program, and signed informed consent. Approximately 50% of eligible new patients enrolled in the study.

The sample was predominantly male (63.6%), minority (52.1% African American and 39.4% Latino), and had a mean age of 37.1 years (range: 19 to 69 years, standard deviation 7.3 years). Almost half (47.2%) had at least a high school education, and 12.9% were married. The sample was similar to the overall patient population of the Addiction Research and Treatment Corporation (ARTC) in its demographic characteristics.

Among the measures administered over a period of several days were:

- the Quick Diagnostic Interview Schedule (DIS),^{22,23} a computer-assisted interview that yields *DSM-III-R* diagnoses, including lifetime nicotine dependence and lifetime major depression,
- the third edition of the Addiction Severity Index (ASI),²⁴ which includes questions about severe depression lifetime and in the last 30 days, and
- the Beck Depression Inventory (BDI),²⁵ which gives a depression score of 0 to 63 for the period of the last 7 days.

The informed consent content and procedures were approved by the ARTC Institutional Review Board, Brooklyn, New York. In addition to the 217 patients reported previously,²¹ an additional 549 were recruited. Results will be reported here for 726 of the 766 for whom complete data was available on all variables and covariates.

Statistical analyses were done using SPSS.²⁶ Since preliminary results from the first 217 patients had indicated that the various measures of depression being collected revealed different prevalences,²¹ each depression measure was examined separately for its relationship with nicotine dependence. To facilitate comparisons with the data of Glassman et al,¹⁶ similar logistic regression models were used. Age, race/ethnicity, sex, education, and marital status were added as covariates to each depression measure to predict the dichotomous variable nicotine dependence versus nondependence. To enable comparisons with the other depression measures, BDI scores also were dichotomized according to Oliver and

Simmons²⁷ as "not depressed" (0 to 9) versus "depressed" (10 to 63).

To facilitate future meta-analyses, Rosenthal and Rubin²⁸ have suggested that results from multiple measures of a similar construct in a single study may be combined in composite measures when individual data is available; therefore, two such composite depression measures also were tested for their relationship with nicotine dependence. For the first composite depression measure, one point was added for each of the four measures on which they were classified as depressed: DIS lifetime depression, ASI lifetime depression, ASI last 30 days depression, and BDI last 7 days depression (dichotomized). The score for each patient therefore could range from 0 to 4. For the second composite depression measure, the BDI was treated as continuous, and scores on each depression measure were standardized with mean zero and standard deviation one. The sum of the four standardized scores was then itself standardized to facilitate interpretation of the units of the odds ratio in logistic regression.

RESULTS

Approximately two thirds of the sample (69.8%) met the criteria for having had a *DSM-III-R* diagnosis of nicotine dependence at some point in their life. As expected from previously reported results from the first 217 of this sample recruited,²¹ the prevalence of depression varied with the different measures. Rates of depression were 13.9% lifetime from the DIS, 39.5% lifetime from the ASI, 19.4% in the last 30 days from the ASI, and 58.7% for the last 7 days from the BDI (dichotomized as 10+ versus 0 to 9). When the BDI was considered as a continuous measure, the sample mean was 13.5 (standard deviation=9.87; range: 0 to 48), which Beck et al²⁵ considered to represent mild depression. The intercorrelations of the dichotomous depression variables ranged from .13 to .42.

The proportion with a history of nicotine dependence was significantly higher for those with a history of depression than for those without on three of the four measures, except the BDI (Table). Logistic regression controlling for age, race/ethnicity, sex, education, and marital status confirmed the three significant associations between depression and nicotine dependence. The adjusted odds of nicotine dependence given depression were: DIS lifetime depression, 3.08 (95% confidence interval [CI]=1.67, 5.69; $P=.0003$); ASI lifetime depression, 1.91 (95% CI=1.35, 2.70; $P=.0002$); ASI depression in the last 30 days, 2.00 (95% CI=1.27, 3.16; $P=.003$); and BDI depression last 7 days (dichoto-

TABLE. QUICK DIAGNOSTIC INTERVIEW SCHEDULE LIFETIME NICOTINE DEPENDENCE: DEPRESSED VERSUS NONDEPRESSED

Depression Measure	Total No. Subjects	No. (%) With History of Nicotine Dependence	Odds Ratio (95% CI)	P Value
DIS lifetime depression				
Yes	101	88 (88)	3.33 (1.76-6.41)	<.001
No	625	419 (67)	1.00	
ASI lifetime depression				
Yes	287	224 (78)	1.96 (1.37-2.80)	<.001
No	439	283 (64)	1.00	
ASI last 30 days depression				
Yes	141	114 (81)	2.06 (1.28-3.33)	<.002
No	585	393 (67)	1.00	
BDI last 7 days depression				
Yes	426	302 (71)	1.13 (0.81-1.58)	.460
No	300	205 (68)	1.00	

Abbreviations: CI=confidence interval, DIS=Quick Diagnostic Interview Schedule, Revised (*DSM-III-R*), ASI=Addiction Severity Index, and BDI=Beck Depression Inventory, scored as depressed (10 to 63) and not (0 to 9).

mized), 1.08 (95% CI=0.78, 1.50; $P=.62$). Beck Depression Inventory scores treated as a continuous measure also did not show a statistically significant relationship with nicotine dependence.

For the composite measure made by adding 1 point for each measure on which the person was classified as depressed, the adjusted odds of nicotine dependence increased 1.38 for each additional point (95% CI=1.18, 1.61; $P=.0001$). For the composite measure constructed by standardizing the sum of the standardized scores of the four depression measures (BDI continuous), the adjusted odds increased 1.49 for each standard deviation increase in depression (95% CI=1.23, 1.79; $P<.0001$). Odds ratios were slightly higher in all cases if not adjusted for covariates.

Because there was no information about the psychological status of the patients who did not agree to participate in the study, additional analyses were conducted to test the robustness of the relationships found above. The conservative assumption was made that among those not measured there was no relationship among the variables. This premise was operationalized by assuming that the distribution of patients without data into cells of the 2×2 table was according to the multiplied marginal distributions of those with complete data. These calculated values expected under the assumption of no relationship were then added to the observed values for those with data, and "lower bound" robust odds ratio estimates were computed for a total "sample" of 1532. The three depression measures significantly associated with lifetime nicotine dependence

above retained statistically significant associations; the odds ratio for the BDI naturally declined further toward 1 (which indicates no relationship). For DIS lifetime depression, the robust odds ratio (OR) with nicotine dependence was 1.62 (95% CI=1.13, 2.32; $P=.007$); for ASI lifetime depression, the robust OR was 1.37 (95% CI=1.08, 1.73; $P=.01$); for ASI last 30 days depression, the robust OR was 1.38 (95% CI=1.02, 1.88; $P=.04$); and for BDI last 7 days depression (dichotomized), the robust OR was 1.06 (95% CI=0.85, 1.33; $P=.62$).

DISCUSSION

An association between depression and lifetime nicotine dependence was found in a predominantly minority inner-city sample of methadone maintenance patients for three of four depression measures administered, as well as with composite depression scores generated by two different methods. The limitations of this data set should be addressed in further research by measuring current nicotine dependence and current smoking behavior in addition to a history of nicotine dependence. Further investigations with this population, which has an unusually high smoking rate, could be important not only for clinical applications, but also for theories of pharmacologic action and self-medication (including the effects of nicotine replacement on the mood of methadone patients during cessation attempts).

It is noteworthy that little information on the relationship between nicotine dependence and depression previously has been available on those with recent substance abuse because diagnosis with substance abuse

disorders or depression in the last 6 months have been exclusion criteria for several clinical trials in this area,¹⁹ including a report focused on history of alcohol abuse and depression in smoking cessation.²⁹ Judging from the complex results of the trial by Hall et al,¹⁹ their cognitive-behavioral mood management component should not automatically be added to all smoking cessation support groups. Although mood management aided those with a history of depression in maintaining abstinence in their study, the nonsignificant effect of mood management on those without a history of depression was in the adverse direction. Although baseline dysphoric mood predicted more difficulty in cessation for those in Hall's study with a history of depression, baseline dysphoric mood was unrelated to smoking cessation among those without such a history. Future research into the usefulness of addressing depression during smoking cessation should differentiate between a history of major depression, current diagnosable depression (which should be addressed in any case), and baseline dysphoric mood.

Depression measurement issues also should be clarified. It is unclear why no relationship was found between the BDI and history of nicotine dependence in the current study despite strong relationships of the other three measures with nicotine dependence. The available data set did not permit analysis of the Cognitive-Affective subscale of the BDI alone, which among opiate users may avoid confounds of depression with substance abuse-related somatic symptoms.³⁰ The single-item depression measures of the ASI avoided this possible confound. It is also possible that the time period referred to by the different measures accounted for the difference, especially since the patients were fairly new to methadone treatment.³¹

Since a link between lifetime nicotine dependence and several depression measures among methadone patients has been demonstrated in this study, further research in this area is justified, particularly in longitudinal studies that could help clarify whether the connection is causal. For those methadone maintenance patients with a history of depression, smoking cessation efforts might be more successful if depression also were addressed. Given the potential benefits of smoking cessation in terms of health and integration within an increasingly smoke-free society, we recommend that such comprehensive smoking cessation programs be developed and tested with methadone maintenance patients. Such treatment could build on the pioneering work of others, such as that of Orleans and Hutchinson,⁸ incorporating stages of change models

into smoking cessation treatment of substance abuse treatment patients, and that of Story and Stark,⁹ for patients receiving methadone therapy specifically.

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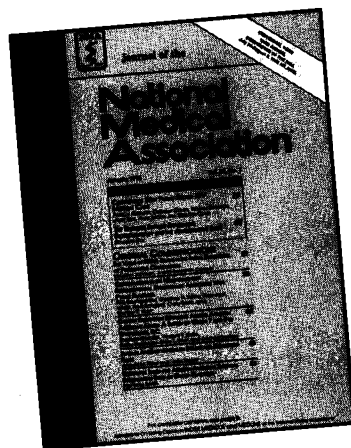
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