Benzodiazepine Anti-anxiety Agents: Prevalence and Correlates of Use in a Southern Community

ABSTRACT

Background: Benzodiazepine anti-anxiety agents are the most widely prescibed psychotherapeutic drugs in the United States today. Recent evidence, however, suggests that their use may be decreasing.

Methods: We examine the population prevalence and correlates of use of benzodiazepine anxiolytics at the Duke site of the NIMH-sponsored Epidemiologic Catchment Area project.

Results: Bivariate analysis of use patterns for the drugs revealed demographic predictors similar to those reported in previous studies: increased likelihood of use by the elderly, Whites, women, the less educated, and the separated or divorced. Use is also associated with symptoms of psychic distress, negative life events, use of health care services, and diagnoses of affective disorder, agoraphobia with panic, and panic disorder. Age, sex, race, education, and marital status remain associated with non-hypnotic benzodiazepine use in a logistic regression analysis.

Conclusions: Multivariate analyses of these data indicate that when potential confounding factors are controlled, age, sex, race, education, and marital status are significantly related to benzodiazepine anxiolytic use but the effects of sex and education are mediated by intervening variables. Implications of these findings are discussed particularly in relation to high levels of use in the elderly. (*Am J Public Health* 1991;81:592–596)

Marvin Swartz, MD, Richard Landerman, PhD, Linda K. George, PhD, Mary Lou Melville, MD, Dan Blazer, MD, PhD, and Karen Smith, PhD

Introduction

Benzodiazepine anti-anxiety agents are the most widely prescribed psychotherapeutic drugs in the United States today.[1] First introduced in 1960, these drugs rapidly achieved a lead position in the prescription drug market,[2] stimulating public and professional debate over appropriate psychotropic drug use.[3] Recent evidence, however, suggests that the prevalence and patterns of psychotropic use, especially those of benzodiazepine anxiolytics, may be changing and resulting in decreased use.[4,5] The first detailed population survey of psychotropic drug use, the National Household Sample in 1970–71,[6–9] found that 22 percent of American adults had used prescription psychotropic medication during the year 1969–70, with higher use among women and the elderly. The most commonly used drug group, "minor tranquilizer/daytime sedatives," was used by 8 percent of men and 20 percent of women. Use was greater in Whites and in divorced, separated, and widowed persons and the elderly.[6] In 1979, the National Survey of Psychotherapeutic Drug Use documented, using weighted data, that an estimated total of 8 percent of men and 13.7 percent of women had used benzodiazepine anxiolytics in the previous year with the greatest use among respondents ages 50–64.[2,10] Recent surveys of the St. Louis area population[11] and Great Britain[12] found lower overall rates of use but similar sex and age usage profiles.

Previous studies have relied primarily on bivariate analyses when describing patterns of drug use, failing to take into account the intercorrelations among predictors, including demographic, diagnostic, symptoms, and service use variables. In the present study we examine the prev-

alence and patterns of benzodiazepine antianxiolytic drug use in the Piedmont region of North Carolina during 1982–83, utilizing logistic regression analysis, which allows prediction of benzodiazepine use while introducing controls for potential confounding and mediating variables.

Method

The present paper reports results from Wave 1 of the Piedmont Health Survey, one site of the five-site National Institute of Mental Health Epidemiologic Catchment Area program (NIMH-ECA).[13] The sampling frame for the Piedmont Health Survey (PHS) was a five-county area in north central North Carolina, consisting of one urban county and four contiguous rural counties. The survey randomly sampled all housing units from segments throughout the catchment area, using the Kish method,[14] yielding 3,798 interviews usable for this study; further details of the study have been published elsewhere.[15] In this paper analyses are based on weighted data, taking into account household probability selection, nonresponse, and the 1980 census demographic profile of adults in the five-county catchment area. For significance tests, the data were downweighted to the original number of subjects, but weighting adjustments remain.

Diagnoses were obtained through use of the Diagnostic Interview Schedule

(DIS), a highly structured interview designed for use by lay interviewers in epidemiological studies and capable of generating computer-based diagnoses for certain DSM-III disorders.[16] The diagnoses generated by the DIS were too numerous to include in a single regression equation. Preliminary analyses ascertained that an affective disorders summary measure (consisting of major depressive disorders, bipolar disorders, dysthymia, and bereavement), panic disorder, and agoraphobia with panic were most strongly related to benzodiazepine use. These measures were retained for subsequent analyses. The version of the DIS used in Wave 1 of this survey and other ECA sites did not include one anxiety disorders diagnosis, generalized anxiety disorder, employed at certain ECA sites in follow-up interviews.

In the present study psychotropic drug use refers to any use within the year prior to interview, regardless of amount or duration of use and was elicited by specific drug use probes aided by photographic drug identification cards. Other measures used for this analysis include a 29-item psychic distress scale analogous to the SCL-90,[17] and the number of negative life events during the year prior to the interview, measured by a scale of 20 major events of the type proposed by Holmes and Rahe.[18] Analyses of life events in the survey have been published elsewhere.[19,20] Interviewers also recorded the number of outpatient visits to physical and mental health providers during the six months prior to interview. The measure of outpatient health service utilization employed in this study is dichotomous, because the use vs non-use measure has more explanatory power than a continuous (number of visits) measure. Demographic variables used in this report include sex, age, race, education level, marital status, and urban vs rural residence. Income is excluded because preliminary analyses indicated that the relationship between anxiolytic use and income is weak.

The Appendix presents a six-stage causal model predicting the dichotomous measure of use vs nonuse of benzodiazepine anti-anxiety agents. A unidirectional causal process is assumed with variables in prior stages affecting those in subsequent stages. No causal direction is assumed for variables in the same stage. In the multivariate logistic regression analysis below, effects of the stage I variables are estimated first, and the equation is then expanded as groups of variables are

entered by stage. This format yields an estimate of the effect of each variable net of all adjacent and prior variables and indicates whether the effects of prior variables are mediated by subsequent variables. The logistic regression procedure calculates maximum likelihood estimates for the parameters of a model that express the log odds of an event (here, drug use) as a simple linear model.[21,22]

Results

Table 1 presents the demographic profile for subjects participating in the survey. Table 2 focuses specifically on use of benzodiazepine anti-anxiety agents—predominantly diazepam and chlordiazepoxide—regardless of source. All other anxiolytics as well as all sedatives and hypnotics (benzodiazepine and other) are excluded. Table 2 presents a cross-tabular analysis of the weighted prevalence of benzodiazepine anxiolytic use among various demographic and other groups of interest. For two continuous variables, correlation coefficients are used: the correlation coefficient of drug use with number of negative life events is .09 (p < .01) and that for drug use with psychic distress symptoms is .20 (p < .01). Benzodiazepine anxiolytic use is more prevalent among women, older persons, Whites, and those with less education. The never married and married have significantly lower prevalence of use than the divorced and widowed. Respondents who have recently used either physical or mental health care services are much more likely to use these agents, as are those with a DIS diagnosis of affective disorder, panic disorder, or agoraphobia with panic.

Table 3 presents results of the logistic regression analyses. The "OR" coefficient in the table is the antilogged regression coefficient and estimates how changes in the independent variables multiply the odds of using benzodiazepine anxiolytics, holding other variables in the equation constant. Ninety-five percent confidence intervals are also given. The overall fit of the model is assessed by R statistic which is roughly analogous to the multiple correlation coefficient in ordinary least squares regression after correcting for the number of parameters estimated.[22]

In stage I, older persons and women are both more likely than others to use benzodiazepines, while Blacks are less likely. The gender effect decreases substantially in stages V and VI indicating that much of the initial sex difference is

TABLE 1—Demographic Profile of Community Subjects Participating in the Piedmont Health Survey (N = 3,798)			
	No.[a]	%[b]	WTD[c]
Sex			
Male	1489	39	46
Female	2309	61	54
Race			
White	2399	63	62
Other[d]	1395	37	38
Age (years)			
18–34	1096	29	43
35–54	863	23	29
55–74	1414	37	23
75+	425	11	5
Marital Status			
Married with spouse	953	51	60
Separated/ divorced	480	13	11
Widowed	814	21	9
Never married	551	15	21
Educational Level (years)			
0–8	973	26	16
9–11	818	22	22
12–13	1062	28	34
14+	935	25	28
Residence			
Rural	1936	51	44
Urban	1962	49	56

[a]The total of some cells do not equal 3,798 because of missing data.
[b]The percents may not sum to 100 due to rounding.
[c]The weighted percentage adjusts the actual response percentage to take into account household probability selection, response rate, the elderly oversample and demographic characteristics of the 196,790 persons in the five-county area who were 18+ years of age. (Total five-county population, based on 1980 census data, was 269,863.)
[d]Other races are almost entirely Black.

due to higher levels of psychic distress and health service utilization among women. The race effect changes very little across stages indicating no substantial effect of potential mediating variables. While the coefficients for age fluctuate across stages, they remain largely unmediated and substantial at stage VI. In stage II, increases across each of four levels of education (as indicated in Table 2) reduce the odds of benzodiazepine use by .9. This initial effect decreases in stages IV and V, indicating that those with more education use benzodiazepines less, in part, because they have fewer DIS diagnoses and psychic distress symptoms. Compared to the never married, the separated, divorced, and widowed are more likely to use benzodiazepine anxiolytics. These marital status effects are not mediated by varia-

TABLE 2—Bivariate Correlates of Benzodiazepine Anti-anxiety Agent Use, Piedmont Health Survey 1982–83

Variables	Total	Number Using Drug	WTD% Using Drug
Sex			
Males	1489	104	6.9
Females	2309	310	10.6[a]
Age (years)			
18–34	1096	50	3.8
35–54	863	99	11.5
55–74	1414	208	14.0
75+	425	57	13.6[a]
Race			
White	2399	317	11.5[a]
Non-White	1395	97	4.7
Marital Status			
Married	1953	197	9.3
Separated/divorced	480	70	11.4
Widowed	814	122	14.7
Never married	551	25	3.6[a]
Educational Level (years)			
0–8	973	124	11.3
9–11	818	111	11.8
12–13	1062	102	7.4
14+	935	77	7.2[a]
Residence			
Rural	1936	192	8.2
Urban	1862	222	9.4
DIS Diagnosis			
No Affective Dx	3638	364	8.2
1 Affective Dx	136	39	21.7
2+ Affective Dx	24	11	41.7[a]
No Agor. w/Panic Dx	3658	386	8.5
Agor. w/Panic Dx	40	10	33.1[a]
No Panic Disorder	3762	405	6.6
Panic Disorder Dx	22	6	39.2[a]
Health Service Utilization			
No Outpatient Physical Health Care (6 mos)	1619	84	3.9
Outpatient Physical Health Care (6 mos)	2150	325	13.2[a]
No Outpatient Mental Health Care (6 mos)	3450	301	7.0
Outpatient Mental Health Care (6 mos)	283	101	31.0[a]

[a]Significant at the .05 level or better. Where a particular set has more than two categories, significance test applies to the set.

bles entered in subsequent stages. Urban residence is not strongly associated with drug use. In stage III the number of negative life events is positively and substantially associated with drug use. Decreases in this effect in stages IV through VI indicate that the effect of negative life events is due primarily to the effects of life stress on DIS diagnoses, psychic distress symptoms, and increased health care utilization. In stages IV through VI, affective disorder, agoraphobia with panic, and panic disorder are all associated with increased benzodiazepine use, as are psy-

chic distress and health care utilization. However as can be seen in the final model, effects of DIS diagnoses are mediated by psychic distress.

Discussion

Multivariate analysis of survey data indicates that when potential confounding factors are controlled, age, sex, race, education, and marital status are related to benzodiazepine anxiolytic use. Age, race, and marital status remain substantially unmediated by other factors while sex and

education, previously thought to be predictors of anxiolytic use, exert their effects indirectly via their relationships with other predictors in subsequent model stages. The effect of education is mediated by intervening factors such as high levels of psychic distress or stressful life events. Women indeed use more anxiolytics, but probably because they either have or report more distress than men and/or are more likely to seek help. That is, net of the effect of increased levels of psychic distress and help-seeking among women, women are no more likely than men to receive and/or use anxiolytics, indicating less evidence for sex bias in prescribing practices and use than suggested in previous studies and the press.[11,23–25]

One of the most important findings in the present study relates to increased anxiolytic use in the elderly, many of whom are already medicated and/or cognitively impaired.[2] Benzodiazepine use in the elderly is a particular concern because the use of long half-life benzodiazepines such as the ones included in the present study is associated with an increased risk of hip fracture,[26] creating a potentially fatal complication of anxiolytic use in this population. High levels of use in the elderly raises concerns about the judicious use of these agents.

The differential rates of anxiolytic use by race, lower among Blacks even when predictors such as use of health services are controlled, cannot be explained further in the present analysis. These results do suggest possible racial bias in prescribing practices and/or different modes of help-seeking and alleviation of psychic distress among Whites vs Blacks. Prior studies have demonstrated that separated or divorced respondents have higher levels of life stress and psychic distress[9] and are more likely to use anxiolytics, presumably as a result of these stressors.[6,9] Our analyses suggest, however, that separated and divorced persons have a greater likelihood of drug use even net of negative life events and psychic distress, suggesting other explanatory or predispositional factors, not examined in the present analysis.

Finally these analyses raise questions about associations between symptoms, diagnosis, and appropriate psychotherapeutic drug use. There is evidence that the American public has become more conservative in its attitudes toward psychotropic drug use.[2,27] In fact, our preliminary data indicate that the majority of persons with high levels of anxiety in the community are not receiving psychotherapeutic medications; further analyses need to ex-

TABLE 3—Logistic Regression Effects Corresponding to Model in Appendix

	I OR (95% CI)	II OR (95% CI)	III OR (95% CI)	IV OR (95% CI)	V OR (95% CI)	VI OR (95% CI)
Intercept	0.04 —	0.05 —	0.03	0.03 —	0.02 —	0.01 —
Age 35–54	3.2 (3.8, 2.7)	2.7 (3.2, 2.2)	2.8 (3.4, 2.4)	3.0 (3.6, 2.5)	3.1 (3.8, 2.6)	3.1 (3.7, 2.5)
Age 55–74	4.0 (4.8, 3.4)	3.1 (3.7, 2.5)	3.4 (4.1, 2.8)	3.7 (4.5, 3.0)	4.0 (4.9, 3.3)	3.4 (4.2, 2.8)
Age 75+	3.6 (4.7, 2.8)	2.6 (3.5, 1.9)	2.9 (3.9, 2.1)	3.1 (4.3, 2.3)	3.4 (4.7, 2.5)	2.7 (3.7, 2.0)
Black	0.4 (0.4, 0.3)	0.4 (0.4, 0.3)	0.3 (0.4, 0.3)	0.3 (0.4, 0.3)	0.3 (0.4, 0.3)	0.3 (0.4, 0.3)
Female	1.5 (1.7, 1.3)	1.4 (1.6, 1.2)	1.4 (1.6, 1.3)	1.4 (1.6, 1.2)	1.3 (1.4, 1.1)	1.2 (1.4, 1.0)
Education		0.9 (0.9, 0.8)	0.9 (0.9, 0.8)	0.9 (1.0, 0.8)	1.0 (1.0, 0.9)	0.9 (1.0, 0.9)
Married		1.4 (1.8, 1.1)	1.5 (1.9, 1.1)	1.5 (1.8, 1.2)	1.5 (1.9, 1.2)	1.6 (2.0, 1.2)
Separated/divorced		2.2 (2.9, 1.6)	2.1 (2.8, 1.6)	2.1 (2.8, 1.6)	2.1 (2.8, 1.6)	2.3 (3.0, 1.7)
Widow		1.8 (2.4, 1.3)	1.7 (2.4, 1.3)	1.8 (2.4, 1.3)	1.7 (2.4, 1.3)	2.0 (2.7, 1.5)
Urban		1.3 (1.4, 1.1)	1.2 (1.4, 1.1)	1.2 (1.3, 1.0)	1.1 (1.2, 1.0)	1.1 (1.3, 1.0)
#Life stress			1.5 (1.6, 1.4)	1.4 (1.5, 1.3)	1.2 (1.3, 1.1)	1.1 (1.2, 1.0)
#Affect Dx				2.2 (2.6, 1.8)	1.2 (1.5, 1.0)	1.1 (1.3, 0.9)
Dx-agor/pan				2.8 (4.3, 1.8)	1.3 (2.0, 0.8)	1.3 (2.1, 0.8)
Dx-panic				4.6 (7.9, 2.6)	2.3 (4.0, 1.3)	1.3 (2.4, 0.8)
Psyc distress					1.2 (1.3, 1.2)	1.2 (1.2, 1.2)
Outpat phys						2.7 (3.2, 2.3)
Outpat ment						2.3 (2.7, 1.9)
Model:						
R	.26	.27	.30	.32	.36	.41

plore whether they are receiving other psychotherapeutic interventions. There is also a strong association between a DIS diagnosis of affective disorder and use of benzodiazepine anxiolytics. Concurrent use of antidepressants is not examined in the present study. However, Craig, *et al*, also found that surveyed women taking minor tranquilizers and sedatives included significantly more respondents with high depression scores, and that depressed respondents of both sexes tended to be taking anxiolytics or sedatives, and not antidepressants.[28] Beardsley, *et al*,[29] found that primary care practitioners provided 72 percent of all anxiolytic drug visits, but documented a psychiatric diagnosis in a minority of anxiolytic drug visits, raising questions about the specificity of anxiolytic use in primary care settings. Although anxious and depressive symptoms are often admixed, the present findings of high anxiolytic use among depressed respondents suggest that depressive symptoms are underrecognized. Major depressive episodes usually require specific antidepressant medication and psychotherapy, and treatment with benzodiazepine anxiolytics in the absence of more specific antidepressant therapy may postpone therapeutic response or even exacerbate symptoms.[23,30,31]

We have examined the current prevalence of benzodiazepine anxiolytic use in a Southern community, demonstrating that age, sex, race, education, and marital status are significantly associated with drug use, but that the effects of sex and education are mediated by intervening variables. In addition we have found benzodiazepine anxiolytic use to be significantly associated with several DIS diagnoses although the effects of diagnoses are largely mediated by psychic distress and use of health services. Future research on this population will focus on duration and frequency of anxiolytic use, use of other psychotropic drugs, and use of potentially interacting drug combinations. Finally, more detailed DIS diagnostic information gathered at follow-up of the survey cohort, including generalized anxiety disorder, will allow closer examination of the associations between benzodiazepine anxiolytic use and DIS diagnoses of affective and anxiety disorders. □

References
1. Baum C, Kennedy DL, Forbes MB, Jones JK: Drug use in the United States in 1981. JAMA 1984; 251:1293–1297.
2. Mellinger GD, Balter MB: Prevalence and patterns of use of psychotherapeutic drugs: Results from a 1979 national survey of American adults. *In:* Tognoni G, Bellantuono C, Lader M (eds): Impact of Psychotropic Drugs. Elsevier, North Holland Biomedical Press, 1981; 117–135.
3. Klerman GL: Psychotropic hedonism vs pharmacological calvinism, The Hastings Report 1972; 2:1–3.
4. Baum C, Kennedy DL, Forbes MB, Jones JK: Drug use and expenditures in 1982. JAMA 1985; 253:382–386.
5. Shader RI, Greenblatt DJ: Benzodiazepine overuse-misuse. J Clin Psychopharm 1984; 4:123–124.
6. Parry HJ, Balter M, Mellinger G, Cisin I, Manheimer D: National patterns of psychotherapeutic drug use. Arch Gen Psychiatry 1973; 28:769–783.
7. Uhlenhuth EH, Balter M, Lipman R; Minor tranquilizers. Arch Gen Psychiatry 1978; 35:650–655.
8. Mellinger GD, Balter MB, Parry HJ, Manheimer DI, Cisin IH: An overview of psychotherapeutic drug use in the United States. *In:* Josephson E, Carroll E (eds): Drug Use: Epidemiological and Sociological Approaches. New York: Hemisphere, 1974; 333–366.
9. Mellinger GD, Balter MB, Manheimer DI, Cisin IH, Parry HJ: Psychic distress, life crisis, and use of psychotherapeutic medications. Arch Gen Psychiatry 1978; 35:1045–1052.
10. Mellinger GD, Balter MB, Uhlenhuth EH: Prevalence and correlates of the long-term regular use of anxiolytics. JAMA 1984; 251:375–379.
11. Cottler LB, Robins LN: The prevalence and characteristics of psychoactive medication use in a general population study. Psychopharm Bull 1983; 19:746–751.
12. Dunbar GC, Perera MH, Jenner FA: Patterns of benzodiazepine use in Great Britain as measured by a general population survey. Br J Psychiatry 1989; 155:836–841.
13. Regier DA, Myers JK, Kramer M, Robins LN, Blazer DG, Hough RL, Eaton WW, Locke BZ: The NIMH Epidemiologic Catchment Area Program. Arch Gen Psychiatry 1984; 41:934–941.
14. Kish L: Survey Sampling. New York: John Wiley and Sons, 1965.
15. Blazer DG, George LK, Landerman R, Pennybacker M, Melville ML, Woodbury M, Manton KG, Jordan K, Locke B: Psychiatric disorders: A rural/urban comparison. Arch Gen Psychiatry 1985; 42:651–656.

16. Robins LN, Helzer JE, Croughan J, Ratcliff KF: National Institute of Mental Health Diagnostic Interview Schedule: Its history, characteristics and validity. Arch Gen Psychiatry 1981; 38:381–389.

17. Derogatis LP, Lipman RS, Covi L: SCL-90: An outpatient psychiatric rating scale: Preliminary report. Psychopharm Bull 1973; 9:13–28.

18. Holmes TH, Rahe RH: The Social Readjustment Rating Scale. J Psychosom Res 1967; 11:213–218.

19. Hughes DC, Blazer DG, George LK: Age differences in life events: A multivariate controlled analysis. Int J Aging Human Devel 1988; 27:207–220.

20. Hughes DC, George LK, Blazer DG: Age differences in life event qualities: Multivariate controlled analyses. J Community Psychology 1988; 16:161–174.

21. Hanushek EA, Jackson JE: Statistical Methods for Social Scientists. New York: Academic Press, 1977.

22. Harrell FE: The LOGIST Procedure. In: Joyner S (ed): Supplemental Library User's Guide, 1983 Edition. Cary, NC: SAS Institute, Inc, 1983.

23. Rickels K: Use of antianxiety agents in anxious outpatients. Psychopharmacology 1978; 58:1–17.

24. Berg RH: The over-medicated woman. McCall's 1971; 67:109–111.

25. Rogers JM: Stimulus/response: Drug abuse by prescription. Psychol Today 1971; 5:16–24.

26. Ray WA, Griffin MR, Downey W: Benzodiazepines of long and short elimination half-life and the risk of hip fracture. JAMA 1989; 262:3303–3307.

27. Manheimer DI, Davidson ST, Balter MB, Mellinger GD, Cisin IH, Parry HJ: Popular attitudes and beliefs about tranquilizers. Am J Psychiatry 1973; 130:1246–1253.

28. Craig TJ, Van Netta PA: Current medication use and symptoms of depression in a general population. Am J Psychiatry 1978; 135:1036–1039.

29. Beardsley RS, Gardocki GJ, Larson DB, Hidalgo J: Prescribing of psychotropic medication by primary care physicians and psychiatrists. Arch Gen Psychiatry 1988; 45:1117–1119.

30. Hall RCW, Joffe JR: Aberrant response to diazepam: A new syndrome. Am J Psychiatry 1972; 129:738–742.

31. Greenblatt DJ, Shader RI: Benzodiazepines in Clinical Practice. New York: Raven Press, 1974.

APPENDIX
A Six-Stage Causal Model Predicting Benzodiazepine Use

I	II	III	IV	V	VI
Age	Education	Life Events	Affective Disorders	Psychic Distress	Utilize Outpatient Physical Health Services
Race	Marital Status		Agoraphobia with panic		
Sex	Urban Residence		Panic Disorder		Utilize Outpatient Mental Health Services
			Other Psychiatric Diagnoses		