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Over-the-Counter Drugs: Factors in Adult Use of Sedatives, Tranquilizers, and Stimulants

RALPH BELL, PhD

Dr. Bell is professor in the Division of Health Administration, School of Health Professions, Governors State University, Park Forest South, Ill. 60466.

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Tearsheet requests to Dr. Bell.

Synopsis

Despite a growing research interest in over-the-counter (OTC) drug use, little information has been available about the determinants of use for this category of medications. The researcher examined the effects of demographic, need, and physician utilization measures on the use of 10 OTC drugs that were categorized as sedatives, tranquilizers, or stimulants. A statewide survey in 1975 of drug-using behavior in the previous year by Illinois adults ages 18–59 resulted in 2,738 questionnaires that could be analyzed. Thirteen variables, representing the demographic, need, and physician utilization characteristics of the respondents, were entered as predictors into logistic multiple regression models to estimate their effects on drug use.

Only 10.37 percent of the respondents indicated that they had used any of the OTC drugs in the previous year. Sedative use was found to be increased in persons who were tense or were having trouble sleeping. Having trouble sleeping also increased the probability of using OTC tranquilizers and stimulants. Women had a much higher probability of using OTC tranquilizers than men, and men had a higher probability of using stimulants. Nonwhites had a higher probability of using tranquilizers than did whites. Stimulants were more likely to be used by younger adults and unmarried adults. Physician utilization, measured by the number of visits to physicians, did not significantly affect OTC drug use.

SELF-MEDICATION THROUGH THE USE of proprietary or over-the-counter (OTC) drugs represents one aspect of a growing movement toward medical self-care (*1*,*2*). OTC use is a cost-effective way of treating minor illnesses and alleviating related symptoms (*1*). Despite a growing interest among researchers in the use of OTC drugs and in the self-care movement in general, we still know little about who does or does not use different types of OTC drugs.

This research focused on the use of three broad classes of proprietary drugs by a cross section of adults: sedatives, including Nytol, Sominex, and Sleep-Eze, that are commonly used to alleviate insomnia; tranquilizers, including Compoz, Cope, and Nervine, that are commonly used to relieve minor tension or anxiety; and stimulants, including No-Doz, No Nod, Vivarin, and caffeine tablets, that are used to combat drowsiness. All three types of drugs are readily available over the counter in retail pharmacies and stores.

Although several studies on OTC use have been conducted, there remains a dearth of empirical data on the correlates and predictors of use. Much of the empirical data available are limited because they are based on small samples or on particular segments of the population and cannot be used as a basis for generalizations. Bryar's study of self-care among British university students, for example, was based on only 28 persons (*3*). Similarly, Freer's research results are based on a sample of 26 women (*4*). The data presented by Knapp and Knapp were based on a sample of 275 households with children in Columbus, Ohio (*5*).

Anderson and coworkers have provided an excellent and comprehensive review of the literature on self-medication and self-care in general (*2*).

Several large-scale studies of OTC drug use have also been conducted. Data on whether the drugs had ever been used or used in the past year were collected for the National Commission on Marihuana and Drug Abuse (NCMDA) (*6*). Its results provide a base from which to examine demographic differences among users and nonusers of sedative, tranquilizer, and stimulant proprietary drugs for a national sample of adults. The OTC drugs

studies by the NCMDA are the same as those examined in this research. The commission concluded that only age and region were strongly correlated with OTC drug use. Other demographic variables such as education, sex, race, and community size were only marginally related to proprietary drug use during the 12 months prior to the interview. The results were based on bivariate relationships only, however, and no attempt was made to control for other factors that might have been relevant, such as the existence of symptoms reported by respondents. Furthermore, the report combined the data for all three categories of OTC drugs without analyzing differences in the usage patterns of the three types of drugs.

More recently, Giachello and coauthors analyzed OTC use for a national sample (*7*). The data were from a 1976 national study of access to medical care conducted by the Center for Health Administration Studies. Using a multiple regression approach, they examined the impact of a number of variables affecting use of OTC drugs during a reported episode of illness. In doing so, they attempted to provide a general model of self-care based on Andersen's behavioral model of medical care (*8*). Their model asserts that use of health services (in this case, measures of self-care including OTC drug use) is a function of the predisposing, enabling, and need characteristics of the respondents. The predisposing factors—the individuals' propensity to self-medicate—are basically demographic characteristics and are similar to those reported by the NCMDA (*6*). Enabling factors—the ability to obtain desired services—include income, education, and insurance coverage. Need characteristics reflect the most immediate reason for using OTC drugs and include factors such as individuals' reported symptoms and perceived health status. The results reported by Giachello and coauthors indicated that, for whites, only need factors (reported symptoms and severity of illness measures) were significant predictors of OTC drug use. For blacks, only family income and severity of illness predicted use. The only significant predictor of Hispanic OTC drug use was the perceived health of the respondent.

The extant literature on OTC use provides few guides for constructing hypotheses. However, by drawing on the empirical literature cited previously, several research questions can be developed. In this sense, my investigation is fundamentally exploratory. The effects of demographic and need variables were examined simultaneously to determine what individual characteristics, if any, could explain use of OTC drugs. The four research questions developed were:

1. Are some adults more likely to be users of over-the-counter medications than others? If so, what characteristics differentiate users from nonusers of OTC drugs?
2. Are the same factors related to the use of all three types of OTC drugs or do some adults tend to use one type rather than another?
3. Do adults who report symptoms that the drugs under study are intended to alleviate have a higher probability of using those drugs?
4. Since self-medication is an alternative to seeking professional medical care, are adults who more frequently use physician services less likely to use proprietary drugs?

Methods

Data. The data used in this research are from a statewide survey of Illinois adults, ages 18–59, conducted by the Institute for Juvenile Research under a grant from the Illinois Dangerous Drugs Commission. Data were collected in 1975 by using a questionnaire designed to gather information on a wide range of drug-using behavior. Adults were selected to be personally interviewed on the basis of an area probability sample drawn from 43 randomly selected counties in Illinois. Persons in institutionalized settings were excluded from the sample. From a total of 3,000 interviews, 2,985 usable questionnaires were completed. The results presented here are based on 2,738 cases, because key data were missing on other questionnaires.

Dependent variables were derived from the section of the questionnaire dealing with the use of OTC drugs. Data were collected on the use of a total of 10 different sedative, tranquilizer, and stimulant proprietary drugs during the previous year. The dependent variables were constructed by defining "use" as a positive response for any drug in a category. Data were collected for each of the drugs separately and then were assigned to categories for analytic purposes. For each of the three categories, the variable was coded 0 for nonuse and 1 for use. Thus, a value of 1 indicated that the respondent had used at least one of the OTC drugs studied during the previous year.

Thirteen independent variables represented the demographic, need, and physician utilization characteristics of the respondents. The demographic variables analyzed were:

- Sex (0 = male, 1 = female);
- Age;
- Race (0 = white, 1-nonwhite);
- Marital status (0 = married, 1 = not married);
- Family income (1 = no income, 2 = less than $2,000, 3 = $2,000–2,999, 4 = $3,000–4,999, 5 = $5,000–6,999, 6 = $7,000–9,999, 7 = $10,000–14,999, 8 = $15,000–24,999, 9 = $25,000 or more);

• Education (1 = 8th grade or less, 2 = 1–3 years high school, 3 = high school graduate, 4 = 1–3 years of college, 5 = college graduate, 6 = some graduate school, 7 = professional or graduate degree).

The variables selected to reflect need were the respondents' perceived health and the presence of particular symptoms. For reporting of symptoms, the general questionnaire instruction was "Please tell me whether the statement is generally true for you or generally not true for you." The need variables follow:

• Perceived health (0 = fair or poor, 1 = good or excellent);
• Tension (response to "I feel tense most of the time"; 0 = not true, 1 = true);
• Nervous (response to "I am a nervous person"; 0 = not true, 1 = true);
• Stress (response to "I am under more stress than usual"; 0 = not true, 1 = true);
• Energetic (response to "I usually have lots of energy"; 0 = not true, 1 = true);
• Trouble sleeping (response to "I have trouble sleeping"; 0 = not true, 1 = true).

Physician utilization was measured by the number of visits to a doctor during the previous year.

Method of analysis. Because all the dependent variables are dichotomous, logistic multiple regression was used (*9*). This procedure treats the dependent variable as a log-odds ratio (denoted as Phi in the following equation) rather than its actual value (*10*). That is, it is transformed to:

$$Phi = Ln\ (p \div 1 - p)$$

Where *Ln* refers to the natural logarithm and *p* refers to the probability of using OTC drugs. Transforming the dependent variable to its log-odds ratio circumvents problems of obtaining predicted values outside the valid range (*10–12*). Thus, the resulting parameter estimates from the logistic multiple regression models estimate the change in the log-odds of using OTC drugs per unit change in the independent variables (*13*). The sign of the parameter estimate indicates whether there is an increase or a decrease in the probability of an adult's using OTC drugs, given the presence or absence of the characteristics in question.

To estimate the impact of a particular measure on the probability of using an OTC drug while controlling for the other variables in the model, an algorithm presented by Pindyck and Rubinfeld (*13*) was employed. By substituting the mean probability of use and the parameter estimate (denoted as *"b"*) for a variable in the following equation, the increase or decrease in the probability of use can be approximated:

$$\Delta p \approx b\ (p\ (p - 1))$$

The resulting change in the probability of use refers to the increase or decrease from the mean probability, given the presence of the relevant characteristic.

Results

In general, a small percentage of adults in the survey population had used OTC drugs during the previous year (table 1). Only 10.37 percent of the respondents indicated that they had used any of the OTC drugs studies. The highest percentage of use in any single category was 5.88 percent for sedatives. These low figures are in contrast to those of some other studies of OTC drug use. It should be noted, however, that other studies often included the use of analgesics, such as aspirin, cold medication, or home remedies, in their measure of use (*7,8*). Including analgesic use could account for the differences in the magnitudes of usage rates.

Table 2 provides the results of the logistic multiple regression analyses on the three OTC drug use measures. The notations at the bottom of the table refer to the model's likelihood ratio chi-square and associated degrees of freedom that measure goodness of fit. The use of R-square measures for logistic multiple regression models is inappropriate because the upper bound of this measure is variable and will generally never approach a value of 1.0 (*17*).

The model for OTC sedative use indicated that there were no statistically significant differences in the demographic characteristics of users and nonusers. Two symptom variables, however, had statistically significant effects on OTC sedative use. Adults who reported being tense or having trouble sleeping were found, when other factors were controlled, to have a higher probability of using sedatives.

There were some differences between tranquilizer and sedative users. Women had a much higher probability of using tranquilizer OTC drugs than men. Controlling for other factors, women had a .036 higher probability of use than men. Interestingly, nonwhites also had a higher probability of using tranquilizer type drugs than whites;

Table 1. Adults who reported using over-the-counter (OTC) drugs during the previous year

Use of —	*Percent*	*Number*
Any OTC drug	10.37	284
Sedative	5.88	161
Tranquilizer	2.48	68
Stimulant	3.54	97

Table 2. Logistic multiple regression results (b's) for measures of over-the-counter drug use

Variable	Use of — Sedatives	Tranquilizers	Stimulants
Demographic:			
Sex	−.014	[1].492	[1]−.623
Age	−.004	−.018	[1]−.026
Race	.011	[1].813	−.379
Marital status	−.040	.087	[1].660
Family income	−.088	−.030	−.051
Education	−.085	.087	.032
Need:			
Perceived health	−.470	.301	−.494
Tension	[2].469	.382	−.183
Nervous	.064	.274	.377
Stress	.249	.082	.406
Trouble sleeping	[1].868	[1].886	[1].667
Energetic	−.199	.039	−.117
Physician utilization: Visits to physician	.050	.033	−.009
Likelihood ratio chi-square	1154.52	567.87	789.17
Degrees of freedom	13	13	13

[1] Significant beyond .01.
[2] Significant beyond .05.

race was not a significant factor in OTC sedative use. Persons who reported having trouble sleeping had an increased probability of using both tranquilizer and sedative OTC drugs.

In contrast to their lower probability of using OTC tranquilizers, men had a higher probability of using stimulant drugs than women. Also, younger adults, unmarried adults, and persons with trouble sleeping had a higher probability of using OTC stimulant type drugs.

Discussion

This research was conducted to answer four basic research questions concerning adult OTC drug use. In response to the question on the characteristics of users of OTC drugs in general, no demographic characteristic differentiated users from nonusers. In fact, the only variable that had a statistically significant effect on use across all three models was having trouble sleeping. In effect, it appears from the results reported here that each OTC drug category examined has different determinants of use.

The second and third research questions concerned differential determinants of the use of the three categories of OTC drugs and whether reported symptoms affect use. As noted, only one measure—having trouble sleeping—had a consistently significant effect on the models for sedative, tranquilizer, and stimulant OTC drug use. People who reported having trouble sleeping had a higher probability of using all three types of drugs than people who did not report having trouble sleeping. The positive effect of using stimulants to alleviate having trouble sleeping is somewhat anomalous, however, because stimulants are used to stay awake. One possible explanation for this finding is that adults who had trouble sleeping at night may have required stimulant type drugs to keep them alert the following day. It was not possible to determine in this survey the precise reason for the relationship between having trouble sleeping and stimulant OTC drug use.

The only other statistically significant predictor of sedative OTC drug use was another symptom, tension. Both symptoms are consistent with the purported action of the drugs. There appear to be no differences in the demographic characteristics of users and nonusers of sedative OTC drugs; use of these drugs appears to be determined primarily by need factors. This finding is consistent with Andersen's framework, which would predict that need is the most immediate reason for using health services (*8*).

Demographic differences existed between users and nonusers of the tranquilizer OTC drugs. Women had a higher probability of using OTC tranquilizers than men. The strong effect of sex here may be a result of the marketing strategy for these drugs, which is geared toward women. Nonwhites also were more likely to be users of OTC tranquilizers than whites.

In contrast to users of OTC tranquilizers, stimulant users were more likely to be men than women. Past research on the use of prescription drugs has shown that women tend to use all types of drugs more than men (*14*). It appears that men tend to use OTC stimulant drugs in lieu of prescription stimulants. To obtain prescription stimulants, a physician must be visited, and men generally are less likely to visit a physician than women (*15*). When men do visit a physician, their visit is less likely to result in a prescription's being written (*16*). Age and marital status were also important determinants of OTC stimulant use, which tended to be used more by younger adults and by unmarried adults.

The issue of self-medication versus professional care was addressed by the fourth research question. Analysis showed that physician utilization (measured as the number of visits to physicians during the previous year) did not have a significant effect on any of the OTC drug use measures. That is, there appears to be no difference in physician utilization between users and nonusers of OTC drugs. The fact that adults tend to use OTC medications independently of visiting physicians may indicate that they are seeing physicians for different, perhaps more serious, medical problems, while using OTC drugs for minor ailments.

The use of OTC drugs examined in this paper is tied to the reported symptoms of the users. A problem with previous research is that data originally collected for other purposes—health surveys or drug surveys—were often used to investigate OTC drug use. Health surveys usually do not adequately tap the use of different types of OTC drugs, while drug surveys (the present data included) do not fully address the health status of the respondents. To circumvent these problems and to fully understand OTC drug use and self-medication in general, specialized research projects are necessary, using large, scientifically drawn samples. Due to the age of these data, it is difficult to make reasonable generalizations about OTC drug use. This analysis provides a strategy for analyzing the determinants of OTC drug use, although more timely data are necessary to determine whether there have been shifting patterns of use over time. This is particularly important in light of recent cases of OTC drug tampering. The effects of tampering on OTC drug use can only be ascertained through the use of newly drawn, large samples of the population.

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