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Concurrent and Simultaneous Use of Alcohol with Sedatives and with Tranquilizers: Results of a National Survey

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The purpose of the present study was to determine the prevalence of concurrent and simultaneous use of alcohol with sedatives and with tranquilizers in the general population and to examine differences in these rates between important sociodemographic subgroups. The results indicated that a sizable proportion of Americans engaged in both substance use practices in the year preceding the interview. The population estimate for simultaneous use of alcohol in combination with sedatives (i.e., use of both substances simultaneously or on the same occasion) was approximately 3 million while the concurrent use of both substances (i.e., during the same time period) was approximately 4 million. Corresponding figures for the simultaneous and concurrent use of alcohol and tranquilizers were both approximately 6 million. The extent of each substance use practice varied as a function of sociodemographic factors. Implications of these findings are discussed in terms of the need for age-sex-ethnic-specific prevention strategies. The need for future analytic epidemiological research to determine the precise relationship between dose, frequency, and duration of concurrent and simultaneous use and each adverse consequence is emphasized. The need for longitudinal research in the general population is also highlighted.

A variety of problems has been linked to the use of alcohol in combination with sedatives and with minor tranquilizers (i.e., use of both substances simultaneously or on the same occasion). Alcohol used in combination with either sedatives (Doenicke & Kugler, 1965; Loomis, 1963; Mould, Curry, & Binns, 1972; Sellers, Carr, & Bernstein, 1972) or tranquilizers (Bo et al., 1975; Franks et al., 1975; Molander & Duvok, 1976; Palva, 1976) has been associated with greater psychomotor impairment than that produced by each substance separately. Gross impairment in a wide array of psychomotor skills resulting from the acute effects of simultaneous use has important implications in terms of the likelihood of traffic, occupational, and other accidents. Because of the supra-additive effects of alcohol and sedatives on the respiratory and cardiac regulation centers of the brain, the probability of overdose and death

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is increased with their combined use. Although minor tranquilizers do not share the potentiating effects of alcohol-sedative combinations (Vaapatalo & Karppanen, 1969; Votarova & Dyntarova, 1970), large doses of benzodiazepines have been shown to have additive effects due to the greater central nervous system depressant activity of both substances (Hollister, 1977; Laisi et al., 1979).

Many other hazards have been associated with the more chronic or indirect effects of the concurrent use of alcohol with sedatives or with tranquilizers (i.e., use of both substances during the same time period). Alcohol used concurrently with sedatives or tranquilizers may increase the risk of organ pathology, neuropsychiatric impairment, arrests and incarcerations, emotional and behavioral problems, and more severe withdrawal and dependence syndromes (Devenyi & Wilson, 1971; Judd, Gerstein, Lee, Riney, & Takahashi 1987; Kreek & Stimmel, 1984; Miller, 1985).

Much of what we know about the epidemiology of concurrent and simultaneous use of tranquilizers derives from studies of emergency room episodes or other treated samples. Alcohol in combination with various sedatives or tranquilizers accounted for 16.6% of the 30 most frequently reported two-way substance combinations among individuals presenting to emergency rooms in 27 metropolitan areas in 1987 (National Institute on Drug Abuse, 1988a). Simultaneous use of alcohol and Diazepam was also the eleventh most prominent two-way drug combination reported in connection with substance abuse related deaths.

Results from the National Drug/Alcohol Collaborative Project (NDACP) showed that 83.0% of a sample of alcohol/drug rehabilitation clients who reported sedative or tranquilizer use during the 3 months preceding admission also used alcohol during the same time period (National Institute on Drug Abuse, 1980). Corresponding percentages of alcohol users who concurrently used sedatives or tranquilizers were 16.0% and 30.0%, respectively. NDACP findings also identified alcohol as the most common substance used to alter the effects of both sedatives and minor tranquilizers. Tranquilizers and alcohol were also the most frequently reported substitute for sedatives while alcohol was most commonly used as a substitute for tranquilizers.

The prevalence of concurrent use of sedatives and tranquilizers among alcoholics and problem drinkers has been estimated between 5.0 to 40.0% (Bartholomew & Sutherland, 1969; Curlee, 1970; George & Glatt, 1967; Glatt, 1962; Rosenberg, 1967). More objective tests, based on thin-layer chromatography of urine samples at admission, identified the use of sedatives, meprobamate, and phenothiazines in 38.0% of 100 consecutively admitted alcoholic inpatients. In a similar study, the presence of sedatives was revealed in the urine samples of 8.0% of 100 alcoholic patients (Devenyi & Wilson, 1971). In both studies, a significant number of clients had not reported their use of sedatives, suggesting that the concurrent use of alcohol and sedatives is likely to be underestimated in self-report studies.

Although studies of available treated samples can reveal much about the concurrent and simultaneous use of alcohol with sedatives or tranquilizers,

it is not possible to construct a realistic picture of such practices in the general population from the results of several unrepresentative samples. Despite this, the prevalence of each of these substance use patterns in the community is unknown. In the present study, data from the 1985 National Household Survey, conducted under the auspices of the National Institute on Drug Abuse and the National Institute on Alcohol Abuse and Alcoholism was used to determine the prevalence of the concurrent and simultaneous use of alcohol with sedatives and with minor tranquilizers and to examine differences in these rates between important sociodemographic subgroups. A system of ratios was also constructed to examine the relationships between alcohol use, sedative or tranquilizer use, and their concurrent and simultaneous use during the year preceding the interview.

METHOD

The 1985 National Survey on Drug Abuse is the eighth in a series of surveys of the US household population aged 12 and older. A random sample of respondents residing in the contiguous United States was selected using a multistage area probability design that included both stratification and clustering methodology. It excluded persons living in group quarters or institutions such as dormitories, military installations, hospitals, and jails and transient populations such as the homeless. The research design also specified an oversampling of blacks, Hispanics, and youths ages 12 through 34 (National Institute on Drug Abuse, 1988b).

Of the 9,630 respondents invited to participate in this interviewer-administered survey, 3,526 men and 4,512 women agreed to do so, resulting in a response rate of 83.0%. Survey participants were asked about the recency of their use of alcohol (beer, wine, and distilled spirits) and nonmedical use of sedatives and tranquilizers. The sedative drug class included barbiturates (e.g., secobarbital, phenobarbital) and nonbarbiturates (e.g., chloral hydrate, methaqualone). The tranquilizer category was defined to encompass minor (e.g., Valium and Librium) but not major tranquilizers or antipsychotics (thioridazine, chlorpromazine). The use of alcohol and either substance during the same time period (i.e., the past year) constituted concurrent use. Simultaneous use of alcohol with sedatives or with tranquilizers referred to the use of either substance with alcohol at the same time (or within a couple of hours) during the past year.

Population prevalence estimates of past year alcohol use, sedative use, tranquilizer use, and their concurrent and simultaneous use were calculated on the basis of weighted data, taking into account the specific sampling procedures employed. Estimates were also adjusted for differences in response rates and deviations of selected demographic characteristics of the sample from Census data. Statistical tests for differences between proportions (Fleiss, 1981) were also modified to incorporate all design effects (i.e., stratification and clustering) of this complex survey and included a correction for continuity. Sex-age-ethnic-specific prevalence estimates presented in this report will differ

slightly from those published by the National Institute on Drug Abuse (1988b) due to our more conservative approach to handling missing data and to statistical testing.

RESULTS

Alcohol and Sedatives: Concurrent and Simultaneous Use

Overall, the 1-year prevalence of concurrent use of alcohol and sedatives was 2.5% and the corresponding prevalence of simultaneous use was 1.6%. Like all summary measures, these overall rates serve to obscure the magnitude of each substance use pattern within sociodemographic subgroups which often exceeded 5.0%. In this section we examine these important subgroup differences in the prevalence of the concurrent and simultaneous use of alcohol and sedatives.

Table 1 shows the relationship of sex, age, and ethnicity to concurrent and simultaneous use of alcohol and sedatives reported during the past year. Among 12–17-year-olds, the prevalence of concurrent use for white males (4.2%) exceeded that of black males (0.4%) ($p<.01$). Concurrent use was also significantly greater ($p<.02$) for 18–25-year-old white males (3.9%) than for Hispanic males (1.6%). For simultaneous use, only the rates for white males exceeded those of Hispanic males in this age group ($p<.005$). Among 26–34-year-olds, white female rates for concurrent use surpassed those of black ($p<.05$) and Hispanic females ($p<.01$). Simultaneous use among this age group was significantly larger ($p<.02$) for white males (6.6%) than for Hispanic males (2.5%) and white females (4.5%).

There were negligible age differences in the prevalence of concurrent and simultaneous use of alcohol and sedatives within each of the sex/ethnic groups. For white males, the 26–34-year-old rate for simultaneous (5.4%) use was significantly larger than the rate for the youngest age group (2.5%) while 12–17-year-old white females reported concurrent use of alcohol and sedatives more frequently ($p<.05$) than the oldest age group (0.6%). For both substance use patterns, the white male and white female rates among the 35-year-old and older age group were significantly lower than either 18–25-year-olds ($p<.005$) and 26–34-year-olds ($p<.005$).

Alcohol Use, Sedative Use, and Their Concurrent and Simultaneous Use

The ratios (expressed as percentages) shown in Table 1 were constructed to assess the relationship between alcohol use, sedative use, and their concurrent and simultaneous use. The concurrent use/alcohol use (C/A) ratio represented the percentage of alcohol users who also used sedatives during the same time period (i.e., during the year preceding the interview), while the concurrent use/sedative use (C/S) ratio referred to that percentage of sedative users who used alcohol and sedatives concurrently. Similarly, the simultaneous use/concurrent use (S/C) ratio expressed the percentage of

concurrent users ofalcohol and sedative who reported using each of these substances at the same time on at least one occasion during the past year.

For sedative use, the C/A ratios were much lower than the C/S ratios, reflecting the greater prevalence of alcohol use compared to sedative use in the general population. During the past year, C/A ratios were generally small, averaging 3.4% and rarely exceeding 5.0% among each sociodemographic subgroup while the corresponding average C/S ratio was 69.4%. A greater percentage of male (4.6%) than female (2.3%) drinkers used sedatives. The C/A ratio for whites (3.5%) was also 1.8 times greater than Hispanics (1.9%) and 1.2 times greater than blacks (2.9%). The C/A ratio for blacks was 1.5 times larger than the corresponding ratio for Hispanics. In contrast, the C/S ratios were consistently high (exceeding 85.0% in most cases) irregardless of sex, age, and ethnicity, indicating that nearly all respondents who reported using sedatives during the past year also drank alcohol during the same time period.

A large percentage of respondents who used alcohol and sedatives concurrently, also used both of these substances at the same time on at least one occasion during the year preceding the interview. The overall S/C ratio was 64.0%. The S/C ratio was generally greater for males (66.7%) than females (50.0%), greater among whites (62.9%) and blacks (64.7%) compared to Hispanics (50.0%), and greater for 18–34-year-olds compared to the youngest age group. The wide variation in S/C ratios observed in the oldest age group was primarily due to the lower, more unstable rates of concurrent and simultaneous use of alcohol and sedatives reported by these respondents for each sex/ethnic group. Despite such instability, age-sex-ethnic-specific S/C ratios often exceeded 60% during the past year.

Alcohol and Tranquilizers: Concurrent and Simultaneous Use

Overall, the 1-year prevalence of both concurrent and simultaneous use of alcohol and tranquilizers was 3.3%. These rates were also greater for males than females ($p<.005$). Although whites more frequently reported concurrent use than either blacks ($p<.05$) or Hispanics ($p<.005$), no ethnic differences were observed for simultaneous use. Concurrent use among 18–25-year-olds was significantly greater for white (2.6%) females than Hispanic females (0.8%) ($p<.005$) while the prevalence of simultaneous use among white males (7.9%) was larger ($p<.05$) than that of Hispanic males (0.5%) in this age group.

Among females aged 12–17, 18–25, and 35 years old and older, the prevalence of concurrent use was larger for whites than blacks ($p<.02$). Concurrent use among 26–34-year-old white males (7.9%) was also significantly greater ($p<.02$) compared to black (2.2%) and Hispanic (2.5%) males. When simultaneous use was considered, white male rates exceeded those of the 18–25, 26–34, and 30-year-old-and-older females.

Age differences in concurrent and simultaneous use among each sex/ethnic group were similar. White males and females, aged 18–25 and 26–34 years, reported greater concurrent and simultaneous use of alcohol and tranquilizers

Table 1. Percent[a] Reporting Alcohol Use, Sedative Use and their Concurrent and Simultaneous. Use in the Past Year by Sex, Age, and Ethnicity

Sex/Age/ Ethnicity		Alcohol Use	Sedative Use	Concurrent Use	Concurrent Use / Alcohol Use ×100	Concurrent Use / Sedative Use ×100	Simultaneous Use	Simultaneous Use / Concurrent Use ×100
Total		73.3	3.6	2.5	3.4	69.4	1.6	64.0
Male		78.3	3.6	3.6	4.6	100.0	2.4	66.7
	12–17	52.7	3.5	3.4	6.4	97.1	2.0	58.8
	18–25	90.2	6.9	6.9	7.6	100.0	5.0	72.5
	26–34	88.4	5.9	5.9	6.7	100.0	4.6	77.9
	35+	76.4	1.5	1.5	2.0	100.0	0.6	40.0
Female		68.6	1.7	1.6	2.3	94.1	0.8	50.0
	12–17	50.4	2.3	2.0	4.0	86.9	0.7	35.0
	18–25	83.8	3.1	2.9	3.5	93.5	2.4	88.9
	26–34	79.6	3.8	3.7	4.6	97.4	1.7	45.9
	35+	63.8	0.4	0.4	0.6	100.0	0.1	25.0
White		76.0	2.8	1.7	3.5	96.4	1.7	62.9
Male		80.0	3.9	3.9	4.9	100.0	2.5	64.1
	12–17	56.9	4.2	4.2	7.4	100.0	2.5	59.5
	18–25	92.8	7.6	7.6	8.2	100.0	5.7	75.0
	26–34	89.3	6.6	6.6	7.4	100.0	5.4	81.8
	35+	77.3	1.6	1.6	2.1	100.0	0.6	37.5
Female		72.5	1.8	1.7	2.3	94.4	0.9	52.9
	12–17	57.1	2.4	2.1	3.7	87.5	0.9	42.8
	18–25	89.2	3.3	3.1	3.5	93.9	2.6	83.9
	26–34	82.6	4.6	4.5	5.4	97.8	2.1	46.7
	35+	66.4	0.3	0.3	0.4	100.0	0.0	0.0

Black		58.7	1.8	1.7	2.9	94.4	1.1	64.7
Male		66.6	2.1	2.1	3.2	100.0	1.6	76.2
	12–17	37.4	0.5	0.5	1.3	100.0	0.5	100.0
	18–25	76.1	2.7	2.7	3.5	100.0	2.0	74.1
	26–34	82.3	2.6	2.6	3.1	100.0	2.4	92.3
	35+	66.4	2.4	2.2	3.3	91.7	1.5	68.2
Female		52.0	1.5	1.4	2.7	93.3	0.6	42.8
	12–17	29.5	2.3	2.1	7.1	91.3	0.3	14.3
	18–25	70.3	1.1	0.7	1.0	63.6	0.2	28.6
	26–34	73.0	1.2	1.2	1.6	100.0	0.3	25.0
	35+	42.5	1.5	1.5	3.5	100.0	1.0	66.7
Hispanic		63.8	1.5	1.2	1.9	80.0	0.6	50.0
Male		75.5	2.0	1.6	2.1	80.0	0.7	43.7
	12–17	45.0	2.7	1.8	4.0	66.7	0.7	38.9
	18–25	84.8	3.5	3.0	3.5	85.7	0.4	13.3
	26–34	87.4	3.0	2.5	2.9	83.3	1.5	70.0
	35+	75.6	0.4	0.4	0.5	100.0	0.4	100.0
Female		52.6	1.0	0.8	1.5	80.0	0.5	62.5
	12–17	36.0	1.4	1.3	3.6	92.8	0.2	15.4
	18–25	66.6	2.8	2.8	4.2	100.0	1.9	67.8
	26–34	67.4	1.2	0.5	0.7	41.7	0.1	33.3
	35+	45.4	0.0	0.0	0.0	0.0	0.0	0.0

[a] Percentages based on weighted figures.

Table 2. Percent[a] Reporting Alcohol Use, Tranquilizer Use and their Concurrent and Simultaneous. Use in the Past Year by Sex, Age, and Ethnicity

Sex/Age/ Ethnicity		Alcohol Use	Tranquilizer Use	Concurrent Use	Concurrent Use Alcohol Use ×100	Concurrent Use Tranquilizer Use ×100	Simultaneous Use	Simultaneous Use Concurrent Use ×100
Total		73.3	3.4	3.3	4.5	97.1	3.3	100.0
Male		78.3	4.4	4.1	5.2	93.2	3.0	73.2
	12–17	52.7	3.1	3.1	5.9	100.0	1.9	61.3
	18–25	90.2	7.7	7.7	8.5	100.0	5.7	74.0
	26–34	88.4	7.0	7.0	7.9	100.0	5.0	71.4
	35+	76.4	2.5	2.1	2.7	84.0	1.6	64.0
Female		68.6	2.6	2.4	3.5	92.3	1.0	41.7
	12–17	50.4	3.7	3.4	6.7	91.9	1.3	38.2
	18–25	83.8	4.9	4.7	5.6	95.9	2.2	46.8
	26–34	79.6	4.4	4.1	5.1	93.2	1.8	43.9
	35+	63.8	1.1	1.0	1.6	90.9	0.2	20.0
White		76.0	3.7	3.5	4.6	94.6	2.1	60.0
Male		80.0	4.6	4.4	5.5	95.6	3.3	75.0
	12–17	56.9	3.6	3.5	6.1	97.2	2.4	68.6
	18–25	92.8	7.9	7.9	13.9	100.0	6.0	75.9
	26–34	89.3	7.9	7.9	8.5	100.0	5.5	69.6
	35+	77.3	2.5	2.1	2.7	84.0	1.8	85.7
Female		72.5	2.9	2.8	3.9	96.5	1.0	35.7
	12–17	57.1	4.6	4.2	7.3	91.3	1.6	38.1
	18–25	89.2	5.8	5.8	6.5	100.0	2.6	44.8
	26–34	82.6	4.9	4.5	5.4	91.8	2.1	46.7
	35+	66.4	1.1	1.1	1.6	100.0	0.1	10.0

Black		58.7	2.1	2.0	3.4	95.2	1.2	60.0
Male		66.6	2.8	2.6	3.9	92.8	1.4	53.8
	12–17	37.4	1.4	1.4	3.7	100.0	0.0	0.0
	18–25	76.1	4.2	4.2	5.5	100.0	2.5	59.5
	26–34	82.3	2.2	2.2	2.7	100.0	2.1	95.4
	35+	66.4	3.0	2.6	3.9	86.7	1.1	42.3
Female		52.0	1.6	1.4	2.7	87.5	1.0	71.4
	12–17	29.5	1.1	1.0	3.4	90.9	0.8	80.0
	18–25	70.3	2.5	1.5	2.1	60.0	1.2	80.0
	26–34	73.0	2.4	2.4	3.3	100.0	0.7	29.2
	35+	42.5	1.0	1.0	2.3	100.0	1.0	100.0
Hispanic		63.8	2.1	1.5	2.3	71.4	0.6	40.0
Male		75.5	2.3	1.7	2.2	73.9	1.0	58.8
	12–17	45.0	2.2	2.2	2.2	100.0	0.6	27.3
	18–25	84.8	2.5	2.5	4.9	100.0	0.5	20.0
	26–34	87.4	3.1	2.5	2.9	100.0	2.5	100.0
	35+	75.6	1.9	0.7	1.0	36.8	0.4	57.1
Female		52.6	2.0	1.2	2.3	60.0	0.3	25.0
	12–17	36.0	1.9	1.9	5.3	100.0	0.2	10.5
	18–25	66.6	1.4	1.0	1.5	71.4	0.8	80.0
	26–34	67.4	4.7	3.6	5.3	76.6	0.5	13.9
	35+	45.4	1.0	0.0	0.0	0.0	0.0	0.0

* Percentages based on weighted figures.

than respondents in the oldest age group ($p<.002$). Only among white females in the youngest age group did the rate for each substance use pattern exceed those of 35-year-old and older respondents ($p<.01$). Concurrent use was also significantly greater ($p<.02$) for 26–34-year-olds (7.9%) than 12–17-year-olds (4.4%) among white males during the year preceding the interview.

Alcohol Use, Tranquilizer Use, and Their Concurrent and Simultaneous Use

For tranquilizer use, the C/A ratios were much lower than the concurrent use/tranquilizer use (C/T) ratios, reflecting the greater prevalence of alcohol use compared to tranquilizer use in the general population. Overall, the C/A ratio was 4.5% and the C/T ratio was 97.1% during the past year. While the C/A ratio rarely exceeded 5.0% the C/T ratios in most cases were greater than 85.0%.

A large, but not overwhelming, percentage of respondents who use alcohol and tranquilizers concurrently also used both of these substances at the same time on at least one occasion during the year preceding the interview. Although the overall S/C ratio was 100.0%, S/C ratios varied widely across sociodemographic subgroups. A greater percentage of males (73.2%) than females (41.7%) simultaneously used alcohol in combination with tranquilizers, and Hispanic S/C ratios (40.9%) were lower than those for either whites (60.0%) or blacks (60.0%).

Although S/C ratios were generally highest among 18–34-year-olds, there were some notable exceptions to this pattern. Among black males and females greater S/C ratios were observed in the oldest age group. The 12–17-year-old age groups also demonstrated a variable pattern with S/C ratios ranging from 0.09% among black males to 80.0% for black females.

DISCUSSION

The prevalence of concurrent and simultaneous use of alcohol and sedatives was 2.5% and 1.6%, respectively, during the year preceding the interview. These prevalence figures represent approximately 4,769,750 and 3,052,640 Americans. The population estimate for both concurrent and simultaneous use of alcohol and tranquilizers was 6,296,070 (3.3%). The C/S and C/T ratios generally exceeded 90% for each major sociodemographic subgroup indicating that the majority of sedative or tranquilizer users also concurrently used alcohol. Although S/C ratios varied as a function of age, sex, and ethnicity, a large percentage of concurrent users had also used each of these substances occasionally or more frequently in combination with alcohol.

Because of the recognized additive and supra-additive effects of combined alcohol with sedatives or with tranquilizers on judgment and psychomotor performance, the likelihood of injury and possibly overdose and death is increased. As the results of this study indicated, there were negligible age differences in rates of simultaneous use of alcohol with sedatives or with

tranquilizers across each sex/ethnic group. The prevalence of alcohol used in combination with sedatives was greater for 26–34-year-old white males than 12–17-year-old white males while 18–25- and 26–34-year-olds only demonstrated greater rates of simultaneous use compared to the oldest age group among white males and white females. Age differences in rates of combined use of alcohol and tranquilizers were similar to those of simultaneous use of alcohol with sedatives with the exception that no statistical differences were observed for white males across age groups. These findings suggest that simultaneous use practices are established early in adolescence and remain stable until at least the third decade of life. The extent to which adolescents seek out the potentiating (i.e., boosting, balancing, or sustaining) effects of alcohol in combination with sedatives or with tranquilizers early in their substance use careers needs further investigation. Longitudinal data on each of these substance use practices is needed to resolve this issue and to confirm the observed cross-sectional trends over time.

The results of this study highlighted the need for sex-age-ethnic-specific strategies aimed at preventing or reducing the simultaneous use of alcohol in combination with sedatives and with tranquilizers. Prevention efforts should be directed toward 12–17-year-old males whose rates of each substance use practice were generally greater than those of their Hispanic male and white female counterparts in the 18–25- and 26–34-year-old age groups. Educational programs designed to emphasize the diverse indirect effects of more prolonged use of alcohol with sedatives or with tranquilizers should also be focused on youths aged 12–17 of all ethnic backgrounds. However, white males may be at particular risk of problems associated with concurrent use of alcohol and sedatives since their rates exceeded those of black males aged 12–17 years, white females, aged 18–25 years, and Hispanic males, aged 18–34 years. Although white male rates of concurrent use of alcohol and tranquilizers also exceeded those of black and Hispanic males in the 26–34-year-old age group, white female rates were significantly greater than Hispanic females in the 18–25-year-old age group and larger than those of black females for each age group except 26–34-year-olds.

Since a sizable number of problems have been associated with the use of alcohol both with sedatives or with tranquilizers, multiple strategies are needed to reduce or prevent each substance use practice. Educational programs focusing on the potential for impairment in judgment and psychomotor skills could easily be incorporated in preexisting driver's education courses offered in high school. The rising adolescent suicide rate also calls for an increased awareness of the possibility of accidental overdose and death resulting from the combined use of alcohol with tranquilizers and particularly sedatives. Because a large proportion of alcoholics also use sedative and tranquilizers, physicians and other health professionals should probe diligently for drug use histories in order to anticipate the difficulties involved in detoxification, rehabilitation, and aftercare arising from dual substance abuse.

There are several reasons to suspect that the concurrent and simultaneous use of alcohol with sedatives or with tranquilizers reported here may un-

derestimate the true prevalence in the general population. Certain groups known to exhibit high prevalence rates of alcohol and drug use, for example, prisoners and transients (Kalish, 1983; Kroll, Carney, Hagedorn, Dog, & Benavides, 1986) were not included in the survey. Individuals who refused to participate in the survey or those who failed to provide information on alcohol and drug use may also be more likely to have used both substances. In addition, while care was taken to maximize the validity of self-reported data on alcohol and drug use (e.g., provisions for sealed answer sheets and assurances of confidentiality), some underreporting may have taken place due to faulty recall or untruthfulness (Harrell, 1985; National Institute on Drug Abuse, 1988b; Pernanen, 1974). Despite potential underestimation, the results of this study indicated that a substantial percentage of males and females in the general population use alcohol concurrently and simultaneously with sedatives and with tranquilizers.

In the present descriptive epidemiologic study, we focused on determining the prevalence of concurrent and simultaneous use of alcohol with sedatives and with tranquilizers during the year preceding the interview without regard to the quantity or frequency of use of either substance. However, risks associated with the acute effects of combined alcohol and sedative or tranquilizer use and those related to the more long-term deficits of concurrent use are likely to vary as a function of dose and frequency of use. For example, the risk of accidents, overdose, and death is likely to depend strongly on the doses of alcohol and sedatives or alcohol and tranquilizers while the risk for neuropsychological impairment, organ pathology, and emotional and behavioral problems will probably vary as a function of dose as well as frequency and the duration of use of each of these substance pairs used concurrently over time. For these reasons, future analytic epidemiological research is needed to determine the precise relation of dose, frequency, and duration of concurrent and simultaneous use of both substances to each specific adverse consequence. It is anticipated that such substance-specific, pattern-specific, and hazard-specific analyses will lead to more precise estimates of risk at various levels of alcohol, sedative, and tranquilizer use and to the more accurate identification of high risk subgroups in the general population. In the long run, longitudinal surveys are needed to confirm patterns of concurrent and simultaneous use observed in these cross-sectional data and to facilitate the identification of factors that are predictive of abstinence, incidence, chronicity, and remission of each substance use practice over time.

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