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Nonmedical prescription analgesic use and concurrent alcohol consumption among college students

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Abstract

Background—Research has linked heavy alcohol use with nonmedical prescription analgesic use, but not studies have focused on concurrent use.

Objectives—To understand the extent to which alcohol use and nonmedical prescription analgesic use co-occurs among college students.

Methods—The Timeline Followback method was used to split the sample ($n=1,118$) into three groups based on their alcohol and nonmedical prescription analgesic use.

Results—Of all nonmedical prescription analgesic users, 58% ($n=90$) were concurrent users. Concurrent users consumed more drinks per drinking day (7.5) than non-concurrent (5.8) and alcohol-only users (5.2), and drank more often (74.4% of days in the past six months, vs. 45.7% and 36.8%, respectively).

Conclusions and Scientific Significance—Concurrent alcohol and analgesic use is prevalent among nonmedical users of prescription analgesics. Findings suggest a need for heightened awareness and increased research of the risks of co-ingestion.

Keywords

College students; alcohol; drinking; nonmedical use; prescription drugs; prescription analgesics; health consequences; opioid analgesics

INTRODUCTION

Nonmedical use of prescription analgesics (PA)—defined as use without a legitimate prescription or use inconsistent with a doctor's instructions—has received significant public health attention during the past 15 years, and is a concerning trend among college students (1-4). National surveys report one quarter of young adults have used PA nonmedically at least

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Declaration of Interest

In the interest of full disclosure of any potential conflict of interest, it is important to note that the University of Maryland Center for Substance Abuse Research has received funding from Ortho-McNeil-Janssen from 11/15/2008 to 5/31/2009 to conduct data analyses of the College Life Study data (although this funding did not support the analyses within this manuscript). In addition, Amelia M. Arria has received honoraria for speaking engagements from the Institute of Behavior and Health, which has also received funding from Ortho-McNeil-Janssen. However, no one employed by Ortho-McNeil-Janssen has reviewed this manuscript or commented on its contents.

once in their lifetime (5). Among college students, estimates of past-year use range from 7% to 9%, with lifetime use ranging from 12% to 14% (6-8).

While decades of research has documented the problem of heavy drinking among young adults, and college students in particular, surprisingly few studies have focused on co-ingestion of alcohol with nonmedical PA use. Evidence for co-ingestion can be derived from the Drug Abuse Warning Network (DAWN). In 2004, PA accounted for 10% of all drug mentions in drug-abuse related emergency department visits, and alcohol was one of the substances most frequently combined with PA (9), with one in five of the 158,281 mentions of PA use also involving alcohol (10).

Several cross-sectional studies of adolescents and young adults have demonstrated a link between nonmedical PA use and heavier alcohol consumption. The likelihood of nonmedical PA use increases significantly as a function of drinking severity (11). Simoni-Wastila and Strickler found that daily alcohol use was a risk factor for problematic nonmedical PA use (12). Nonmedical PA use has been linked to frequent binge drinking over the past two weeks (6,7) and alcohol abuse or dependence in the past year (13).

Used alone without medical oversight, PA can have dangerous effects. Friedman (14) notes, "Even in small doses, sedatives, hypnotics, and opiates have subtle effects on cognition and motor skills that may increase the risk of injury, particularly during sports activities or driving." The combination of alcohol and PA is particularly dangerous. Both are central nervous system (CNS) depressants, and concurrent use can lead to additive CNS depression, resulting in excessive psychomotor impairment, sedation, respiratory depression, unconsciousness, and death (15-18).

This study aimed to estimate the prevalence of concurrent nonmedical PA and alcohol use among college students and examine the alcohol use patterns of drinkers who do and do not use PA nonmedically.

METHODS

Sample

Data were derived from the College Life Study, an ongoing longitudinal study of college students. A two-stage sampling design was used to enroll participants. First, all first-time, first-year students ages 17-19 at a large, public university in the mid-Atlantic region were approached to complete a brief screening survey during Summer Orientation in 2004 ($n=3,401$). A sample was chosen for longitudinal follow-up, with deliberate over-sampling of students who used illicit drugs prior to college (19), yielding a cohort of 1,253 participants. Participants were interviewed during their first year of college and every 12 months thereafter. They received \$5 for completing the screener and \$50 for each annual interview. Informed consent was obtained, the study was approved by the university's Institutional Review Board, and a Federal Certificate of Confidentiality was obtained.

The current analysis uses data from the second and third annual assessments ($n=1,142$, *response rate*=91% and $n=1,101$, *response rate*=88% respectively), both of which included a six-month Timeline Followback (TLFB) Calendar. Data for PA users was taken from the first interview in which PA use was indicated on the calendar ($n=72$ from the second annual interview and $n=81$ from the third). Data for individuals who used only alcohol was taken from the first interview in which data was available ($n=871$ from the second interview and $n=94$ from the third). Excluded were two individuals missing calendar data, and 128 individuals who used neither alcohol nor PA on any days during the six-month periods covered by either calendar.

The final sample was 1,118 participants. It is important to note that no participants reporting using PA but not alcohol on either calendar.

The sample was divided into three groups based on alcohol and nonmedical PA use: 1) Alcohol-only users (alcohol, but no PA); 2) Non-concurrent users of alcohol and PA (used both, but not on the same day); and 3) Concurrent users (alcohol and PA use on the same day at least once).

Measures

During the structured interview, trained interviewers explained what was meant by “nonmedical use” and “prescription analgesics” and provided photo examples of PA. Nonmedical use was defined as use of a prescription medication that was not prescribed to the participant or that was taken in a way that was inconsistent with the doctor’s instructions. Participants also completed a six-month TLFB on alcohol and drug use. The TLFB method is highly valid and reliable for measuring alcohol (20,21) and drug use (22,23). To facilitate recall, the calendar included events significant to the college population (e.g., school holidays, exam weeks, school sports events, etc.), and participants were encouraged to write in events personally significant to them (e.g., birthdays, travel, etc.). Participants indicated days on which they had used alcohol by writing the number of drinks they consumed on that day based on standard drink sizes, and days on which they had used PA nonmedically by writing the code “RxP” on the calendar. Participants’ responses to PA quantity or dosage questions were often missing, and were therefore not included due to reliability concerns.

The mean number of alcohol drinks consumed per drinking day was calculated by summing the number of drinks they had on each day of the six-month calendar and dividing by the number of days on which they drank alcohol. “Alcohol days” (and “PA days”) were counted as the number of days alcohol (or PA) was used. Concurrent days were counted as the number of days both substances were used.

Statistical Analyses

Frequencies were computed to estimate the prevalence of concurrent alcohol use and nonmedical PA use. Frequency of concurrent use was analyzed in two ways: first, as the percentage of alcohol days on which PA were also used, and second, as the percentage of PA days on which alcohol was also used. Accordingly, for each concurrent user, we divided the total number of concurrent days first by the total number of alcohol days, and second by the total number of PA days.

Frequency and quantity of alcohol use, as well as frequency of nonmedical PA use, were also examined descriptively among the three alcohol-PA groups. Between-group differences were evaluated using *t* tests. A series of logistic regression models were developed to examine the association between alcohol use patterns and concurrent use of alcohol and PA.

RESULTS

Table 1 describes the sample characteristics and compares the demographic characteristics between the three alcohol-PA groups. Approximately half (47.4%) were male and almost three-quarters were White (71.9%), indicating that the sample is slightly over-representative of Whites in comparison to the university population. Comparisons revealed that concurrent users were more likely than alcohol-only users to be male and White, but no other demographic differences were found. Of the total sample, 13.7% used PA nonmedically ($n=153$) over a six-month period. The alcohol-only group comprised the majority (86.3%, $n=965$) of the sample,

with the non-concurrent group and concurrent group comprising 5.6% ($n=63$), and 8.1% ($n=90$) of the sample, respectively.

Table 1 also presents results of the comparison of drinking patterns among the three alcohol-PA groups. Overall, concurrent users tended to be heavier and more frequent drinkers than non-concurrent or alcohol-only users. With respect to alcohol quantity, concurrent users consumed significantly more drinks per drinking day, on average, than the alcohol-only group and the non-concurrent group (7.5 vs. 5.2 and 5.8 drinks, respectively; $p<.05$ for both). With respect to the frequency of alcohol use, non-concurrent users drank significantly more frequently than alcohol-only users, and concurrent users drank significantly more frequently than both groups (74.4, 45.7, 36.8 days, respectively; $p<.05$ for all).

Table 2 presents comparisons of nonmedical PA use between the concurrent and noncurrent groups. Among this subset of 153 nonmedical PA users, 58.8% ($n=90$) had used alcohol and PA nonmedically on the same day (i.e., concurrently) at least once. Analgesic use was typically infrequent with 60.3% of non-concurrent users and 42.2% of concurrent users using only once in the past six months. The average number of PA days was significantly higher among concurrent users ($M=3.8$, $SD=5.9$) than non-concurrent users ($M=2.1$, $SD=2.4$). Among the concurrent users, alcohol was used concurrently on the majority of PA days (83.6% on average). However, the proportion of alcohol days that were also PA days was quite small (3.9% on average).

Table 3 presents the results of a series of logistic regression models testing the association between drinking patterns and concurrent PA use. Results indicate that both quantity (i.e., number of drinks/drinking day) and frequency (i.e., number of drinking days) are significantly associated with concurrent alcohol and nonmedical PA use, even controlling for demographic variables. Each additional drink per drinking day, on average, increases the likelihood of being a concurrent user versus a non-concurrent user by 18% (Model 1), whereas each additional drinking day increases the risk by 3% (Model 2). When frequency and quantity of alcohol consumption were entered simultaneously into the model, drinking frequency, but not quantity, retained significance.

DISCUSSION

The present findings extend prior cross-sectional evidence of an association between nonmedical use of PA and heavy drinking (6,7,13). In our sample of nonmedical PA users, PA use occurred infrequently, consistent with prior research (6-8). Using the TLFB method, we observed that more than half of nonmedical PA users had ingested alcohol and PA on the same day at least once in a six-month period. Moreover, concurrent PA-alcohol users drank significantly more often and in greater quantities than non-concurrent users. Alcohol consumption was least frequent among drinkers who did not use PA at all, consistent with prior evidence linking PA use to heavier alcohol use (6,11,12). Finally, when we examined data from the 90 concurrent users more closely, we found that, although nonmedical use of PA did not occur on a high percentage of days in which alcohol was used (3.9%), alcohol was consumed on most of the PA days (83.6%).

While it is apparent that concurrent users had the riskiest drinking patterns of the three groups studied, even non-concurrent PA use was associated with somewhat risky drinking. Compared to the alcohol-only group, non-concurrent users drank in similar quantities but significantly more often. This pattern of findings suggests the possibility that nonmedical use of PA may be a marker for high-risk drinking even in cases where PA and alcohol are not used concurrently.

Limitations

Several limitations must be acknowledged. Although the TLFB method has good reliability and validity, we can only say that alcohol and PA were consumed on the same day, and not necessarily simultaneously. Because the sample was derived from a single large public university, findings have unknown generalizability to other settings with different characteristics (e.g., small private colleges). Also, small cell sizes may have affected significance testing. Finally, analyses were exploratory and did not take advantage of the longitudinal nature of the parent study, nor did they examine other problem behaviors or psychopathology that may be associated with substance use. Further analyses are underway, utilizing more sophisticated longitudinal modeling techniques to elucidate changes in alcohol consumption patterns and the relationship to concurrent nonmedical use of prescription drugs.

Implications and Future Research

Much recent effort has gone into training physicians to be more aware of the possibility of nonmedical use of PA. Added to this, clinicians should recognize that many young adults taking PA nonmedically are at risk for concurrent alcohol use. Patient education is warranted regarding the risks of diversion and co-ingestion with alcohol. Conversely, professionals involved with young adults in treatment for alcohol problems should screen for concurrent PA use. Given clinical evidence of concurrent physical dependence to both alcohol and PA, future research should examine whether co-ingestion of alcohol and PA is associated with an elevated risk for the development of alcohol dependence. Future research should also examine predictors of concurrent use, especially the possible role of other drug use, to better inform parents and health professionals about potential targets for preventive interventions.

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TABLE 1

Demographic and alcohol-use characteristics of 1,118 alcohol users, by absence or presence of nonmedical prescription analgesic use, and either concurrent or non-concurrent use with alcohol in the past six months

	Non-Users of Prescription Analgesics	Nonmedical Prescription Analgesic Users		
	Alcohol Only	Non-Concurrent ^a	Concurrent ^b	All Drinkers
	(n=965)	(n=63)	(n=90)	(n=1,118)
	n (%)	n (%)	n (%)	n (%)
Gender [*]				
Male	445 (46.1%)	30 (47.6%)	55 (61.1%)	530 (47.4%)
Female	520 (53.9%)	33 (52.4%)	35 (38.9%)	588 (52.6%)
Race ^c [*]				
White	677 (70.2%)	49 (77.8%)	78 (86.7%)	804 (71.9%)
Non-White	286 (29.6%)	14 (22.2%)	11 (12.2%)	311 (27.8%)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Mean adjusted gross income of parents ZIP code ^d	\$73,259 (34,326)	\$73,971 (28,037)	\$75,292 (37,975)	\$73,465 (35,289)
Number of drinks per drinking day ^{**†}	5.2 (2.9)	5.8 (2.6)	7.5 (3.3)	5.4 (2.9)
Male ^{**†}	6.4 (3.3)	6.4 (3.0)	8.3 (3.6)	6.6 (3.3)
Female ^{†*}	4.2 (2.0)	5.3 (2.2)	6.1 (2.2)	4.4 (2.0)
Number of days drank in six months ^{†**†}	36.8 (28.1)	45.7 (30.7)	74.4 (34.2)	40.3 (30.5)
Male ^{**†}	41.7 (30.2)	39.6 (29.1)	77.3 (28.2)	45.3 (31.8)
Female ^{†**†}	32.6 (25.4)	51.3 (31.5)	69.9 (41.9)	35.8 (28.6)

^a Non-concurrent users used both alcohol and prescription analgesics nonmedically, but not on the same day.

^b Concurrent users used alcohol and prescription analgesics nonmedically on the same day.

^c Two participants from the Alcohol Only group and 1 participant from the Concurrent group had missing data for the race variable

^d The mean adjusted gross income is from 2003, the last year the participant lived with their parents prior to entry to college.

[†] Significant difference between alcohol only and non-concurrent users

^{*} Significant difference between alcohol only and concurrent users

^{†*} Significant difference between non-concurrent and concurrent users

TABLE 2

Comparison of nonmedical prescription analgesic use patterns among individuals who did and did not use prescription analgesics concurrently with alcohol in the past six months (n=153)

	Non-Concurrent Users ^a	Concurrent Users ^b
	(n=63)	(n=90)
	Mean (SD)	Mean (SD)
Number of days used prescription analgesics *	2.1 (2.4)	3.8 (5.9)
Male	2.7 (3.2)	4.3 (7.0)
Female *	1.5 (1.0)	3.0 (3.4)
% of alcohol use days on which prescription analgesics were nonmedically used	n/a	3.9 (4.8)
Male		4.3 (5.9)
Female		3.3 (2.2)
% of nonmedical prescription analgesic use days on which alcohol was used	n/a	83.6 (25.7)
Male		82.1 (26.3)
Female		85.9 (24.8)

^a Non-concurrent users used both alcohol and prescription analgesics nonmedically, but not on the same day.

^b Concurrent users used alcohol and prescription analgesics nonmedically on the same day.

* Significant difference between concurrent and non-concurrent users (p<.05)

TABLE 3

Results of logistic regression analyses predicting the likelihood of being a concurrent user^a versus a non-concurrent user,^b among 153 individuals who nonmedically used prescription analgesics and alcohol in the past six months

	Bivariate Models	Multivariate Model	Multivariate Model 2	Multivariate
		1	AOR (CI)	Model 3
	OR (CI)	AOR (CI)		AOR (CI)
Sex (ref=female)	1.73 (0.90-3.32)	1.33 (0.66-2.65)	1.63 (0.79-3.33)	1.34 (0.63-2.84)
Race (ref=nonwhite)	2.03 (0.85-4.82)	1.42 (0.57-3.60)	1.25 (0.46-3.43)	1.00 (0.36-2.80)
AGI in 10 thousands ^c	1.01 (0.92-1.11)	1.01 (0.91-1.11)	1.00 (0.91-1.11)	1.00 (0.90-1.10)
Drinks per drinking day	1.22 (1.08-1.38)*	1.18 (1.03-1.35)*		1.13 (0.98-1.31)
Number of days drank	1.03 (1.02-1.04)*		1.03 (1.02-1.04)*	1.03 (1.01-1.04)*

^a Non-concurrent users used both alcohol and prescription analgesics nonmedically, but not on the same day.

^b Concurrent users used alcohol and prescription analgesics nonmedically on the same day.

^c The mean adjusted gross income (AGI) is from 2003, the last year the participant lived with their parents prior to entry to college.

* $p < .05$