The Relationship between the Nonmedical Use of Prescription Drugs (NMUPD) and Sleep Behavior among a Large Sample of College Students.

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Background

- Poor sleep can cause sleep disorders (e.g., sleep apnea, insomnia, and narcolepsy) and is associated with a host of negative behavioral and health outcomes including substance use.
- Substance use can take different forms involving the intentional use of drugs for non-medically or without a medical prescription.
- However, the **association** between the non-medical use of prescription drugs (NMUPD) and **sleep** among college students has **not yet been explored**; extant literature has focused only on the **association** between **stimulant** use and **sleep**.

Purpose, Questions, Aims & Hypotheses

- **Purpose:** To examine the relationship between the nonmedical use of stimulants, pain killers, sedatives, and antidepressants (past 12 months), and sleep behavior among a large sample of college students.
- **Primary Research Question:** Are there differences in sleep behaviors among users and non-users of stimulants, pain killers, sedatives, and antidepressants among United States college students? **Secondary Research Question:** What are the prevalences of both poor sleep the nonmedical use of stimulants, pain killers, sedatives, and antidepressants among college students?
- **Hypotheses: Primary:** we expect an existence of differences in sleep behaviors between users and non-users of stimulants, pain killers, sedatives, and antidepressants. The expected differences may confirm the existence of association between the nonmedical use of stimulants, pain killers, sedatives, and antidepressants and sleep behavior, and particularly poor sleep. **Secondary:** Both poor sleep and the nonmedical use of stimulants, pain killers, sedatives, and antidepressants are highly prevalent among college students.

Method

- A cross-sectional analysis, using the fall 2010-spring 2011 national American College Health Association – National College Health Assessment (ACHA-NCHA) surveys (N=231,586).
- Data Analysis: SAS 9.4 for Windows. In addition to the basic descriptive statistics, we conducted a multivariate logistic regression model.

Results Summary

- Any use of prescription drugs (OR=2.18) and painkiller use (OR=2.38) were significantly associated with overall poor sleep ($p<.0001$).
- Painkillers use was significantly associated with poor sleep in all aspects of sleep, particularly awaken and hard falling asleep (OR= 1.40 and 1.38, respectively, $p<.0001$).
- Antidepressants and Stimulants uses were significantly associated with problem with sleepiness (OR=1.25, 1.32, respectively, $p< .0001$) and having more tiredness and sleepy during the day (OR=1.24, 1.26, respectively, $p< .0001$).
- Sedative use was significantly associated with getting more Awaken (OR=1.32) and hard sleep (OR=1.39) ($p<.0001$).

Discussion

- Overall, students who suffered from **poor sleep** were more likely to report NMUPD to alter sleep and increase alertness.[3,6] Correspondingly, we found significant association between the use of any of prescription drugs and poor sleep.
- **Painkillers** increases **sleep latency** (falling asleep) and alertness.[1] Consistently we found significant association with hard falling asleep.
- **Antidepressants** are associated with insomnia, **daytime sleepiness**, short sleep duration, prolonged sleep latency, and suppressed REM-sleep.[2,4] In our results Antidepressants are associated with daytime sleepiness.
- **Stimulants** affect both sleep duration and sleep quality by increasing sleep **latency** and suppressing **REM sleep.**[1] These affect sleep duration and the quality of sleep which are reflected in the next day as having problem with sleepiness and feeling tired and sleepy, as we have found.
- **Sedatives**, such as sleep aid prescriptions, are used by adults who **sleep less** than five hours or sleep nine or more hours.[5] In our results, sedatives use is associated with all sleep aspects including having less days of enough sleep.

Limitation:

- Causal relationships cannot be determined owing to the cross-sectional study design.
- Self-report data may cause potential recall bias
- Measure of sleep behavior (subjective, in 7days) comparing to objective and 30 days.
- Lack of potentially important control variables (e.g., caffeine) because they are not included in the ACHA.
- Results may not be generalizable to the college population because institutions self-select to participate in the ACHA.

Results

Table 1: Sample Characteristics by Gender & Race (N=231, 586; mean age 22 years, SD=6)

Characteristic		***Frequency***	***Percent %***	***Total***
Gender	*Male*	79, 615	35	**226, 526**
	Female	146,424	64	
	Transgender	487	1	
Race/Ethnicity	*White*	155, 118	68	**226, 796**
	Black-American-Indian	14, 898	7	
	Others	56, 780	25	

Table 2: Distribution of Sample Sleep Behaviors (Dependent Variables) (in the past 7 days)

Characteristic		*Mean*	*SD*	*Frequency*	*Percent %*	*Total*
Enough Sleep (Number of days of having enough sleep)	*As continous (0-7days)*	***3.14***	*1.91*			
	Better (2+ days)			178, 217	**78.0**	**227 , 998**
	Poor (0-1 days)			49, 781	**22.0**	
Awaken too early and and could not get back to sleep	*As continous (0-7days)*	***1.06***	*1.57*			
	Few (0-1 days)			165, 441	**72.0**	**227 , 472**
	Often (2+ days)			62, 031	**28.0**	
Tired and sleepy during the day	*As continous (0-7days)*	***3.25***	*2.03*			
	Few (0-1 days)			49, 930	**22.0**	**227, 769**
	Often (2+ days)			177, 839	**78.0**	
Extremely hard time falling asleep (hard sleep)	*As continous (0-7days)*	**1.57**	2.02			
	Few (0-1 days)			145, 134	**64.0**	**227, 670**
	Often (2+ days)			82, 536	**36.0**	
Problem with sleepiness during day activities (5-likert scale)	***No problem (no)***			23, 641	**10.0**	**227, 997**
	Problem (a littel- very big)			204, 356	**90.0**	
Overall sleep behavior (combining all sleep aspects)	***Better***			13, 169	**52.0**	**25, 084**
	Poor			11, 915	**48.0**	

Table 3: The Non-medical Use of Prescription Drugs (Independent Variables), other Substance Use Variables (Covariates), and Diagnosed Medical Disorders (Additional Covariates)

Prescription drugs (past 12 months)		***Frequency***	***Percent %***	***Total***
Antidepressant use	***Use***	7, 145	3	**229 , 053**
	No	221, 908	97	
Painkiller use	***Use***	18, 881	8	**228 , 754**
	No	209, 873	92	
Sedative use	***Use***	9, 729	4	**228 , 500**
	No	218, 771	96	
Stimulant use	***Use***	16, 517	7	**228 , 377**
	No	211, 860	93	
Any NUMPD	***Use***	33, 282	15	**227, 306**
	No	194, 024	85	
Other substance use (past 30 days)				
Cigarette smoking	***Use***	35, 644	16	**229 , 954**
	No	194, 310	84	
Alcohol use	***Use***	148, 346	65	**228 , 927**
	No	80, 581	35	
Marijuana use	***Use***	36, 940	16	**229 , 409**
	No	192, 469	84	
Diagnosed Medical Disorders in the Past 12 Months (Additional Covariates)				
Attention Deficit Hyperactivity Disordr (ADHD)	***Yes***	9, 673	4.0	**227, 799**
	No	218, 126	96.0	
Insomnia	***Yes***	8, 481	4.0	**227, 671**
	No	219, 190	96.0	
Sleep-related Disorders	***Yes***	4, 757	2.0	**227, 115**
	No	222, 358	98.0	
Depression	***Yes***	39, 872	18.0	**221, 229**
	No	181, 357	82.0	

Table 4: Logistic Regression Analysis for the Non-Medical use of Prescription Drugs as Variables Predicting Sleep among College Students (N=231,586)

Predictors Drugs use vs no	**Responses:** Sleep Vraibales (Poor)					
	Enough Sleep	**Sleepiness**	**Awaken**	**Sleepy**	**Hard Sleep**	**Overall Sleep**
	OR (95% CI)					
Antidepressants	**1.18*** CI (1.11-1.25)	**1.25*** CI (1.13-1.39)	**1.17*** CI (1.10-1.24)	**1.24*** CI (1.15-1.33)	**1.23*** CI (1.17-1.30)	**1.78*** CI (1.47-2.15)
Painkillers	**1.25*** CI (1.21-1.30)	**1.35*** CI (1.27-1.44)	**1.40*** CI (1.35-1.45)	**1.27*** CI (1.22-1.33)	**1.38*** CI (1.34-1.43)	**2.38*** CI (2.12-2.67)
Sedatives	**1.15*** CI (1.09-1.21)	**1.18** CI (1.08-1.28)	**1.32*** CI (1.26-1.39)	**1.21*** CI (1.13-1.28)	**1.39*** CI (1.33-1.46)	**1.81*** CI (1.54-2.11)
Stimulants	**1.08 ** CI (1.03-1.12)	**1.33*** CI (1.24-1.43)	**1.19*** CI (1.14-1.24)	**1.26*** CI (1.20-1.32)	**1.20*** CI (1.15-1.24)	**1.78*** CI (1.56-2.03)
Use at least one	**1.18*** CI (1.15-1.22)	**1.37*** CI (1.30-1.44)	**1.31*** CI (1.28-1.35)	**1.30*** CI (1.26-1.35)	**1.32*** CI (1.28-1.36)	**2.18*** CI (1.99-2.39)

*p<.01; **p<.001; ***p<.0001

*Controlling for race, gender, age; cigarette, alcohol and marijuana use; and being diagnosed for ADHD (Attention Deficit Hyperactivity Disorder), insomnia, sleep disorders, and depression.

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