Substance Use & Misuse, 45:865–887 Copyright © 2010 Informa Healthcare USA, Inc. ISSN: 1082-6084 (print); 1532-2491 (online) DOI: 10.3109/10826080903443610



Original Article

Nonmedical Prescription Drug Use Among US College Students at a Midwest University: A Partial Test of Social Learning Theory

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We estimate the prevalence of nonmedical prescription drug (NMPD) use and test social learning theory as an explanation for NMPD use based upon data from a large pilot study. Data were collected from 465 college students at a Midwestern university in the USA using a self-administered questionnaire. The sample was predominantly white (88%), 43% were female and the mean age was 22. Most participants (80%) were not members of social fraternities or sororities. A majority of students did not report NMPD use: 39.4% of respondents reported lifetime NMPD use, 31% reported pastyear use, and 14.4% reported past-month use. Multivariate regression results partially supported social learning theory as an explanation for lifetime NMPD use. Limitations and suggestions for future research are suggested.

Keywords social learning theory; nonmedical prescription drug use; NMPD use; prescription drug use and misuse; college students; deviance

Introduction

Relatively recently, calls for the use of social network theories (the equivalent of social learning theory) have been called for to better understand how drug use occurs from a sociological vantage point (see Valente, Gallaher, and Mouttapa, 2004 for a thorough overview). In response to this call for research, we test social learning theory as an explanation for nonmedical prescription drug (NMPD) use using data from a large pilot study collected at a Midwest university in the United States. In the past decade, NMPD use among college students has been steadily rising (McCabe, West, and Wechsler, 2007). According to a 2004 report by the National Survey on Drug Use and Health, the number of Americans initiating

The authors thank Dr.'s Keith Durkin (Ohio Northern University) and Michelle Brown (Ohio University) for early substantive contributions. We also thank Dr. Stan Einstein, editor in Chief, *Substance Use and Misuse*, Dr. Cheryl Elman (The University of Akron), and the anonymous reviewers at *Substance Use and Misuse* for their suggestions and comments on initial drafts. Finally, we thank Dr. Christopher Eustis, Dr. Robert Jeantet, and Mr. Herman Jara-Droguett of the Modern Languages Department of The University of Akron for abstract translation.

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(i.e., used at least once) the nonmedical use of prescription opioids over the age of 12 years (2.4 million) exceeded individuals initially beginning the use of marijuana (2.1 million) or cocaine (1.0 million) with young adults (18–25) having the highest rates of NMPD use (14.5%) than any other age group (SAMPSA, 2006a, 2006b).

Recent national survey data have found that college students may be more likely than their noncollege peers to report misuse of prescription drugs, specifically prescription stimulants (Herman-Stahl, Krebs, Kroutil, and Heller, 2007; Johnston, O'Malley, Bachman, and Schulenburg, 2004). Research on NMPD use has tended to focus on specific classes of drugs. The three most commonly recognized categories of prescription drugs examined in the current literature are opiates, stimulants, and depressants. There are only a handful of studies that have examined all classes concurrently. Table 1 below displays recent findings on NMPD use so that readers can make assessments about generalizability.

A possible theoretical explanation for NMPD use at the college level is social learning theory (Akers, 1994, 1998; Sutherland and Cressey, 1960). Social learning theory states that deviant and/or criminal behavior and the justifications for behavior are learned from intimate groups. Critical conditions for social learning theory to operate include exogenous (e.g., social concerns such as the impact of friends who use) as well as endogenous conditions (e.g., physiological or psychological precursors to substance use). The advantage of this perspective is that socio-structural conditions (e.g., exposure to social norms and socialization) are emphasized while limitations of social learning theory center on the problem of causal ordering and/or the ignoring of bio-psychological predispositions to substance misuse. Nevertheless, studies examining social learning theory have proved to be useful in explaining substance use and misuse. For example, Triplett and Pavne (2004) and Ford (2008a) found that social learning theory was supported in studies on adolescent NMPD use and is a valuable criminological theory for explaining this particular type of drug use. Triplett and Payne (2004) also reported that social learning theory was useful in explaining NMPD use for a sample of adolescents. Other studies suggest most users obtain prescription drugs from friends: a key aspect of social learning (Hurwitz, 2005; McCabe, Knight, Teter, and Weschler, 2005; McCabe, Teter, and Boyd, 2005). Findings such as these infer that peer association with drug-using acquaintances or friends is predictive of NMPD use (Ford, 2008a). Given these established findings, we suggest that NMPD use among college students can at least partially be explained by elements of social learning theory.

Social learning theory is composed of four major components: differential association, definitions, imitation, and differential reinforcement (see Table 2). Differential association states that deviant and/or criminal behavior is learned; specifically, it is learned through intimate social interaction (e.g., friendship networks, peer socialization, and romantic relationships). Learning criminal and/or deviant behavior includes learning the techniques, motives, rationalizations, and attitudes needed for committing the violation (which is similar to learning pro-social behavior). An individual becomes delinquent, for example, if he or she poses more favorable definitions of crime over definitions that are not favorable toward crime. Learning criminal behavior or deviance thus follows the same processes associated with learning other behaviors (Akers, 1994, 1998; Ford, 2008a; Sutherland and Cressey, 1960). Akers conducted a study examining drug use among teenagers and concluded that actual and anticipated rewards and punishments were significant predictors of frequency of drug use (Akers, 1998). Given the theory's support in other areas of study, it is surprising that few studies have applied social learning theory to substance use and misuse treatment (Andes, 1994).

Although researchers are beginning to document the epidemiological distribution of NMPD use, there has been little theoretical investigation into this particular form of

				Recent research on	non-medical prescripti	on drug (N	MPD) use: a resource 1	able*			
Author, year	Country	Hypothesis /Purpose	Critical concepts	Under-pinning	Population	z	Data source/ instruments used	Analysis	Findings	Limitations	Critical unresolved issues
Boyd, McCabe. and Teter, 2006	USA	Descriptive study	Pain medication	Evidence-based	Students ages 10–18 in a Midwest public school district	1017	Use of questions adapted from Monitoring the Future: specific question on nonprescribed use of pain medication	Bivariate and logistic regression; content analysis of open ended survey questions	16% lifetime use (i.e., pain medication); 1% use in past year: girls reported higher rates of use; no found: leading sources of pain medication were friends and family	Limited opera- tionalization of NMPD use (specific to pain medication) and no specification of drug type: cross sectional study. secliconal study. frequency and route of administration measures	Parental awareness of NMPD use; level of education and awareness about NMPD use in schools
Ford, 2008a	USA	Social control/social learning predictor of NMPD use	Substance abuse/ delinquency nexus	Evidence-based	National sample 12 and older	55,905	National Survey on Drug Use and Health 2005	OLS and logistic regression	8.8% past year year year year year year year year	Self-report data, noninstitution- alized sample, cross sectional data, limited comprehen- siveness of prescription drugs in survey	Identify motives for use, theoretical predictors of use, and explain increases in use over time
Ford, and Arrastia, 2008	USA	Social control; social learning predictor of NMPD use	Correlates of use	Evidence-based	National college student sample	10,401	Harvard School of Public Health College Alcohol Survey 2001	Multi- Nomial logistic regression	11% lifetime use (NMPD only); whites more likely to report NMPD use; illicit street drug use associated with greater risk-behavior than NMPD; support for support for social control theory	Did not account for poly-substance abuse: self-report data; cross-sectional; limited com- prehensiveneess of prescription drugs in survey (<i>Contin</i>	Social and behavioral consequences of NMPD; perceived safety of NMPD use compared to "street drugs"; theoretical predictors of use use

Table 1	on non-medical prescription drug (NMPD) use:

			Recen	it research on non-m	edical prescription dru	ig (NMPD)	use: a resource table* (Continued)			
		Hypothesis	-		-	:	Data source/		:		Critical
Author, year	Country	/Purpose	Critical concepts	Under-pinning	Population	z	instruments used	Analysis	Findings	Limitations	unresolved issues
Ford and Rivera, 2008	USA	Hispanics Jess likely to use NMPD compared to whites	Ethnic and race predictors of NMPD use	Evidence-based	National sample 12 and older	55,905	National Survey on Drug Use and Health 2005	Bivariate and logistic regression	 12.1% NMPD use in past year, the highest prevalence was opiate use (10%); Hispanics less (10%); Hispanics less (10%); Hispanics less compared to whites but more likely to use than Blacks aculturation important for Hispanic use 	Self report data; nominstitution- alized sample, definition of NMPD use; limited cus- prehensiveness of prescription drugs in survey	Conco- mitant social problems stemming from NMPD use
Hall, Irwin, Bowman, Frankenberger, and Jewett, 2005	USA	Descriptive study	ADHD, prescribed stimulants, college students	Bvidence-based	Midwest college students	381	Likert-type survey on opinions and attitudes toward stimulant use	ANOVA	13.7% used stimulants that prescribed; anti- depressants depressants depressants mon drug taken (7%); men more likely to have reported taking stimulants for nonmedical purposes	Initial low response rate from men; estimates may be conservative; single college studied; low generalization	What is the impact of stimulant prescription for children on their adolsecent NMPD use? Regional differences, if any, need to be explored

 Table 1

 search on non-medical prescription drug (NMPD) use: a resource

The dimensions of psychological stress as they pertain to gender, race, ethnicity, and age are important for future consideration	Peaks and downturns in use need use need use need there of treatment demand and police interventions needed <i>on next page</i>)
NMPD survey measures not optimal (jimited description of: choices for prescription drg use): cross-sectional; unknown if current NMPD was the result of past prescription; liftime and past month measures not used	Response validity and reliability (ow privacy): possible under- estimation; inconsistencies across surveys (<i>Cont</i>
2.1% used NMPD (stimulants) in past year; whites had the highest rate; selling and the highest rate; selling and the high socciated with increased odds for NMPD stimulant use; psychological distress. sensation- secking, binge drinking, and college drinking, and college drinking drinking, and college drinking, and college drinkin	9.1% engaged in any NMPD use in the past year in 2004; analgesic use most common; females outnumber males in NMPD use but difference decreasing over time
Multivariate analysis	Logistic regression
National Survey on Drug Use and Health 2002	structured questionnaire, face to face
23,645	4,000
Young adults (18–25)	National sample ages 12-64, urban, semi rural rural
Evidence-based	Evidence-based
Metham- phetamine	Prevalence and incidence trends
Descriptive study	Descriptive study
USA	Greece
Herman-Stahl, Krebs, Kroutil, and Heller, 2007	Kokkevi, Fotiou, and Richardson, 2007

			Recen	it research on non-m	redical prescription dru	ig (NMPD)) use: a resource table*	(Continued)			
Author, year	Country	Hypothesis /Purpose	Critical concepts	Under-pinning	Population	z	Data source/ instruments used	Analysis	Findings	Limitations	Critical unresolved issues
Kokkevi, Fotiou, Arapaki, and Richardson, 2008	Europe	Descriptive study	Prevalence, correlates	Evidence-based	Adolescents from 31 European countries	85,000	Standa- rdized surveys	Logistic regression	5.6% lifetime nonmedical tranquilizer or sedative use; NMPD use associated with tobacco, alcohol, and illicit drugs; findings comparable to US: Lithuania had the highest and UKraine and UKraine and UKraine had the hwest	The use of tranquilizers and sedatives combined in a single question; limited opera- tionalization of NMPD; cross-sectional; self-report	Crossva- lidation through contextual information on prescription practices and different countries or retail aales needed
Leukefeld, McDonald, Mateyoke- Scrivener, Roberto, Wälker, Webster, and Garrity, 2005	NSA	OxyContin users will be more drug involved, use more health services, and commit more crimes than nonusers	OxyContin (narcotic analgesic) unsurs versus nonusers; drug use criminality nexus	evidence-based	Purposive sample of rural Midwest probationers	295	Addiction soverity index; Miami Health Services Utilization Questionnaire	Univariate, chi squares; <i>i-</i> tests	Oxyconiu users significantly younger, younger, higher levels of other illicit drug use, used more detoxification services, reported higher llness and criminal behavior than nonverse	Predomi- nantly white male sample; did not control for age; division between OXyContin use and nonuse; nonrepresenta- tive sample; self-report	dMPD Targeting NMPD abusers for reatment for rearment and mean trans treatment and treatment for the and the and the a
Leukefeld, Walker, Havens, and Talbert, 2007	USA	perceptions and options will vary across types of intormant group	perceptions of rural NMPD use	theory based	key informants from Applachian counties in Kentucky (e.g., elected officials, business leaders)	20	face-to-face structured interviews	qualitative analysis derived from snowball sampling	NMPD use is not new physical pain, recreational use and cultural acceptance are pathways to pathways to pathways to pathways to pathicks and options did not very by group extremily high trate of NMPD use	Non random sampling of respondents self reported data cross-sectional design	Views from law enforcement and judicial system needed research on treatment and prevention pertinant to rural communities in general also in need

Table 1 ;

Research on initiation, use,	supply, and	contexts	among IDUs	needed			Context of early	onset	important to	study; social,	psychological,	and	physiological	vulnerabilities	to early use	important to	consider; role	of family	histories of	alcoholism	important to	consider													nued on next page)
Primarily male, white,	heterosexual	sample					NMPD survey	measures not	optimal (i.e.,	comprehensive	list not offered	to participants)	thus estimates	likely	conservative;	based on	secondary	analysis; word	choice	differences	compared to	other surveys;	failure to	identify the	misuse of one's	own	medication	versus the	misuse of	other's	medications;	results may not	generalize	outside the	(Conti
95.8% NMPD use; opioids most	common;	NMPD an	integral part of	drug use	among IDUs		9.1% of adults	lifetime NMPD	use; early year	of NMPD onset	predictive of	adult NMPD	abuse and	dependence;	polydrug use	common																			
Mixesd methods (descriptive	univariate and	qualitative	analysis)				Results from	structured	diagnostic	interviews	analyzed via	bivariate, chi	square, and	logistic	regression																				
Face-to-face structured	interviews						National	Epidemiologic	Survey on	alcohol- related	conditions	2001-2002																							
213							43,093																												
Youth and young IDUs from 3	US cities						National sample of	adults 18 and	over																										
The ory-based							Evidence-based																												
Polydrug use; IDUs							Early onset,	dependence																											
Exploratory examination of	context and	patterns	associated with	NMPD use	among injection drug	users (IDUs)	Descriptive study																												
NSA							USA																												
Lankenau, Sanders,	Bloom,	Hathazi,	Blarcon, Tortu,	and Clatts	2007		McCabe, West,	Morales,	Cranford, and	Boyd, 2007																									

House the service of the ser				Recer	it research on non-m	Table edical prescription dr	e 1 ^{ug (NMPE})) use: a resource table	* (Continued)			
MCtherant Ush Derge Mase struntant Motion and struntant MOTION and struntant <th< th=""><th>Author, year</th><th>Country</th><th>Hypothesis /Purpose</th><th>Critical concepts</th><th>Under-pinning</th><th>Population</th><th>z</th><th>Data source/ instruments used</th><th>Analysis</th><th>Findings</th><th>Limitations</th><th>Critical unresolved issues</th></th<>	Author, year	Country	Hypothesis /Purpose	Critical concepts	Under-pinning	Population	z	Data source/ instruments used	Analysis	Findings	Limitations	Critical unresolved issues
McCabe West, and Wethsles, USA Descriptive study Trends and college Evidence-based National sample of 15,282 College Alcohol HLM, multiple 4.4% past year Findings and Wethsles, level college 14,428 Study pairwise NMPD use in secon 2007 level college 14,428 Study pairwise 1993 and rose analyvise 2007 level college 13,953 comparisons, 1993-2001 10,904 cin square tests, 1993 and rose anarcer 2001 lifetime 1993-2001 10,904 cin square tests, 1993 and rose anorers 2001 fistione 10,904 cin square tests, 1093 and rose anorers 2001 fistione 10,904 cin square tests, 1093 and rose 2001; lifetime arcer 2001 fistione rose anorers 2001 lifetime 201; lifetime arcer 201 fistione rose anorers 201; lifetime arcer 201; lifetime arcer 201 roser	McCabe and Teter, 2007	USA	Descriptive study	Prescription stimulants	Evidence-based	Web-based Midwest sample	3,639	Modified use of the Drug Abuse Screening Test (DAST)	Bivariate, ANOVA	8.5% lifetime NMPD use, while past year use was 6%: NMPD users more likely to report polydrug use (90%); mode of NMPD ingestion significant	NMPD survey measures not optimal (limited description offebics for prescription drug use); DAST not tested in Web-based versions; nonresponse rate could be problematic	Future studies should examine multiple colleges from a range of geographic locations for comparison purposes and to assess generalization; diverse samples are needed: sexuality, race, and ethnicity differences are in nood of
significantly from increasing institu	McCabe West, and Wechsles, 2007	USA	Descriptive study	Trends and college level characteristics	Evidence-based	National sample of college students 1993–2001	15,282 14,428 10,904 10,904	College Alcohol Study	HLM, multiple pairwise comparisons, chi square tests,	4.4% past year NMPD use in 1993 and rose to 9.97% in 2001; lifetime NMPD use was 16.34% students from Historically Black schools uses tikely to use HLM suggests a steady significantly increasing	Findings based on secondary analysis; NMPD use survey measures not optimal; data are cross sectional and not longitudinal; self-report; variations in respons rates from different institutions	ni need ol study has facilitated inscreases in NMPD across time would be useful as would research on the socio- structural processes associated with regional and historically black status differences

Research into why co-occurrence of alcohol and NMPD use is so prevalent is needed: research on about the potential for interaction effects are needed <i>timued on next page</i>)	
NMPD survey measures not optimal (i.e. comprehensive list no toffered to participants listly conservative; bused on analysis; word differences compared to thoice differences compared to thoice differences compared to thoice differences compared to thoice differences compared to thoice differences compared to the new misuse of own were the misuse of other's medications; results may not generalize outside the USA	
3.17% past year NMPD use overall sample; 18–24 years had highest past year Rate drinking severity significantly severity associated with NMPD (alcohol- dependent 18X more likely to report any NMPD use)	
Results from structured interviews Analyzed with bivariate, chi square, and logistic regression	
43.093 National Epidemiologic Survey on Actobol Related conditions 2001–2002	
National sample	
Evidence-based	
Alcohol use co-occurrence	
Descriptive study	
nsa	
McCabe. Cranford, and Boyd, 2006	

			Recen	it research on non-m	nedical prescription dru	g (NMPI) use: a resource table*	(Continued)			
Author, year	Country	Hypothesis /Purpose	Critical concepts	Under-pinning	Population	z	Data source/ instruments used	Analysis	Findings	Limitations	Critical unresolved issues
Quintero, Peterson, and Young, 2006	USA	Exploratory examination of types and source of NMPD use, the venue in which use takes place, and types of use	Socio-cultural factors	The ory-based	College students in a southwest university who misused prescription drugs	52	2-stage sequential iterative semi-structured interviews	Qualitative analyse derived from snowball sampling and advertisements	Narcotic herzodi- berzodi- azepines most common NMPD used for self- medication, socio- recreation and academic functioning; NMPD experi- mentation is socially is socially is widespread, which MPD academic to the social of the social widespread, which MPD academic to the social of t	Small sample/non representative; reliability; interview effects (i.e., social desirability); desirability); from high-risk settings (i.e., dorms)	Research on relationship between NMPD and adherence to legitimate prescription drug use; the role of stress in NMPD use to enhance scholastic performance
Simoni-Wastila and Strickler, 2004	USA	Descriptive study	Problem use	Evidence-based	National sample of past year NMPD use	4049	National Household Survey on Drug Abuse 1991–1993	Logistic regression	4% use of any NMIPD in past past of which 15% were categorized as problem users; marcotic analgesic was the most common; being female, in poorfhir female, in poorfhir daily alcold ally alcold users increased the probability of use; female status predicted marcotic marcotic the probability of use; female status predicted marcotic marcotic marcotic marcotic marcotic marcotic marcotic marcotic marcotic female and the probability of use; female status predicted marcotic marcotic marcotic marcotic marcotic marcotic marcotic marcotic marcotic mon to the status predicted marcotic marcotic marcotic temale and the probability of use; female status predicted marcotic marcotic temale and the probability of marcotic temale and temale and	Noninstit- utionalized sample and self-report data likely produced conservative estimates: oper- ationalization of NMPD needs to be validated and refined	Hurther analysis of the current data needed: longitudinal data needed; the role of medical consequence abuse is in need of study

Table 1

Need to control for alcohol and illicit drug use in conducting analyses of NMPD use due to high rates of polydrug use reporting	More diverse samples are needed for effective effective factors to be factors to be farther further qualitative research is needed on users using alternative routes of administration and on and on pulations) populations)
Patient and provider proceptions not taken into account; dated data	NMPD survey measures not optimal nor comprehensive: limited genera lizability due to single campus single campus predominandly white predominandly white opulation; quantity of NMPD use per occasion not established
Women significantly more likely than men to engage in NMPD use (primarily narcotic analgesic and tranquilizer use); being white and illicit drug users predictive of NMPD use	8.1% of undergraduate reported (Stimulant) use in lifetime, 5.4% in past prest men had higher lifetime rates than vomen: Blacks had the lowest lifetime rates; correlated with NMPD
Logistic regression	Chi square, latent content analysis (qualitative analysis)
3.185 National Survey on Drug Use and Health 2001	9,278 Self-administered Web survey Student Life Survey adapted from monioring the Fiuture and College Alcohol Survey)
National sample; 12 years and older of NMPD users and non-users	College students 1
Evidence-based	Evidence-based
Gender	Motives, prevalence
Descriptive study	Descriptive study
nsa	USA
Simoni-Wastila, Ritter, and Strickler, 2004	Teter, Mc Cabe, Cranford, Boyd, and Guthrie, 2005

	The four major components of social le	arning theory
Parameter	Definition	Necessary conditions for social learning theory to operate
Differential association	The influence of the attitudes, definitions, and behaviors of significant others on individuals' conduct.	Exposure (in terms of intensity, frequency, and duration) to the behaviors and definitions of others whom one interacts with.
Definitions	The attitudes and values one holds pertaining to both the morality of the law in general and the wrongfulness of specific criminal and/or deviant behaviors.	Weak or neutral attachment to mainstream morals and values are sufficient for deviant or criminal behavior to occur. Strong attachment to deviant or criminal values and morals are sufficient for deviant or criminal
Imitation	The extent to which one emulates the behavior of role models.	Role models should be significant others whom one admires, whom one has a perceived personal relationship with, and whom one has directly observed
Differential Reinforcement	The perceived gain after weighing the costs and benefits associated with a given behavior.	When the rewards outweigh the costs, deviant and or criminal behavior will occur.

substance misuse among college students. Studies on stimulant use have shown that most college students get their drugs from other students but fail to make the connection as to why certain individuals will choose to engage in drug use, while others refrain from this particular form of substance misuse. Meanwhile, research on social deviance in general and social learning theory specifically continues to reveal that peer association is an important predictor of drug use. Thus social learning theory appears to be a useful theory for the explanation of both use and nonuse of drugs among college populations. As such, we attempt to advance knowledge of the epidemiological distribution of prescription drug use among college students and advance deviance and criminological theory by testing social learning theory.

Method and Hypothesis

A self-administered questionnaire was developed and distributed with the approval of the research site's Institutional Review Board. Questionnaires were pre-tested with graduate students. During the study, those taking the survey were informed verbally by the second author and in writing that "…non-medical prescription drug use is defined as the use of prescription drugs for non-prescription purposes, specifically recreational use (which includes drug use in order to aid in studying, test taking, and getting high or buzzed)." Thirteen classes were selected from the College of Arts and Sciences at a university (25,000 students) situated in a rural area and medium-sized town of the Midwest in spring 2006. Classes were randomly selected. Upon permission from instructors, the study was announced in classes and students over the age of 18 were invited to participate.

Careful and appropriate steps were taken to protect respondent's rights. Potential respondents were informed that the survey was completely voluntary and participation did not affect class performance. Respondents were instructed not to put any identifying information on the survey. Participants were informed that they could discontinue the survey at any time or skip any questions. A cover page was added to ensure the privacy of their answers and serve as a reminder that the survey was confidential. The cover page also reminded participants that they had to be 18 years of age or older to participate and that by completing the questionnaire they were providing consent to have the data analyzed and prepared for publication consideration. Survey responses were analyzed using Statistical Package for the Social Sciences (SPSS). It is important to note the ethical implications of using collected data from individuals-minors and adults-in terms of if and how participants benefit from study participation (see Kleinig and Einstein, 2006). As we were not able to compensate participants directly because our pilot study was unfunded, in asking about NMPD use, the prompting of students to consider NMPD use as potentially problematic may have occurred. Future research should consider providing students with treatment literature and other benefits to offset the "using" of participants for scientific advancement.

We hypothesize that the probability for self-reports of NMPD lifetime use will increase in relation to the four aspects of social learning theory (see Table 3): (1) differential association; (2) definitions; (3) imitation; and (4) differential reinforcement. In other words, if a participant has friends who engage in NMPD use, he or she will also be more likely to engage in NMPD use. NMPD use will be greater among those whose behavior is reinforced either socially or nonsocially (i.e., the more rewards and fewer punishments perceived, the more likely the behavior will occur). Peers who participate in NMPD use will have more neutral or positive definitions of this behavior. By determining the applicability of social learning theory, we directly test social learning theory as a predictor of NMPD use.

Table 3Social learning instrument

	Range	Alpha
1. Differential Association		0.62
la. What proportion of your close friends (or friends you associated with most frequently) take prescription drugs for recreational purposes?	(1-5)	
1b. Have any of your friends ever pressured you to take prescription drugs for recreational purposes?2 Definitions	(1-5)	
 2. Definitions 2a. College students should not be held responsible for using prescription drugs without a prescription, such as Ritalin, to get ahead in schoolbecause 	(1-6)	0.80
2b. Older adults have no right to condemn students for taking prescription drugs since they take pills for their problems everyday	(1-6)	
2c. Using prescription drugs without a prescription is not really that dangerous	(1-6)	
2d. Taking prescription drugs without a prescription does not hurt anyone	(1-6)	
2e. Using prescription drugs is not as bad as using illegal drugs such as cocaine, heroin, etc.	(1-6)	
2f. Prescription drugs are less addictive than other illegal drugs such as cocaine, heroin, etc.	(1-6)	
3. Imitation		0.83
3a1. How would <i>most of your friends</i> react if they discovered that you were using or had used illicit prescription drugs?	(1-5)	
3a2. How would your <i>best friends</i> react if they discovered that you were using or had used illicit prescription drugs?	(1-5)	
3a. How do you feel your friends view illicit prescription drug use?	(1-5)	N/A
4. Differential Reinforcement		0.73
4a. Costs and benefits (scale 2-reinforcement)	(1-4)	
4b. Willbecome sick	(1-4)	
4c. Get arrested	(1-4)	
4d. If arrested, severely punished	(1-4)	
4e. Develop an addiction	(1-4)	
4f. Fit into the group better	(1-4)	
4g. Relief fromboredom	(1-4)	
4h. Have a good time	(1-4)	
4i. Achieve better grades	(1-4)	
4j. Feel buzz or high	(1-4)	
4k. Suffer a serious physical side-effect that can affect one's health	(1-4)	
41. Suffer from a serious mental-side effect that can affect one's mental health	(1-4)	
4m. Lose weight or look more attractive	(1-4)	
4n. Improve focus	(1-4)	

The Instrument

The instrument was 13 pages long and consisted of 45 questions and a prescription drug checklist, which had 32 prescription drug choices. NMPD use was assessed by asking respondents to choose from a list of 30 of the most common names of opiates, stimulants, and depressants (i.e., tranquilizers), which were acquired from the National Institute on Drug Abuse (see Appendix A). An open-ended question was provided to allow students to list additional drugs. We asked about lifetime use and current use. The question phrasing was as follows: How many occasions in (a) your lifetime, (b) the last 30 days, (c) the last 3 months, (d) the last year have you used illicit prescription drugs? This scale was similar to scales used in national research on NMPD use. The response options were: (1) never; (2) 1-2 occasions; (3) 3-5 occasions; (4) 6-9 occasions; (5) 10-19 occasions; (6) 20-30 occasions; (7) more than 30 occasions (Boyd et al., 2006; McCabe, Teter, and Boyd, 2006; Teter, McCabe, Boyd, and Guthrie, 2003; Teter, McCabe, Cranford, Boyd, and Guthrie, 2005). Two changes were adopted to improve the precision of the instrument. Use in last 3 months was included in the present study to sharpen epidemiological precision of prescription drug misuse. Next, participants were asked to identify from a provided list of specific prescription drugs used (instead of drug categories) in the past (lifetime, past year, and past month) for increased accuracy. Other questions, not analyzed here, included questions on coingestion, where or whom the drug was obtained from, and questions on alcohol use and other illicit drug use (e.g., heroine).

The survey was designed to include a series of indicators consistent with components of social learning theory (see Table 3). A number of questions relevant to social learning theory were drawn from previous studies on social learning theory (e.g. Akers et al., 1979; Durkin, Wolfe, and Clark, 2005). The four main components of social learning theory examined were differential association, definitions, imitation, and differential reinforcement. While family influence certainly is an important component of socialization, for the purposes of this study, we were concerned with the effects of peer associations. Also, family members are not considered a primary socialization group for young adults. The impact of secondary socialization factors were beyond the scope of the present study.

Differential association was measured using a two-part scale that asked (a) what proportion of your close friends (or friends you associated with most frequently) take prescription drugs for recreational purposes? and (b) have any of your friends ever pressured you to take prescription drugs for recreational purposes? Response options ranged from 1 (none or almost none) to 5 (all or almost all) (Cronbach's $\alpha = .62$). Definitions were measured using a six-question scale designed to assess the presence of techniques of neutralization. Rationalizations for use were provided (e.g., "College students should not be held responsible for using prescription drugs without a prescription, such as Ritalin, to get ahead in school because they are under so much pressure"). Respondents were asked the degree to which they agreed or disagreed with each rationalization by choosing from a range of 1 (strongly disagree) to 6 (strongly agree) (Cronbach's $\alpha = .80$). Next, respondents were asked how they thought their friends viewed NMPD use in order to assess imitation based on friend's positive outlook on NMPD use. We also inquired about friends reactions to NMPD use by the participant-both 'best' friend and 'most of your friends' reaction were used to approximate imitation. Response options ranged from 1 (very negatively) to 5 (very positively) (Cronbach's $\alpha = .83$). Finally, for differential reinforcement, a scale was composed of 13 items and was designed to measure student's perceived cost (e.g., getting sick) and benefits (e.g., achieving better grades) associated using NMPD. Responses ranged from 1 (very unlikely) to 5 (very likely) (Cronbach's $\alpha = .73$).

	Percentage	n
Gender		
Female	43	199
Male	55	257
Race		
White	88	409
African American	3	14
Hispanic	1	6
Other	3	13
Age		
Mean		20
18–20	55	252
21–22	39	177
23–24	5	18
25 and older	2	8
Greek Membership		
Greek	20	92
NonGreek	80	364
Year		
Freshmen	26	120
Sophomore	22	103
Juniors	21	96
Seniors	29	136

Table 4Sample demographic characteristics (N = 465)

Participants

The sample size consisted of 465 students (see Table 4). Forty-three percent (n = 199) were male and 55% (n = 257) female, which is representative of the overall college population in the United States (Freeman, 2004). According to the registrar at this particular university, 662 students were registered for the 13 classes included in the sample, which indicates that the number of students missing from the sample was 197. Respondents may be missing for a number of reasons including absenteeism or not being qualified to take the survey (e.g., "age" and "undergraduates only" restrictions; enrollment in more than one class participating in the study).

Results

A minority of students (39%) reported NMPD use at least once in their lifetime (see Table 5). The mean age of NMPD use onset was 18. About 31% reported NMPD use in the last year, 23.4% in the last three months, and 14.4% in the last thirty days. Also, 24% of those who had used prescription drugs nonmedically, reported that they had used more than one prescription drug. Eighteen percent self-reported using three or more different types of prescription drugs. The three most common drugs respondents reported using were Vicodin (22.4%), Adderall (20.9%), and Ritalin (11.2%). When these drugs were organized into categories, opiates were the most common (27.3%) followed closely by stimulants (26%) and depressants (12.5%).

Variable	Percentage	п
Lifetime use	39	183
Past year	31	146
Last 3 months	23	109
Last 30 days	14	67
Used more than one prescription drugs in lifetime	24	116
Used three or more prescription drugs in lifetime	18	84
Vicodin	22	104
Adderall	21	97
Ritalin	11	52
Opiates	27	127
Stimulants	26	121
Depressants	13	58

Table 5Rates of NMPD use

Using OLS regression, we created models investigating the probability of lifetime NMPD use for those students who reported ever using NMPD a minority of the sample (see Table 6). Because of strong correlations among independent variables, these models were tested for multicollinearity. Multicollinearity can be potentially problematic for social learning theory by having damaging effects on regression outcomes. In particular, shared variance often happens with social learning models. If this issue is neglected, it can lead to misleading conclusions (Fox, 1981). However, in this study, multicollinearity was not a threat given inter-item correlations did not exceed .70. None of the variance inflation factors were near 5.0, providing more evidence that multicollinearity was not problematic for this study.

The first model was composed of "any lifetime NMPD use" and demographic control variables. A significant regression equation was found (F(8,260) = .3.333, p < .001), with an R² of .09. However, none of the demographic independent variables were found to be significant at the .05 level. The results of this model explain a very small amount of the variance, approximately 9%, for the lifetime use of illicit prescription drugs. A second OLS regression model was calculated for lifetime use of NMPD and social learning variables. The regression equation was significant (F(5,424) = 43.874, p < .000) with an R² of .34. We found support for three of our four hypotheses. The most robust significant predictor was differential association ($\beta = .25$), followed by imitation (i.e., friend's reactions) ($\beta = .26$) and differential reinforcement ($\beta = .20$). Definitions and our second imitation variable, how friends view use, were not significant in this equation. The results of this model explain about 34% of the variance for lifetime NMPD use. Results for this model suggest that peer associations, or having friends that participate in this behavior, make it more probable that an individual will engage in NMPD use.

A final model (Table 6, model 3), composed of all variables, was significant (F(13,238) = 11.639, p < .000), with an R² of .39. The most robust significant predictor was differential association ($\beta = .24$) followed by differential reinforcement ($\beta = .22$) and imitation (i.e., friend's reactions ($\beta = .22$). The other two social learning variables, friends view use (i.e., imitation) and definitions, were similarly not significant in this equation. In our final model, partial support for social learning theory was again found for three of the four aspects of social learning theory. In terms of our imitation variable, it appears a friend's reaction to

Variables	Model 1 Demographics	Model 2 Social learning	Model 3 Full model
Control Variables			
Gender (Female $= 1$)	-0.04		0.03
Race (White $= 1$)	-0.02		-0.05
Greek membership	-0.01		-0.20
Current residence	0.11		0.10
Overall GPA	-0.01		-0.07
Age	0.18		0.13
Income $(50 \text{ k} - 170 + \text{ k})$	0.11		-0.02
Year in school	-0.01		-0.03
Social Learning Variables			
Differential association		0.25***	0.24***
Definitions		0.03	0.01
Imitation (friend's reactions)		0.26***	0.22**
Imitation (friend's view of use)		-0.01	-0.02
Differential reinforcement		0.20***	0.22***
R^2	0.09	0.34	0.39

 Table 6

 Lifetime NMPD use, Standardized Beta Coefficients

Significance

*.05, ** .01, *** .001.

personal use is a more significant factor compared to a friend's general attitude toward NMPD use. The results of this model explain about 39% of the variance in lifetime NMPD use. As in previous models, peer associations, or having friends that participate in this behavior, made it more likely that an individual would also engage in NMPD use. We should note here that similar findings were found for past year NMPD use with differential association, differential reinforcement, and imitation increasing the reported use of NMPD (results not presented here but are available upon request). We should add that gender was significant for NMPD use in our past year model (also not presented here).

Discussion

The rates of lifetime, last-year, and last-month NMPD use were higher than anticipated, yet NMPD users were a minority in our sample of college students. This study reveals that 39.4% of the sample reported lifetime use of nonmedical prescription drugs, while 31% had reported use in the last year and 14.4% in the last month. The three most popular prescription drugs chosen by respondents were Vicodin (22.4%), Adderall (20.9%), and Ritalin (11.2%). The elevated rates of use reported here could be due to the general ease of overall accessibility given sales and production of these drugs have increased over the last ten years (Manchikanti, 2007). Perhaps students are more likely to be exposed to prescription drugs legitimately (through physician prescription) due to relative socio-economic privilege associated with college-student status. Furthermore, college students are more likely to be treated for ADHD compared to the general population, which may exacerbate risk for NMPD use (see Johnston, O'Malley, and Bachman, 2003).

The percentages for lifetime use of stimulants presented here are larger than what national studies of undergraduate students have estimated. Typically, these studies have

prevalence rates between 6.9% and 8.1% for lifetime use of stimulants (McCabe, Knight, Teter, and Weschler, 2005; Teter et al., 2005), while 26% of our sample reported lifetime recreational use of stimulants. The university chosen for this study could be a factor in the higher prevalence rate for stimulant use. A study by McCabe, Knight, Teter, and Wechsler (2005) revealed that prevalence rates differed by region (i.e., some universities' prevalence rates of stimulant use were as low as zero, while other schools had rates as high as 25%). The location of the university in which this study took place was in the North Central region of the USA, an area found to have higher rates of prescription drug use.

Another factor that could account for differences in prevalence rates could be due to our questionnaire design. The questionnaire listed approximately 30 well-known prescription drugs for students to choose from and an opportunity for students to write in the names of drugs not listed (eight students chose to use the open-ended category and of those most wrote a street name variation of the drug listed). Requiring respondents to choose drugs limited to "opiates," "stimulants," or "depressants" may yield conservative estimates. Using categorical options can limit the accuracy of substance abuse data collection instruments because respondents may not know what category the drug he or she took belonged to thus increasing the likelihood of skipping questions. Listing common names of prescription drugs may trigger the respondents' memory that he or she did in fact use a particular drug within the time frame under investigation.

In our research, the lifetime rate of nonmedical opiate use was slightly smaller compared to one national study by McCabe, Knight, Teter, and Wechsler (2005), which discovered that 33% of college students in that sample admitted to lifetime opiate use, while only 27.3% of this study's sample reported lifetime nonmedical use of opiates. In our study, the rate of lifetime depressant use was 12.5%. Other studies have reported rates of sedative and tranquilizer use at 6% and 8% respectively (McCabe, West, and Wechsler, 2007).

Several of the hypotheses for social learning theory and NMPD use were supported in this study. Our regression models provide some support for social learning theory as at least a partial explanation for NMPD use among college students (39% of the variance in lifetime NMPD use was explained in the social learning need). Results suggest that NMPD use is influenced by peer associations. This finding corresponds to other studies conducted on deviant behavior in general and substance abuse specifically (Akers, 1994; Akers, Krohn, Lanza-Kaduce, and Radosevich, 1979; Durkin et al., 2005; Lanza-Kaduce, Akers, Krohn, and Radosevich, 1984; Michaels and Miethe, 1989; Triplett and Payne, 2004; Winfree, Sellers, and Clason, 1993).

We recommend that future research designs include the analysis of family influence data in the interest of expanding upon social learning theory. Also, because we may have a conceptualization bias in that the respondent is related to as being the potential or actual focus of pressure — a unidirectional movement – future research should take bi-directionality into consideration because the individual can be a source of pressure on others. Of relevance, comprehensive information on social networks was not collected. However, information on Greek membership and off or on campus residence was collected. Future research should expand upon the implications for other types of social networks (e.g., clubs and other social organizations). The study of multidimensional, complex processes-involving perceptions, expectations, judgments, decision-making, and learning or not learning necessitates a range of adaptation and functioning skills, abilities, and energies. Data collection related to these issues allows for a more comprehensive sense of the person–unfortunately, these are data that were not collected and thus limit our study. Others who pursue social learning theory in treatment approaches should contend with competing paradigms such as "natural recovery" processes (Burman, 1997) and "rational addiction" (Becker and Murphy, 1988)

of the behavioral economists and the work of Kahneman (2003) who has documented the irrationality of human judgment. Finally, it is problematic that the sample was largely composed of white students. More research is needed to understand the dynamics of substance use in the context of racialized and gendered social structures given the significant variations found in substance use by gender (Wechsler, Dowdall, Maenner, Gledhill, and Lee, 1998; Wilsnack, Vogeltanz, Wilsnack, and Harris, 2000; Peralta, 2007) and race (Wallace and Bachman, 1991; Peralta, 2005; Hallman and Broman, 2009; Peralta and Steele, 2009). Bridging the literatures discussed here is promising for the development of substance use and misuse theory building and science-based treatment approaches.

Declaration of interest: The authors report no conflict of interest. The authors alone are responsible for the content and writing of this paper.



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References

Akers, R. (1994). A social learning theory. In F. T. Cullen (Ed.), *Criminological theory: past to present* (pp. 142–153). Los Angeles, CA: Roxbury.

Akers, R. (1998). *Social learning and social structure: a general theory of crime and deviance*. Boston: Northeastern University Press.

- Akers, R., Krohn, M. D., Lanza-Kaduce, L., Radosevich, M. (1979). Social learning and deviant behavior: a general theory. *American Sociological Review*, 44:636–655.
- Andes, F. U. (1994). The application of social learning theory to reduce alcohol and drug use. Unpublished doctoral dissertation, Yeshiva University, New York, NY.
- Becker, G. S., Murphy, K. M. (1988). A theory of rational addiction. *The Journal of Political Economy*, 4:675–700.
- Boyd, C. J., McCabe, S. E., Teter, C. J. (2006). Medical and non-medical use of prescription pain medication by youth in a Detroit-area public school district. *Drug and Alcohol Dependence*, 81:37–45.
- Burman, S. (1997). The challenge of sobriety: natural recovery without treatment and self-help groups. *Journal of Substance Abuse*, 9:41–61.
- Durkin, K. F., Wolfe, T. W., Clark, G. A. (2005). College students and binge drinking: an evaluation of social learning theory. *Sociological Spectrum*, 25:1–18.
- Ford, J. A. (2008a). Social learning theory and nonmedical prescription drug use among adolescents. Sociological Spectrum, 28:299–316.
- Ford, J. A. (2008b). Nonmedical prescription drug use and delinquency: an analysis with a national sample. *Journal of Drug Issues*, 38(2):493–516.
- Ford, J. A., Arrastia, M. C. (2008). Pill-poppers and dopers: a comparison of non-medical prescription drug use and illicit/street drug use among college students. *Addictive Behaviors*, 33:934–941.
- Ford, J. A., Rivera, F. L. (2008). Non-medical prescription drug use among Hispanics. *Journal of Drug Issues*, 38(1):285–310.
- Freeman, C. E. (2004). Trends in educational equity of girls & women. National Center for Education Statistics. *Education Statistics Quarterly*, 6(4):1–109.
- Fox, J. A. (1981). Methods in quantitative criminology. New York: Academic Press Inc.:104-105.
- Hall, K. M., Irwin, M., Bowman, K. A., Frankenberger, W., Jewett, D. C. (2005). Illicit use of prescribed stimulant medication among college students. *Journal of American College Health*, 53:167–174.
- Harrell, Z. A. T., Broman, C. L. (2009). Racial/ethnic differences in correlates of prescription drug misuse among young adults. *Drug and Alcohol Dependence*, 104:268–271.
- Herman-Stahl, M. A., Krebs, C. P., Kroutil, L. A., Heller, D. C. (2007). Risk and protective factors for methamphetamine use and nonmedical use of prescription stimulants among young adults aged 18–25. *Addictive Behavior*, 32:1003–1015.
- Hurwitz, W. (2005). The challenge of prescription drug misuse: a review and commentary. Forensic Pain Medicine Section. American Academy of Pain Medicine, 6:1526–2375.
- Johnston, L. D., O'Malley, P. M., Bachman, J. G. (2003). National survey results on drug use from the monitoring the future study, 1975–2002. Volume II College Students and Young Adults ages 19–40. (*NIH Publication No. 03-5376*). National Institute on Drug Abuse.
- Johnston, L. D., O'Malley, P. M., Bachman, J., Schulenburg, J. E. (2004). Monitoring the future national survey results on drug use, 1974–2003, vol.II. *College Students and Adults ages 19–45*. NIH Publication 04–5508. US Department of Health and Human Services.
- Kahneman, D. (2003). A psychological perspective on economics. *The American Economic Review*, 93(2):162–168.
- Kleinig, J., Einstein, S. (2006). Ethical challenges for intervening in drug use: policy, research and treatment issues. Huntsville TX: Office of International Criminal Justice.
- Kokkevi, A., Fotiou, A., Arapaki, A., Richardson, C. (2008). Prevalence, patterns, and correlates of tranquilizer and sedative use among European adolescents. *Journal of Adolescent Health*.
- Kokkevi, A., Fotiou, A., Richardson, C. (2007). Drug use in the general population of Greece over the last 20 years: results from nationwide household surveys. *European Addiction Research*, 13:167–176.
- Lanza-Kaduce, L., Akers, R., Krohn, M., Radosevich, M. (1984). Cessation of alcohol and drug use among adolescents: a social learning model. *Deviant Behavior*, 5:79–96.

- Leukefeld, C., McDonald, H. S., Mateyoke-Scrivener, A., Roberto, H., Walker, R., Webster, M., Garrity, T. (2005). Prescription drug use, health services utilization, and health problems in rural Appalachian Kentucky. *Journal of Drug Issues*, 35(3):631–644.
- Leukefeld, C., Walker, C., Havens, R., Tolbert, J. (2007). What does the community say: key informants perceptions of rural prescription drug use. *Journal of Drug Issues*, 37(3):503–524.
- McCabe, S. E., Teter, C. J., Boyd, C. J. (2005). Illicit use of prescription pain medication among college students. *Drug and Alcohol Dependence*, 77:34–47.
- McCabe, S. E., Knight, J. R., Teter, C. J., Wechsler, H. (2005a). Non-medical use of prescription stimulants among US college students: prevalence and correlates from a national survey. *Addictions*, 99:96–106.
- McCabe, S. E., Cranford, J. A., Boyd, C. J. (2006). The relationship between past-year drinking and non-medical use of prescription drugs: prevalence of co-occurrence in a national sample. *Drug* and Alcohol Dependence, 84:281–288.
- McCabe, S. E., Teter, C. J., Boyd, C. J. (2006). Medical use, illicit use, and diversion of abusable prescription drugs. *Journal of American College Health*, 54:269–278.
- McCabe, S. E., Teter, C. J. (2007). Drug use related problems among non-medical users of prescription stimulants: a web-based survey of college students from a Midwestern university. *Drug and Alcohol Dependence*, 91:69–76.
- McCabe, S. E., West, B., Morales, M., Cranford, J., Boyd, C. J. (2007). Does early onset of nonmedical use of prescription drugs predict subsequent prescription drug abuse and dependence? Results from a national study. *Addiction*, 102:1920–1930.
- McCabe, S. E., West, B., Wechsler, H. (2007). Trends and college-level characteristics associated with the non-medical use of prescription drugs among U.S. college students from 1993–2001. *Addiction*, 102:455–465.
- Michaels, J. W., Miethe, T. D. (1989). Applying theories of deviance to academic cheating. Social Science Quarterly, 70:870–885.
- Peralta, R. L. (2005). Race and the culture of college drinking: an analysis of white privilege on a college campus. In W. R. Palacios (Ed.), *Cocktails and dreams: an interpretive perspective on substance use* (pp. 127–141). Upper Saddle, NJ: Prentice Hall.
- Peralta, R. L. (2007). College alcohol use and the embodiment of hegemonic masculinity among white males. Sex Roles, 56:741–756.
- Peralta, R. L. and Steele, J. L. (2009). On drinking styles and race: A consideration of the sociostructrual determinants of alcohol use behavior. *Journal of Ethnicity in Substrance Abuse*, 8:146–162.
- Quintero, G., Peterson, J., Young, B. (2006). An exploratory study of socio-cultural factors contributing to prescription drug misuse among college students. *Journal of Drug Issues*, 36(4):903–932.
- SAMPSA (Substance Abuse and Mental Health Services Administration). (2006a). Non-medical users of pain relievers: characteristics of recent initiates: The NSDUH Report. Office of Applied Studies. http://www.oas.samhsa.gov/2k6/pain/pain.pdf. (accessed 19 Feb. 2008).
- SAMPSA (Substance Abuse and Mental Health Services Administration). (2006b). The NSDUH Report: Stimulant Use 2003. Office of Applied Studies. (accessed 19 Feb. 2008).
- Simoni-Wastila, L., Ritter, G., Strickler, G. (2004). Gender and other factors associated with nonmedical use of abusable prescription drugs. *Substance Use & Misuse*, 39:1–23.
- Simoni-Wastila, L., Strickler, G. (2004). Risk factors associated with problem use of prescription drugs. American Journal of Public Health, 94:266–288.
- Sutherland, E. H., Cressey, D. R. (1960). A theory of differential association. In F. T. Cullen (Ed.), *Criminological theory: past to present* (pp. 131–133). Los Angeles, CA : Roxbury Publishing Co.
- Teter, C. J., McCabe, S. E., Boyd, C. J., Guthrie, S. K. (2003). Illicit methylphenidate use in an undergraduate sample: prevalence and risk factors. *Pharmcotherapy*, 23:609–617.
- Teter, C. J., McCabe, S. E., Cranford, J. A., Boyd, C. J., Guthrie, S. K. (2005). Prevalence and motives for illicit use of prescription stimulants in an undergraduate student sample. *Journal of American College Health*, 53:253–262.

- Triplett, R., Payne, B. (2004). Problem solving as reinforcement in adolescent drug use: implications for theory and policy. *Journal of Criminal Justice*, 32:617–630.
- Valente, T. W., Gallaher, P., Mouttapa, M. (2004). Using social networks to understand and prevent substance use: a transdisciplinary perspective. *Substance Use and Misuse*, 39:1685–1712.
- Wallace, J. M., Bachman, J. G. (1991). Explaining racial/ethnic differences in adolescent drug use: the impact of background and lifestyle. *Social Problems*, 38:333–337.
- Wechsler, H., Dowdall, G. W., Maenner, G., Gledhill, J., Lee, H. (1998). Changes in binge drinking and related problems among American college students between 1993 and 1997: results from the Harvard school of public health college alcohol study. *Journal of American College Health*, 47:57–68.
- Wilsnack, R. W., Vogeltanz, N. D., Wilsnack, S. C., Harris, R. T. (2000). Gender differences in alcohol consumption and adverse drinking consequences: cross-cultural patterns. *Addiction*, 95:251–265.
- Winfree, L. T., Sellers, C., Clason, D. (1993). Social learning and adolescent deviance abstention: toward understanding the reasons for initiating, quitting and avoiding drugs. *Journal of Quantitative Criminology*, 9:101–125.

Appendix A

List of drug options available to respondents

Oxycodone	Dexedrine
Oxycontin (hillbilly heroin)	Ativan
Percodone	Valium
Oxycet	Librium
Percocet	Xanax
Darvon	Halcion
Propoxyphene	Amytal
Hydrocodone	Seconal
Vicodin	Phenobarbital
Lortab	Nembutal
Lorcet	Prescription diet pills
Codeine (Captain Cody)	(phentermine, adpex, merida, tenuate, didret
Fentanyl	xenical, Ionamin, Bontril, phendinnetrazine,
Meperidine	diethylpropion)
Demerol	Other (please list, even if you know only the street
Ritalin (smart drug)	name)
Concerta	
Adderall	
Methyphenidate	

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