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PRESCRIPTION DRUG MISUSE AMONG COLLEGE STUDENTS: AN
EXAMINATION OF SOCIOLOGICAL RISK FACTORS

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in the Department of Sociology
in the College of Sciences
at the University of Central Florida
Orlando, Florida

Summer Term
2012

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ABSTRACT

Prescription drug misuse (PDM), defined as use without a prescription or solely for the feeling or experience caused by the drug, has become a popular topic among substance use researchers. While the vast majority of studies on the topic tackle epidemiological questions surrounding PDM, there is a notable lack of studies that look specifically at risk factors rooted in sociological/criminological theories. The current research seeks to bridge this gap in the literature by examining theoretically based explanations for PDM among college students utilizing three criminological theories commonly applied to other forms of substance use: Social Learning Theory, Social Bonding/Control theory, and General Strain Theory. In addition, this study also seeks to examine differences in user types characterized by motives for misuse as they relate to predictors stemming from these theories of interest. Utilizing an independently collected sample of 841 college undergraduates from a large southern university, the findings show that nearly one in four students misused prescription drugs in the past semester. Motivations for PDM were primarily instrumental in nature, with very few respondents misusing solely for recreational purposes. Furthermore, social learning based risk factors could best account for PDM within the sample with partial and indirect supports also found for strain based risk factors as well. Implications of these findings as well as theoretical and practical applications are presented.

ACKNOWLEDGEMENTS

There are a lot of people who are responsible for the creation and completion of this work aside from its author. The influence, intended or not, that countless individuals have had on my life in a personal, professional, and collegial manner all have had a vicarious hand in this project. They are too many to name personally, but I will try to illustrate my gratitude to those who I feel deserve recognition here. My mother (to whom this document is dedicated) has been a constant driving force in my life. She always challenged me to do better, allowed me to make mistakes, and helped me learn from each and every one of them. My only wish is that I could show her how much she truly has made me the man and the scholar I am today, even though she couldn't tell you what a regression model even is. I also owe a debt of gratitude to the rest of my family. They say "it takes a village" and I feel I am certainly a poster child for that. Taking from each and every one of you the best lessons you provided me over the years and allowing that to help push me along played no small part in getting to this point. I know it felt like I was in school forever compared to the more traditional path many of you took, but I hope this reward at the end leaves you as proud as I am thankful.

To the countless friends and colleagues who made my experience a smooth and pleasurable one, I say thank you. These last few years have certainly been some of the most fun I never want to have again. To the naysayers who did not believe I "could not pass a comprehensive exam, let alone write a defensible dissertation" and to those who passively agreed, I provide to you this work as my retort. For those who stood by me and

never lost faith in my abilities as a scholar and professional, I hope this provides you with relief that your faith was well put. To the undergrads at the University of Michigan from 2001-2005, thank you for providing me with the idea for this dissertation. I cannot begin to express my gratitude to the wonderful faculty in the Department of Sociology at the University of Central Florida. You provided me with a good home for three years and did your best to train me to be the best. I hope one day I can live up to that potential.

Finally, I have to acknowledge my advisor, Jason Ford. Thanks for taking me under your wing these last few years and allowing me to learn from you. I'm not sure which I desire more: to be the scholar that you are, or to have the amazingly laid back demeanor that you do whilst being so accomplished. In either case, thanks for providing me with an academic path to follow. I hope that I can make you proud as well given all the investments you have made in my future career over the past few years.

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CHAPTER 1: INTRODUCTION

Prescription drug misuse (PDM), commonly defined as use of a drug without a prescription or solely for the feeling or experience caused by the drug, has become a popular topic among substance use researchers as demonstrated by the rise in publications on this trend over the past decade. Data from the 2009 National Survey on Drug Use and Health, a national survey of individuals aged 12 and older focusing on substance use and mental health, estimated that 21% of Americans had misused prescription drugs at some point in their lifetime (SAMHSA, 2010). Since 1993 the prevalence of PDM has more than doubled in the U.S., giving merit to much of the research attention that has been paid to the topic in recent years (SAMHSA, 1993; 2010). This illustrates how important it is to dutifully monitor emerging forms of substance use in order to gain insight into the dynamics of their use and characteristics of users. With roughly one in five individuals indicating misuse of prescription drugs, it is necessary to explore this form of substance use more closely. The added interest in PDM is evidenced by the more recent inclusion of items relating to PDM in national surveys such as Monitoring the Future, Harvard College Alcohol Study, and the National Survey on Drug Use and Health (Johnston et al., 2011; Wechsler et al., 2005; SAMHSA, 2010).

Research on PDM is also important given the potential negative health consequences associated with prescription drugs. According to the 2009 Drug Abuse Warning Network, a public health surveillance system that monitors drug-related visits to

emergency departments (ED), nearly 3.5 million drug-related ED visits were attributable to prescription drugs that year. More troubling is the 98% increase in the number of ED visits related to the misuse or abuse of prescription drugs between 2004 and 2009. The sharp increase in this period due to PDM occurred at the same time that ED visits for the misuse or abuse of other illicit drugs showed a slight decrease of 2% (SAMHSA, 2010a). These data highlight the fact that PDM has become a serious public health issue.

Current research on PDM concentrates primarily on prevalence and identifying correlates of misuse (McCabe et al. 2007; Johnston et al., 2011; SAMHSA 2010). General demographic profiles of users have been established including information regarding age, race and gender (Ford, 2009; McCabe et al., 2005; 2006; Ford, 2008; 2008a; Ford & Rivera, 2008; Ford & Arrastia, 2008; Harrell and Broman, 2009; Teter et al., 2006). In addition behavioral and personality correlates of PDM have been examined. Many of these, such as the use of alcohol and other drugs, have been shown to be risk factors for PDM (Ford, 2008; 2009; Ford & Schroeder, 2009; Ford & Arrastia, 2008; Harrell & Broman, 2009; McCabe et al., 2007; Arria et al., 2008; McCabe, 2005). Prescription drug diversion (Califano, 2004; McCabe et al., 2005; 2006; Friedman, 2006), motivations for use (Johnston & O'Malley, 1986; Low & Gendaszek, 2002; McCabe et al., 2007; Quintero et al., 2006; Teter et al., 2005; 2006; Barrett & Pihl, 2002), routes of administration (McCabe et al., 2007; Teter et al., 2006), and negative health consequences have also been investigated (Hernandez & Nelson, 2010; McCabe & Teter, 2007; Kroutil et al., 2006; SAMHSA, 2010a).

While the vast majority of these studies tackle epidemiological questions surrounding PDM, there is a notable gap in the literature regarding the applicability of theoretically based risk factors (Ford & Schroeder, 2009; Ford, 2009; Triplett & Payne, 2004; Peralta & Steele, 2010). Although a few studies have looked at motivations, examining PDM from a theoretical standpoint is a necessary first step in not only assessing the current problem, but also identifying correlates framed in a theoretical context. In doing so, it is essential that researchers examine the applicability of theories commonly used to explain other forms of substance use. The current research seeks to bridge this gap in the literature by examining theoretically based explanations for PDM among college students. Overall, there appears to be something about the “traditional college age” period (~18-24) and/or the college environment that promotes or facilitates certain types of risky behaviors. It is for this reason, that college students have been the subject of a great deal of research with regards to substance use (Johnston et al., 2007; Mustaine & Tewksbury, 2004; Weschler et al., 2002, Quintero et al, 2006).

The current research examines risk factors based in three sociological/criminological theories regarding their ability to explain PDM: social learning theory, social control theory, and general strain theory. These theories were selected because their principles have been frequently applied in the past to other forms of substance use (Akers et al, 1979; Akers & Cochran, 1985; Marcos et al., 1986; Paternoster & Mazerolle, 1994 Paternoster & Brame, 1997; Bahr et al., 1998; Piquero & Sealock, 2000; Rebellon, 2002). Consequently, it is fitting to utilize these theories in this case as their explanatory power has gone relatively untested regarding PDM. In doing

this, we can determine if risk factors based in these popular theories are able to assess the likelihood of PDM. To accomplish this, information on the topic was gathered, via survey, from undergraduate students at a large southern university. In addition to collecting basic information on demographic characteristics, social and behavioral correlates, the survey contained items derived from the aforementioned theoretical frameworks. Analyses of these data will determine which theory best can account for PDM among college students.

The overall contribution to the body of literature this study provides is three-fold. First, this study looks to use an independently collected sample to assess prevalence and correlates of PDM in a college student population. By doing so, this study will add to the growing literature concerning this specific type of substance use. As a relatively new trend in substance use among college students, compared to the likes of marijuana or alcohol, it is important to obtain an accurate understanding of the problem for prevention and policy development purposes. Second, this investigation will also contribute to the literature involving theoretically based examinations of various forms of substance use. As previously stated, PDM is not a form of substance use that has been subjected to intensive theoretical scrutiny. Because of this, it is relatively unknown whether theoretically based explanations for other forms of substance use hold true for PDM. This study will help to answer that very question. Third, an examination of user typologies will highlight differences between those who misuse prescription drugs based on varying motives, potentially providing useful practical applications for prevention efforts. An investigation of this nature will further highlight the utility of

sociological/criminological theory in its ability to explain substance use behaviors, thereby providing greater clarity as to how researchers should go about studying this phenomenon.

CHAPTER 2: LITERATURE REVIEW

College Students and Transitions into Adulthood

College itself represents a unique and transitional period in an individual's life. According to the National Center for Education Statistics (2011), in 2009 20.4 million 18-24 year olds in this country were enrolled in a 4-year college. This number represents nearly half all U.S. citizens in this age group. With this figure steadily rising over the past 40 years, and a 39% increase in undergraduate enrollment the last decade alone, it is evident that a growing number of young adults in this country are provided the opportunity to take part in the "college experience".

This experience can have both positive and negative aspects. On the one hand, many individuals are able to attain a good education, form lifelong bonds and friendships, and attain some direction for their future. On the other hand, the college experience brings various opportunities for risky behavior, such as substance use (Johnston, et al., 2007; Slutske et al., 2004; Slutske, 2005). In a social sense, this period of one's life comes with a normative understanding that experimentation and risk taking behavior will be present (Dworkin, 2005; Ravert, 2009). Studies focused on these phenomena have examined college student alcohol use (Weschler et al., 1995; 2003; Slutske, 2005; Slutske et al., 2004), illicit drug use (Gfroerer et al., 1997; Gledhill-Hoyt et al., 2000; White et al., 2006) and other risky behaviors including sexual practices (Cooper, 2002; Stanford et al., 1996) compared to non-college students in the same age group. The evidence shows that the college experience brings with it a set of social and situational circumstances that

can make behaviors such as these more likely to occur. Peer pressure, norm confusion, and lack of supervision in the college environment can all facilitate involvement in these types of risky behaviors.

While the college environment and the subsequent lifestyle can have an effect on the propensity for these types of behaviors, something can be said about the distinct developmental period that accompanies individuals of this age, independent of the college influence. To this end, Jeffrey Jensen Arnett (2000) coined the term “Emerging Adulthood” to refer to the period in one’s life where adolescence ends and adulthood begins. According to Arnett, this developmental period occurs in the 18-25 year old age window, or during the “traditional college years”. In this stage individuals are at a dynamic and transitional period in their development. They are free from the restraints of adolescence where they are still under the supervision of others (e.g. parents and teachers) but not yet at a point where they have settled into adult roles, responsibilities, and role requirements. Because of this, these individuals have more freedom in their choices and activities. Residential instability, relationship and job turnover all characterize this period. In addition, identity exploration is more apt to occur in this stage. Here, individuals attempt to find their niche regarding aspects such as employment/career, love, and worldview. While identity formation has been shown to begin in adolescence, it generally continues, is fine-tuned, and is not complete until well into one’s early twenties (Waterman, 1982; Montemayor et al., 1985; Valde, 1996).

This developmental period may help explain why college students engage in risky behaviors. Substance use, binge drinking, risky sexual and driving practices are all more

frequent among individuals in this age group (Johnston et al., 2007; Arnett, 1992). Sensation seeking and participation in risky behaviors can serve as a tool in which individuals use different avenues in the formation of their identity. Overall, in emerging adulthood, the lack of supervision combined with the absence of adult responsibilities creates opportunity for risky behaviors. With less at stake and little monitoring of their behavior, individuals are free to participate in acts that they may have been barred from in the past, and may not be able to do in the future. The desire to experience risky situations before one settles into adult roles and responsibilities have been linked with this period of development (Arnett, 1994). Studies have also shown a clear decline in such behaviors once marriage, family, and job responsibilities begin to come into the picture in one's later twenties (Arnett, 1992; Gardner & Steinberg, 2005). College students, therefore, present a unique population from which to study these behaviors. These individuals find themselves in an environment that encourages and facilitates risky behaviors while at the same time experiencing a naturally occurring developmental transition into the next phase of their life. The fact that this population is still growing serves to demonstrate the necessity for investigating the various behaviors and social dynamics of this group of individuals.

Prescription Drug Misuse

In recent years there has been a good deal of research on PDM, primarily on samples of adolescents and young adults, typically college-aged. To begin, researchers have been able to identify the demographic characteristics of individuals who misuse prescription drugs. Findings indicate that whites are more likely to report misuse than

members of other racial/ethnic groups (McCabe et al., 2006, 2006a; Ford, 2008, 2008a, 2009; Ford & Rivera, 2008; Ford & Arrastia, 2008; Harrell & Broman, 2009). Regarding gender, some evidence suggests that females may have higher rates of misuse than males (Simoni-Wastila et al. 2004; Sung et al. 2005; Matzger & Weisner, 2007; Ford & Schroeder, 2008), while other research on PDM identifies males to be at a higher risk for misuse (McCabe, 2005; McCabe et al., 2005; Kroutil et al., 2006; McCabe et al., 2006; Teter et al., 2006). This finding is notable, given that most research indicates that males are at greater risk for substance use than females. For age differences in PDM, research shows that young adults (18-25) display the highest proportion of lifetime, past year, and current use compared to other age groups (SAMHSA, 2011). Geography plays a factor as well, as studies find that those living in rural areas have a heightened risk for PDM (Inciardi & Goode, 2003; Davis et al., 2003; Leukefeld et al., 2005; Havens et al., 2007).

When looking at risk factors for use, there are a few that are consistent over numerous studies. Binge drinking, marijuana, and other drug use appear to be uniformly related to PDM regardless of demographic differences or research methodology (Ford, 2008; 2009; Ford & Schroeder, 2009; Ford & Arrastia, 2008; Harrell & Broman, 2009; McCabe et al., 2007). Several other individual factors demonstrate a relationship with heightened risk for PDM, or are characteristic of those who are currently misusing prescription drugs. These include depression and other negative affective states such as anger and anxiety that can lead to strain and subsequent PDM (Vegh, 2011; Ford & Schroeder, 2009). In addition, these same investigations also found a relationship between PDM and peer binge drinking and substance use. PDM has also been shown to

be higher among those without health insurance, who are sexually active, who self-rate their health status as fair or poor, and those who began PDM in either high school or college without a prescription (Becker et al., 2008; Ford & Arrasita, 2008; Ford & Rivera, 2008; Khosla et al., 2011; McCabe et al., 2006). Low levels of perceived harmfulness as well as heightened individual sensation seeking tendencies and other patterns of risky behavior are associated with greater risk for PDM (Arria et al., 2008; McCabe, 2005). Furthermore, when looking specifically at college students, there are several college level risk factors that appear to be important. Membership in a fraternity or sorority as well as living in a Greek house increases one's risk for PDM (McCabe et al., 2005). In addition, attendance at rural schools, a co-educational university, a non-historically black college or university, and universities located in the south or northeast are associated with higher levels of PDM (McCabe et al., 2007).

Another important issue related to PDM research is diversion, or the source of the prescription medication. McCabe & Boyd (2005) conducted, arguably, the most comprehensive examination of prescription drug diversion among college students. Their findings indicate that peers are the largest source of diversion, followed by family members. This study also found gender and racial differences with regard to source of diversion. Females are more likely to obtain prescription drugs from family members (in most cases their mother) than males. Furthermore whites were nearly twice as likely to obtain prescription drugs from peers compared to African Americans. Evidence also suggests that individuals with legitimate prescriptions for these drugs are often approached by their peers. McCabe et al. (2006) reported that over half of the college

students who had a legitimate prescription for stimulants reported being approached about selling, trading, or giving away their medication to others. Finally, research indicates a connection between how people obtain prescription drugs and how they use these drugs. Ford & Lacerenza (2011) found that PDM is more frequent when individuals purchase the drugs from a friend, relative, drug dealer, or stranger. Conversely, less frequent PDM is reported among those who were given drugs by a friend or relative. In regards to prescription drug source and other substance use, research shows that individuals who procure prescription medication from their peers report a higher frequency of heavy episodic drinking, marijuana use, alcohol and drug related problems, and concurrent use of prescription medication with alcohol and other drugs compared to those who obtain it from family or other sources (McCabe & Boyd, 2005). Reasons for this might include less supervision over use when obtaining prescription medication from peers, allowing one to use them in conjunction with other substances, or via non-traditional methods. Furthermore, misusing prescription drugs with peers, who can double as the source, might lead to risky use practices simply as a function of peer group norms. Conversely, when obtained through family or other conventional sources, there may be greater control over how, when and in what manner the drugs are used as a condition of the diversion. This accounts for more responsible use as well as the lack of co-ingestion with other substances when obtaining from these sources.

Regarding motives for misuse, there are, again, some commonalities in the literature. Johnston & O'Malley (1986) very broadly stated that the motivation for

misusing prescription medication is for the purposes of either gaining positive reinforcement from its use or to avoid various consequences via this action. Recent research operationalizes these reinforcements/consequences into motivations and found them to be relatively uniform between studies of PDM in general and regarding particular types of prescription drugs. Common motivations for misuse of prescription drugs include relaxation/euphoria/getting high, experimentation, relieving and controlling pain, aiding in sleep and losing weight (Low & Gendaszek, 2002; Teter et al., 2005; Quintero et al., 2006; McCabe et al., 2007). For some drugs there are focused effects that are desired (ex. opiates for pain control and alleviation). Among college students, the most common motivation to use painkillers is to relieve pain, with 63 percent of those sampled reporting this as their primary motivation (McCabe et al., 2007). This speaks to the instrumental nature of the drug in the sense that it can be misused, but for the intended socially acceptable effects rather than for recreational purposes or getting high.

One type of prescription drug in particular that gained a great deal of attention in recent years is prescription stimulants. These drugs, commonly referred to as study drugs, have an instrumental effect that aids individuals (students in particular) in achieving socially promoted goals such as good grades. Not surprisingly, stimulant misusers commonly cite improving their intellectual performance, increased alertness, and help studying as motivations for use of this drug (Babcock & Byrne, 2000; Low & Gendaszek, 2002; Teter et al., 2005). Research indicates that there are gender differences in motivations for misuse of prescription stimulants. Men are significantly more likely to report misusing prescription stimulants to counteract the effects of other drugs or simply

indicate they were experimenting with the substance. Women, on the other hand are more likely to report that they misuse prescription stimulants in an effort to lose weight, which is still an instrumental effect of the drug (Teter et al., 2006). With regards to social alcohol use, reducing drunkenness is a motivation cited by both males and females, particularly in college, as a reason for prescription stimulant misuse (Barrett & Pihl, 2002). Among college students, this motivation can be very dangerous due to the sheer prevalence of alcohol use among this population (Weschler, 2005). Reducing drunkenness via the use of prescription stimulants can lead to further excesses in alcohol use, and also cause adverse reactions due to the co-ingestion of the two substances.

Motivations for PDM appear to be connected to other forms of substance abuse as well. Research shows that those who cite their primary motivation for PDM as getting high are at a greater risk for overall substance abuse compared to individuals who report motivations related to self-treatment (Boyd et al., 2006; McCabe et al., 2007; McCabe et al., 2009). The research on motivations highlights the need to distinguish PDM based on motives. Clearly, an individual who uses prescription drugs to self-treat pain (instrumental use) is different than an individual who uses the same type of prescription drug to get high (recreational use).

Among prescription drug misusers, there are various routes of administration that go beyond simple ingestion of the drug, in many cases altering the effect of the substance. Crushing pills for ingestion intranasally, smoking the substances either alone or in conjunction with another drug, and dissolving the pills for intravenous injection are other methods by which individuals can use these substances. While oral ingestion still

appears to be the favored route of administration, most likely due to its convenience, rates of intranasal misuse also are concerning due to the negative health consequences stemming from this method (McCabe et al., 2007). For prescription opioid misuse among college students, 13% indicated lifetime intranasal misuse. This number is higher among males (15.7%) than females (10.5%). Smoking these drugs either by themselves or in conjunction with another substance was indicated by 4% of college students, with males once again using this non-traditional route of administration at higher rates than females. Overall, over 97% of opioid misusers indicated lifetime oral ingestion (McCabe et al., 2007). For prescription stimulants, the numbers are similar with 95% indicating oral misuse. However, nearly 40% of college misusers have indicated snorting/intranasal use as a method of ingestion in their lifetime. Smoking stimulants also has a slightly higher rate of use (5.6%) than opioids (Teter et al., 2006). A reason why non-traditional routes of administration are dangerous is that it can change the magnitude of the effects of the drugs. Many prescription substances, which are intended to be taken orally, are meant for a slow onset and release of the medication throughout the body. Intranasal and intravenous use, as well as smoking alters the intended onset of the drug which can lead to adverse health consequences (McCabe et al., 2007).

As previously stated, there is an association between PDM and the use of alcohol and other drug use. Moving beyond the simple correlation between PDM and alcohol and other drug use, a few studies have examined polydrug use more thoroughly. Research has demonstrated that both rates of concurrent polydrug use (using two or more different types of substances in a broad time period) and simultaneous polydrug use

(using two or more substances at the same time) ought to raise concern due to the synergistic and antagonistic effects that prescription drugs have when combined with other substances. Among college students, 5.2% report past year concurrent polydrug use involving prescription drugs and alcohol while an even higher 6.9% report simultaneous use of prescription drugs and alcohol (McCabe et al., 2006b). When delineating these findings by type of prescription drug, opioids are cited as having the highest rate of simultaneous and concurrent use with alcohol, followed by prescription stimulants and sedatives. In addition, this same investigation found that whites, males, and those who are in middle and high school run a greater risk for concurrent and simultaneous use compared to other demographic groups and college students. Furthermore, Shillington et al. (2006) echoed these results, finding alcohol to be the substance with the highest simultaneous use with prescription stimulants. In addition, this study found that 86% of past year misusers of stimulants reported alcohol use in the same time frame along with 70% indicating marijuana use as well. McCabe et al. (2007) examined the effect of using two or more types of prescription drugs in conjunction, finding not only a significant proportion of individuals who misuse multiple prescription substances at the same time, but also that use of two or more simultaneously raises one's odds of abuse and dependence.

The misuse of prescription drugs has been thrust into the spotlight in recent years because of the potential negative health consequences, and the rising number of health related incidents related to PDM. Records from emergency departments (ED) in 2009 across the United States show that 77% of all drug related visits to hospital ED were

attributable to prescription drugs (SAMHSA, 2010a). More troubling is that ED visits for PDM in conjunction with alcohol, illicit drugs, or both has risen significantly over the past decade and that this trend represents a potentially more dangerous health concern with regards to PDM (Hernandez & Nelson, 2010). In addition, there is some research on PDM and abuse/dependence. A few studies have attempted to identify negative consequences associated with PDM by giving survey respondents substance abuse screening tests. Findings demonstrate that those who misuse prescription drugs are at a significantly higher risk of experiencing three or more of the negative effects listed in the Drug Abuse Screening Test (Skinner, 1982) in the last year. This metric is a 10 item scale that looks at the social and health consequences of substance use. Those who are polydrug users with prescription stimulants or opioids, or who choose non-traditional routes of administration are also more likely to experience health consequences. Further, the greater number of motivations for PDM one has, the higher their score on the DAST-10. A greater number of motivations for PDM is also related to an elevated risk for substance abuse and dependence in general, especially when the motive is recreational in nature (Boyd, et al., 2006; McCabe & Teter, 2007; McCabe et al., 2007; McCabe, Boyd, & Young, 2007; McCabe et al., 2006; McCabe et al., 2009).

Overall, there is a notable lack of evidence regarding user typologies for PDM. Establishing a set of criteria that differentiates individuals who misuse prescription drugs in different ways, could help researchers better understand the dynamics of, and motivations for their misuse. McCabe et al. (2009) attempted to conquer this very problem, separating individuals into four distinct groups: (1) nonusers, (2) those who use

for self-treatment, (3) those who use for recreational purposes, and (4) those who have mixed reasons for their PDM. For all PDM, they found that the vast majority of those surveyed (80%) were non-users. Of the remaining 20% who had misused prescription medication in their lifetime, 13% were classified as recreational, 39% as self-treatment, and 48% as having mixed motivations for use. For pain and sleeping medications, self-treatment is given as the most common reason for misuse. For stimulants, mixed reasons were most common while sedatives were used primarily for recreational purposes. Results from this study showed that those who misuse for self-treatment used for the drug's intended purpose and used common routes of administration while abstaining from simultaneous use with alcohol or other drugs. These individuals are also less likely to be classified as abusers. Recreational users were more concerned with the side effects of the drugs and were more likely to use in conjunction with other substances and have greater health related consequences due to their misuse. Furthermore, more women were classified as self-treating, while men comprised the majority of those in recreational and mixed motivation subgroups. Additionally, black respondents reported the highest levels of self-treatment motivations for PDM and the lowest levels of recreational or mixed motivations.

Martin Hall (2009) attempted to identify subtypes of PDM, focusing specifically on sedative misuse among adolescents. Using a latent profile analysis, his investigation yielded three distinct classes of individuals. The first class, comprising the majority of users in his study were infrequent users of sedative and other prescription drugs, displayed low levels of psychiatric problems, substance use problems and behavioral

issues, as well as reported low levels of depression and anxiety. The second class he identified, the smallest in proportion of the three, reported the highest severity of anxiety, psychiatric symptoms and antisocial behavior. This group is considered the self-treatment group and was more common among females. The final class is classified as mixed motive subtype comprised of moderately troubled individuals displaying self-treatment motivations as well as impulsivity and other substance use patterns suggesting recreational motives as well.

Wu et al. (2008) identified a minimum of two distinct subgroups of adolescent and young adult misusers of prescription painkillers. The first group is classified as misuse for self-treatment, based primarily on their motivations for use, and low frequency of alcohol and other drug use outside of misusing prescription painkillers. The second group of users displayed trends of misuse that are associated with polydrug consumption and indicated at least the current use of two or more other substances. The conclusion that is drawn from this typological dichotomy is that the use of, or abstinence from other substances can play a heavy factor in classifying subtypes of PDM.

Generating typologies for PDM is a new and relatively undeveloped endeavor. Overall, the classification of those who use prescription drugs into various types based on factors such as motives, routes of administration and individual level traits can allow researchers and practitioners to better identify those who would be at risk for this type of substance use. This research on typologies recognizes that people misuse prescription drugs for a variety of different reasons. Future studies on the topic need to recognize that

not all of these individuals are the same, and must consider the differences in instrumental/self-treatment and recreational users in their investigations.

Most of the investigations into this particular substance use phenomena are epidemiological in nature with the goal of assessing prevalence, correlates, trends, and risk factors. However, there are a handful of studies that look at PDM in a theoretical context in an attempt to frame this type of substance use in a more organized fashion. When applying Agnew's general strain theory to the misuse of prescription stimulants, Ford & Schroeder (2009) found that academic strain lead to higher levels of depression, which, in turn, lead to higher rates of stimulant misuse. In this investigation, academic strain was measured as a disjunction between academic aspirations and outcomes operationalized by self-rated importance of academic work and grade point average. A single measure was then formed using these items to identify respondents as achievers or underachievers. Of notability is that the same strain-use relationship did not hold when examined in the context of hard drug use as a coping measure. This speaks to the potential utility of prescription stimulants in their ability to reduce, in particular, forms of academic strain.

Regarding social bonding/control theory, Ford (2009) found that school bonds were negatively associated with all types of prescription drug misuse with the exception of stimulants. In this study, school bonds were a scaled measure of five items: like going to school, school work is meaningful, things learned at school are important, classes are interesting and teachers tell you that you are doing good work. Furthermore, strong family bonds appeared to act as a protective factor, as the same study displayed a

negative relationship between family bonds and misuse of all prescription medication except sedatives. The items relating to family bonds used in this study included parents check if you have done homework, parents help you with homework, parents make you do chores, parents limit the amount of TV you watch, parents limit the amount of time you go out with friends on a school night, parents let you know that you are doing a good job, and parents tell you they are proud of something you have done. Furthermore, Ford & Arrastia (2008) incorporated bonding items in a study of college students. Their findings indicate that lack of faculty attachment, little importance placed on religious beliefs, and less time spent involved in conventional activities were associated with college student PDM.

Ford (2008) also examined PDM among adolescents in the context of social learning theory, focusing on differential association (peer substance use), definitions (attitudes toward substance use), and differential reinforcement (close friend and parental reactions to substance use). For any PDM as well as misuse of pain relievers, differential association, definitions favorable towards substance use, and each type of reinforcement of substance use was significantly related to a higher risk of PDM. The adolescents included in this study were found to have a higher risk for stimulant misuse with definitions favorable toward substance use and parental reinforcement. Tranquilizer misuse is associated with peer substance use, as well as close friend and parental reactions favorable to substance use. Additionally, the aforementioned study by Ford & Arrastia (2008) also includes social learning concepts operationalized as the number of close friends, the amount of time one spends socializing with their friends, and perceived

alcohol norms. Here, a greater amount of time spent socializing and perceived alcohol norms geared toward more drinking are associated with PDM.

Peralta & Steele (2010) find partial support for social learning theory in its ability to explain PDM as well, operationalizing each of the four components of social learning theory (differential association, definitions, differential reinforcement, and imitation) based on measures from previous studies. The focus in this investigation was primarily on peers as they are the primary agents of socialization among college students. The items measuring differential association, definitions, and imitations centered on these individuals in the respondent's life. Reinforcement is measured using both social and non-social costs and benefits of PDM. As hypothesized, this study concludes that peer associations do influence PDM among college students. While these studies certainly are a good first step toward the theoretical investigation of PDM, further examinations are still warranted given the growing trends and health consequences of this behavior. Next, I will provide a thorough review of the theoretical literature and the ability of the theories examined in this study in their ability to explain both substance use and delinquency as a whole.

Social Learning Theory

Akers' social learning theory is rooted in Sutherland's differential association (1947) and borrows elements from behavioral psychology, specifically, operant conditioning. Differential association serves as one of the four components of the social learning theory along with definitions, differential reinforcement and imitation (Akers et al., 1979; Akers, 1985; Akers, 1998). While there have not been widespread tests of

these principles with regards to PDM, they have been used to look at other types of substance use (Kandel, Kessler, & Margulies, 1978; Akers et al., 1979; Akers & Cochran, 1985; Marcos et al., 1986; Bailey & Hubbard, 1990; Paternoster & Brame, 1997; Spooner, 1999; Ellickson & Morton, 1999; Rebellon, 2002; Warr, 2002).

The first component of social learning theory, differential association, is adapted from Sutherland's (1947) theory. He stated that criminal behavior, like any other behavioral pattern is learned through interaction with others. Like all behaviors, learning criminal or deviant behavioral patterns involves learning the motivations, rationalizations, and attitudes that are behind them. In addition to being exposed to the behavioral patterns of significant others, an individual is also exposed to definitions that others have toward the behavior as normative or deviant in nature. Criminal acts are the result of exposure to criminal behaviors of others and subsequent learning of these behaviors as well as adopting a definition of the behavior that makes the resulting acts favorable to the individual. According to this theory, associations with others vary in priority, frequency, duration, and intensity. Regarding these very concepts, associations that occur earlier in a person's life, occur most often, are long(er) lasting, and involve significant others will have a greater influence over one's behavior.

Definitions are the meanings that one places on various behaviors as right or wrong. These can be termed as general definitions or specific definitions. General definitions reflect the whole of an individual's belief to be law abiding based on their own normative beliefs and values. Specific definitions, conversely, focus on single act or set of acts (Akers et al., 1979). Definitions, as a whole, serve as discriminative stimuli

that indicate how an individual is to act in a given situation or set of circumstances. These indicators can be law abiding (normative), or law violating (deviant) in nature. A weak adherence to normative definitions of behavior is a sufficient reason for criminal behavior to occur. In addition, a strong conviction toward deviant behavior also sets the stage from criminal acts to result. Definitions can also serve to excuse or justify one's behavior (Sykes & Matza, 1957). Just as endorsing definitions that favor delinquency can lead to behaviors based on those definitions, the attitudes and definitions toward an act that justifies its occurrence or neutralize the idea of culpability and harm can also increase the chances of delinquent behavior.

Differential reinforcement reflects the conditioning portion of the learning process. It is the process of weighing various rewards and punishments that can result from committing an act. Positive reinforcement relates to rewards. Here the rewards one receives for acting in a particular fashion serve to strengthen the behavior. Negative reinforcement relates to the punishments. Behavior is strengthened, in this case, when an individual acts in a certain manner as a means of avoiding punishment that could be levied due to their actions. The consequences of this action serve as the driving force to act initially (Akers, 1977). These rewards and punishments are classified as social and non-social reinforcers. Social reinforcers are rewards or punishments for behaviors, the source of which are persons or institutions that hold influence on the individual. Non-social reinforcers can be the experienced or anticipated effects of an act, such as substance use (Akers et al., 1979). For both types of reinforcement, when the odds of reward or gaining approval are higher, so too are the odds that the act will be committed.

Another motivating factor to behave or act in a particular manner is the ability to avoid negative stimuli, such as outward disapproval or loss of something valued. With this reasoning, if the consequences resulting from an act, such as risk of punishment or legal penalty, are seen as too high to risk, then that person will be less likely to commit the act (Akers & Sellers, 2004). According to Akers et al. (1979) differential reinforcement is the most important and most influential of the four aspects of the theory.

Imitation, also referred to as modeling, is the fourth and final concept of social learning theory (Akers, 1977). Imitation is used to explain the initiation into patterns of deviant behavior. Primary associations, such as parents and peers, are an important factor as they relate to imitation because it is these individuals are most likely to be role models for behavior. The more direct the association that one has with the model being imitated, the more likely the behavior is to be copied. That is not to say however that imitation cannot occur through vicarious means as well through a disconnected medium (i.e. imitating media portrayals of behavior). The behavior being modeled is also important as one not only needs to have the motivation to personally demonstrate the behavior they are exposed to, but also require the cognitive and practical ability to mimic it as they see it. Finally, consequences of such imitated behaviors (akin to reinforcement) play a factor. If others are rewarded or positively reinforced for their actions, it makes those behaviors more enticing to imitate. If these behaviors result in punishment to the models that would be imitated, it is less likely that the behaviors would be copied as the individual would want to avoid the same consequences for similar actions (Bandura, 1977; Akers, 1977). Overall, imitation can be an attempt at reward or positive reinforcement through these

mimicking actions. However, once the reward (or lack of punishment) is initially attained, reinforcement becomes the dominant factor in continued behavior.

Research on social learning theory has found that the single best predictor of delinquency is delinquent peers (Marcos et al., 1986; Spooner, 1999; Warr, 2002). Drug and alcohol using peers, specifically, have been cited as the most common risk factor for one's own substance use (Kandel, 1978; Biddle, Bank & Marlin, 1980; Lang, 1985; Newcomb et al, 1986; Barnes & Welte, 1986; Oetting & Beau, 1987; Kandel & Andrews, 1987; Newcomb & Bentler, 1989; Agnello-Linden, 1991; Hawkins et al., 1997), with general peer delinquency (Dishion, Capaldi, Spracklen, & Li, 1995; Bates & Labouvie, 1997) and number of delinquent peers (Haynie, 2002) also acting as risk factors. Peer attitudes favorable toward delinquent behavior, have also been correlated with higher substance use (Kandel, Kessler, & Margulies, 1978; Marcos et al., 1986; Bailey & Hubbard, 1990; Paternoster & Brame, 1997; Piquero & Sealock, 2000; Rebellon, 2002) as has greater availability of illicit substances through drug using peers (Gorsuch & Butler, 1976; Newcomb & Felix-Ortiz, 1992; Ellickson & Morton, 1999).

The family unit also exerts a significant influence on an adolescent's behavior. Here, elements of social learning work through family interactions and can have significant associations with one's law-abiding or law-breaking behavior (Patterson, 1975). For this reason, it has been shown that those with substance using parents are at a greater risk to become involved in substance use themselves (Gorsuch et al., 1976; Kandel et al., 1978; Lang, 1985; Swadi, 1989; ; Barrett, 1990; Hawkins et al., 1997). Holding positive definitions toward substance use is also related to a higher propensity

for use among individuals, a factor that can be mediated heavily by aforementioned peer associations (Smith & Fogg, 1978; Kandel et al., 1978; Krosnick & Judd, 1982; Hawkins et al., 1997; Ellickson & Morton, 1999). The effect of imitation has also been illustrated in studies measuring the effects of primary associations on an individual's use of cigarettes, marijuana, alcohol and narcotics (Kandel et al., 1978; Huba et al, 1980).

Overall, PDM would be most likely among students who have substance using peers or specifically peers who participate in PDM. Furthermore, the definitions one has toward PDM will also play a factor in deciding to misuse prescription drugs. This not only applies for recreational motivations for PDM, but also instrumental ones as well. The goals of instrumental use can be to achieve things that are commonly praised or normatively valued. This fact can be used to make a person's otherwise delinquent PDM seem justifiable or defensible (Whitley, 1998). In addition to them directly forming definitions favorable to PDM, they may also develop neutralizations of the harm being caused by their actions, so long as the eventual goal is seen as conventional and socially promoted. Peers would again, certainly, have a significant influence on the pro or anti-PDM definitions that one internalizes.

Imitation of those closest to a student, in this case their peers, can initiate someone into the practice of PDM, which can be exacerbated by substance using peers and the reinforcement they receive. This reinforcement, both positive and negative, would have a significant effect on their propensity for PDM. Non-social reinforcement such as the favorable effects of the drugs or social reinforcement in the form of greater goal achievement while using can be factors that heighten one's risk of PDM. In addition,

a student may wish to better fit into a certain peer group or social setting. If these groups engage in PDM, the student may partake as well in order to gain favor. Once this favor is gained, it can become less about attempting to fit in and mimic those in the group and more about maintaining the praise and adulation (positive reinforcement) that keeps the student in this pattern of deviance. Again, peers play the most major role in all aspects of social learning theory, especially within a college student population. As such, an inquiry into one's friendship dynamics and peer characteristics is necessary to any investigation such as this.

Social Control Theory

Hirschi's social control theory (1969) argues that individuals are born with an inclination to break rules and deviate from normative behavioral patterns. This theory is amotivational in nature because it does not explain what the mechanisms are that motivate people to be delinquent, only that our bonds to convention keep deviant behavior in check. When the bonds to conventional persons and institutions are strong, conformity to the norm is the result. However, when the bonds that one has to these societal elements are weak or broken, individuals remain free to break the rules and deviate. Hirschi outlined four components to the social bond: attachment, commitment, involvement, and belief.

Attachment refers to the affective ties to significant others that constrain behavior (Hirschi, 1969). The strength of this relationship affects how a person may choose to act due to the emotional bond they have formed with other persons (parents, peers, romantic partners, etc.) Because of this bond, one will be more likely to care how this other person

views them, and subsequently, their behavior (Hirschi, 2003). Here, a person would be less likely to commit acts of deviance as their actions may be seen in a negative light by those with whom they have the attachment. Among adolescents, parents and/or family can signify the most significant and influential attachment one can have. However, among young adults and college students, who have typically distanced themselves, both emotionally and physically, from their parents and family, the most influential attachment would most likely be peers and romantic partners (Haynie, 2003; Haynie et al., 2005).

Commitment is the next component of the social bond. This element represents an investment in conventional activities and goals that creates a stake in conformity (Hirschi, 1969). This not only represents a commitment to the activities, but also to the outcomes that they will produce. The outcomes in this case are conventional, socially promoted, and can be jeopardized by deviant behavior. As such, individuals who are more committed to conventional activities have more to lose as they place greater value on the outcomes of where this commitment will lead. A greater level of commitment to a goal will lead to a greater stake on law abiding behavior as not to jeopardize this (Burton et al., 1995). In addition, one can not only be committed to future goals, plans, and aspirations, but also to previous achievements and accumulations (i.e. reputation and wealth). Law violating behavior can result in the forfeiture of these elements of value, and thus, those committed to maintaining these conventional achievements will avoid behavior that would put these in danger (Hirschi, 1969).

Involvement is the third element of the social bond. It represents participation in conventional activities. In these conventional activities they not only are assumedly

exhibiting socially promoted, non-deviant behaviors, but also are being exposed to individuals who would, actively or passively, serve to steer them away from deviant behavior. The rationale behind this component of the social bond is that those who spend more time participating in conventional activities have less free time to commit acts of delinquency, and subsequently also spend more time being monitored by conventional individuals (Hirschi, 1969). Substantively, commitment and involvement are very similar concepts, and in some cases, difficult to disentangle. Because of this, there have been some cases where researchers have elected to measure this overlap as a single construct as opposed to separate concepts (Krohn & Massey, 1980; Akers & Lee, 1999).

The final element of the social bond, belief, is an internalization of societal rules and values. This can be facilitated through all of the concepts related to this theory. As such, it is considered to be a lesser component of the social bond. The belief component in social control theory simply demonstrates a devotion to conventional values and norms in society and the will to behave accordingly (Hirschi, 1969). The bonds formed with other people and institutions can also help instill these values in the person. The stronger the bond, the more likely one is to adopt the conventional belief structure being conveyed.

Empirical support is demonstrated for all aspects of the social bond, both in its relationship to substance use and to delinquency in general. Hirschi (1969) posits that a strong parent-adolescent bond can decrease the likelihood of participating in acts of delinquency, such as drug use. Previous investigations have shown one's attachment to their parents to be directly related to lower levels of substance use among adolescents

(Waitrowski, Griswold, & Roberts, 1981; Hoffman & Johnson, 1998; Bell, Forthun, & Sun, 2000; Gerra, et al., 2004). Additionally, attachment to parents has an indirect effect on substance use that is mediated by influence it has on other types of bonds, such as those to education, religion and peers (Marcos et al., 1986; Bahr et al., 1998; Urberg, Luo, Pilgrim, & Degirmencioglu, 2004). This bond is also associated with household makeup and parental monitoring (Hirschi, 1995) as delinquent acts among adolescents are least prevalent in homes featuring two biological parents (Rankin & Kern, 1994; Neher & Short, 1998; Hoffman & Johnson, 1998).

Educational commitment is another important bond one can have and is applicable to this investigation in particular. The stronger the commitment to one's schooling and the present and future goals that it represents, the less likely one would be to participate in acts of deviance for fear that they would jeopardize the investment they have made (Hirschi, 1969). Regarding education, school bonding displays an association with lower levels of delinquent behavior, including substance use (Simons-Morton, Crump, Haynie, & Saylor, 1999; Sale, Sambrano, Springer, & Turner, 2003). In a similar fashion, studies show lower levels of educational bonding and commitment to one's school to be correlated with higher levels of substance use (Brook, Brook, Gordon, Whiteman, & Cohen, 1990; Hawkins, Catalano, & Miller, 1992). Involvement with school and other education based endeavors, a conventional activity, is also associated with lower levels of delinquency, assumedly due to less time available to devote to acts of deviance (Wiatrowski et al., 1981).

For social control in general, it is clear that parental bonding can set the tone for one's behavior in college, and subsequently their risk for PDM. Once in college however, peers become the primary agents of attachment. Hirschi (1969) states that peer attachment is not necessarily conducive to delinquent behavior. With this understanding, it is the nature of the peers to which one is attached, and not just the idea of attachment that will play a role in one's PDM. If attached to conventional peers, conventional behavior would result, which would lower the likelihood for PDM. If attached to delinquent peers, presumably this risk of delinquency would be greater as not to jeopardize this attachment. Commitment to school/education, something seemingly important to those who are invested in a college education follows a similar path in that one may not want to jeopardize their commitment to education with substance use. Involvement with school or other conventional activities can reduce free time one has to use drugs or even associate with delinquent peers, thereby reducing the likelihood of PDM. Similarly, those with strong convictions against substance use, regardless of the motivations and reasons for it, would be less likely to misuse prescription drugs.

These social control claims are not met without challenge, which partially represents the exploratory nature of this study as it relates to PDM. First, there is a caveat regarding the nature of delinquent peer bonds that needs to be addressed. Hirschi (1969) stated that delinquents develop "cold and brittle" relationships with other delinquents, labeled as such due to the lack of intimacy in them. Simply stated, the influence of this attachment as a social bond would not be as strong among delinquents, which would lower one's likelihood for PDM. Next, a contradiction to the commitment-

delinquency relationship can arise as well. Previously cited studies have examined motivations for PDM and found them to be instrumental as well as recreational. Many of the instrumental motivations were directly or indirectly related to enhancing academic performance. In a college population, students might turn to PDM in the form of study drugs when it can serve the purpose of enhancing their academic performance and help them meet their goals. Here, commitment to a conventional goal may lead individuals to deviant means in which to accomplish the goal. Both of these potential discrepancies regarding peer attachment and educational commitment will be examined in this investigation. Given the fact that control theory has primarily been tested using adolescent populations, most claims regarding the relationship of bonding concepts to acts of delinquency have been drawn from this group. This study not only tests the concepts of control theory as it relates to PDM, but also demonstrates the degree to which this theory supports or deviates from previous findings on the theory using an older sample that differs in many key aspects from adolescent populations.

General Strain Theory

Robert Agnew's General Strain Theory is a modern revision of classical strain theories which concentrated primarily on an individual's inability to attain monetary success, socially and culturally promoted goals, and, overall the "American Dream" (Merton, 1938; Cohen, 1955; Cloward & Ohlin, 1960). During the latter part of the 20th century, strain theories were surpassed in utility by other explanations of delinquency that centered more on learning elements and agents of social control (Hirschi, 1969; Akers et al., 1979). To remedy this Agnew re-examined the notion that monetary success was the

primary goal of all delinquents and therefore the instrumental goal of their behavior (Agnew, 1983). Among youth, he went on to identify a series of goals that were more applicable to younger populations. These included academic and athletic success and well as achievement in one's social circle (Agnew, 1984). The belief behind this was that those who found difficulty or could not achieve these goals would be more likely to be delinquent.

Agnew further added to this revision by including the concept of strain in the form of the blocking of pain-avoidance behavior (Agnew, 1985). This notion finds individuals in a situation where they are trying to achieve socially promoted goals in a set of circumstances which causes them pain, from which they are unable to escape. He noted two ways in which this type of strain can result in delinquency. The first is delinquency in order to avoid the adverse situation. The second is a reactionary form of delinquency in which the individual behaves in a certain way in order to lash out against the circumstance or individual causing them strain.

Agnew (1992) made what would be his most drastic and empirically accepted revision to strain theory by incorporating the concept of negative affect based on adverse situations into the idea of strain. Negative affective states typically occur through negative relationship with others and manifest themselves in anger, depression or other related negative emotions. In this effort he identified three ways in which strain can occur: the failure to achieve positively valued goals, the removal of positively valued stimuli, and the confrontation of negative stimuli. The rationale behind these assertions is that strain is related to delinquency via negative emotions (affect).

The first type of strain constitutes a failure to achieve positively valued goals. This form is the most complicated, and as such, has three subtypes of its own (Agnew, 1992). The first, reflecting previous conceptions of strain, is the gap between aspirations and expectations. This relates closest with the idea of the “American Dream” and unequal access by all individuals to achieve it. This causes individuals to begrudgingly accept their positions/status in society after recognizing omnipresent personal or institutional barriers that will block their goal achievement. The second type is a gap between expectations and real world achievements. Failing to meet expectations can lead to negative emotions such as anger, resentment, and depression. The third type in this category is the discrepancy between what is a just or equitable outcome and what the outcome actually is. Here, we see reward and achievement comparisons to others around the individual. Strain results from perceiving the outcome as unfair in the context of the effort that other put forth compared to those who received a different, more preferential outcome. Strain brought on by this belief leads individuals to truncate their efforts for achieving positively valued goals if they feel an equitable and satisfying outcome cannot or will not occur. Agnew also stressed that, unlike previous forms of proposed strain, a positively valued goal in this case may not necessarily constitute money or some form of monetary gain; it can come from goals related to school, athletic, or social achievements. These types of successes/achievements relate more closely with the population that is the focus of this study.

The second type of strain is removal of positively valued stimuli. Agnew suggests this occurs primarily in adolescence and the loss can produce anomie feelings

due to the change it elicits. Examples of this would include a death of a loved one, a romantic breakup, a geographical move, or any significant social change that can befall an individual and lead to anger, frustration or resentment.

Third, Agnew states that there is a confrontation with negative stimuli. Here an individual is forced into deviant action, typically caused by a negative emotional response, such as anger, after being presented with stressful or potentially traumatizing life events. Examples of this include child abuse, neglect, victimization, poor physical and emotional health, or deviant peer pressure. Agnew (1995) later suggests that anger can serve to justify the resulting criminal or deviant act in these cases. The subsequent behavior of acting out in response to strain can be targeted at an individual (i.e. a victimizer) or more generally to an institution such as school or religion by, for example, rampant misbehavior or acts of vandalism.

Agnew (2001; 2002; 2006) later revised the original version of his theory addressing criticisms regarding the lack of specificity and the lack of ability to explain racial, class, and gender differences in offending related to strain. He supplemented the theory with the concepts of vicarious and anticipated strain. In this case, vicarious strain represents witnessing or knowing of the negative experiences of others. On the other hand, anticipated strain reflects one's perceptions regarding future strain. Here, they can either expect negative experiences in the future, or maintain that current negative situations will continue to persist. In addition, Agnew (2001; 2006) went on to differentiate between objective and subjective forms of strain and their relation to delinquency. Objective strains are events or conditions that are regarded adversely by the

masses. Subjective strain, on the other hand, are events and conditions regarded adversely only by those who have experienced them. Overall, subjective strains have been found to have a greater connection with crime than objective forms (Froggio & Agnew, 2007)

While proposing measures and methodologies to properly test strain, Agnew also stated that strain was not in direct competition with other theories of behavior such as control or learning theories, but rather that strain principles operated through these mechanisms in addition to individual traits such as self-control. Further, Agnew also clarified that there are four conditions in which strain is most likely to lead to crime or delinquent behavior. The first is when the situation(s) a person finds themselves in appear to be unjust, while the second is when the strain is high in magnitude. Third, extraneous conditions associated with low social control are more likely to lead to delinquent acts as well as situations where there is pressure or incentive to cope with the condition in a criminal manner (Agnew, 1992; 2001; 2006).

There is an abundance of empirical research on general strain theory as a viable explanation for crime and delinquency, including substance use (Agnew and White, 1992; Keane, 1993; Paternoster & Mazerolle, 1994; Brezina, 1996; Hoffman & Miller, 1998; Piquero & Sealock, 2000; Aseltine et al., 2000; Broidy, 2001;) Each of these aforementioned studies finds at least partial support for Agnew's conception of strain as related to crime and deviant behavior. Other studies highlight the importance of negative affective states as it relates to strain (Broidy & Agnew, 1997; Mazerolle & Piquero, 1997; Hay, 2003; Jang & Johnson, 2003; Drapela, 2006; Preston, 2006; Jang, 2007; Piquero et

al., 2010) Previous research, unrelated to general strain theory as it is stated by Agnew, garners support for the suppositions of the theory as well as the connections between concepts of negative emotion related to stress and crime (Rabkin & Struening, 1976; Schlesinger & Revitch, 1980; Molof, 1980; Linsky & Strauss, 1986).

In connecting General Strain Theory to this study in particular, there are several circumstances in which PDM can occur due to the various forms of strain proposed by Agnew. These strains can come from both academic and socially based sources as it relates to college students. PDM can be a medium for pain avoidance behavior related to academic or social stressors affecting a college student, as well as a coping mechanism for failures in both of these realms. Falling short of one's goals in school or among one's peers as well as feeling that fair and equitable treatment is not being conferred also stand as reasons for PDM. Furthermore, the loss of a valued relationship or association can lead someone down this path of substance use as can being confronted with adverse situations, both temporary and long-lasting, with which a student would need to cope. Strains such as these can lead to PDM for both instrumental and recreational purposes. Regarding instrumental use, reactions to strain and the subsequent negative affective states that can accompany it (ex. depression) can lead a student to misuse prescription drugs for the purposes of self-medication, or can act as an attempt to alleviate or further prevent the straining circumstance itself. Regarding recreational motivations, escapism from and coping with these adverse situations and emotions can serve as reasons why college students would use these drugs as well, with no intention of using them for their intended medicinal effects.

In conclusion, each of the three theories discussed in this section have received rigorous testing, over a number of decades, regarding their ability to explain both delinquent behavior and substance use. Reflecting back on one of the primary goals of this investigation, it is my intention to continue this effort to examine theoretically based risk factors, their relation to PDM, and how they may be similar or different in the manner and degree to which they can explain this form of substance use.

CHAPTER 3: HYPOTHESES AND METHODS

Hypotheses

The primary goal of the current research is to assess the ability of various theoretically based risk factors to explain PDM. Thus, a specific set of hypotheses regarding the relationship of each theory to PDM is derived based on prior research on substance use and delinquency. Consistent with *social learning theory*, respondents who report that PDM is more common among college students and those who differentially associate with peers who report PDM are more likely to report PDM. Also, respondents who define PDM as being more acceptable are more likely to report PDM. Finally, respondents who anticipate positive outcomes from PDM are more likely to report PDM. Consistent with *social control theory*, respondents with stronger attachments are less likely to report PDM. In addition respondents with a greater stake in conformity, measured by the commitment and involvement elements of the social bond, are less likely to report PDM. Consistent with *general strain theory*, respondents who experience higher levels of strain are more likely to report PDM. The relationship between strain and PDM is partially indirect, as respondents who experience strain are more likely to experience negative affect and negative affect is positively related to PDM.

Sample

The sample for this study consists of undergraduate students at a large southern university. The data was collected via a paper survey that was distributed to students during the first month of the semester in their regularly scheduled courses. The goal was to collect data from students enrolled in courses offered by several different colleges at the university: Arts & Humanities, Business Administration, Education, Engineering & Computer Science, Health & Public Affairs, and the College of Sciences. These colleges were selected based on their high enrollment as well as having courses and students located primarily on the main campus of the university, where the sample was collected. Courses were selected via a convenience sampling method, contingent upon instructor permission to survey their students. An attempt was made to select core/required courses at both the lower and upper levels in order to assure the maximum number of participants per sampled course. The desired sample for this study was 1,000 students; a sample size that would be much larger than most other independently collected samples focusing on PDM.

Several items in the survey are adapted from the Student Life Survey (SLS) collected by Carol Boyd and Sean McCabe who are affiliated with the University of Michigan's Substance Abuse Research Center. Dating back to 1993 the SLS collected data bi-annually from a sample of students at the University of Michigan to determine the prevalence and correlates of alcohol and other drug use. Much of what we know about PDM among college students is based on these data.

Dependent Measures

The dependent measures for this study consist of the misuse of five separate classes of prescription drugs: pain relievers (i.e., Darvocet, Percocet, Vicodin, codeine, and Demerol), tranquilizers/sedatives (i.e., Klonopin, Xanax, Ativan, Valium, and Lorazepam), stimulants, (i.e., Ritalin, Cylert, Dexedrine, and Adderall, Concerta), anti-depressants (i.e. Prozac, Paxil, Zoloft, Wellbutrin, Effexor) and sleeping medication (i.e. Ambien, Halcion, Restoril, temazepam, Triazolam). Adapted from the SLS, this question reads “Sometimes people use prescription drugs that were meant for other people, even when their own doctor has not prescribed it to them. Please indicate how many times in the past academic semester you have used the following types of drugs when they have not been prescribed to you.” Respondents were then presented with the list of the 5 classifications of prescription drugs and corresponding examples of each. The response options include “never”, “1-2 times”, “3-5 times”, “6-9 times”, “10-19 times”, “20-39 times”, and “40 or more times”.

PDM Motivation

For respondents who reported any past year PDM, information was also gathered regarding motives for misuse. Again utilizing the wording and options of the SLS, respondents were asked to provide the reason(s) that they used prescription medication not prescribed to them. The response options include because... it helps me sleep, it helps decrease anxiety, it gets me high, it counteracts the effects of other drugs, experimentation, it is safer than street drugs, I am addicted, it helps increase my alertness,

it helps me lose weight, or “other”. The reason for measuring motivations for PDM is not only to gather general information on the dynamics of PDM, but also to create user typologies. Based on motives for use, respondents were broken into three mutually exclusive categories: self-treatment, recreational, and mixed use.

Social Learning Items

Several items are used to measure elements of social learning theory. Most of the measures used in this study were adapted from previous studies that have examined social learning theory as it relates to substance use (Akers et al., 1979; Durkin et al., 2005; Srnick, 2007; Peralta & Steele, 2010). Two items are used to measure *differential association*. The first asks respondents to estimate how many of their close friends take prescription drugs not prescribed to them, coded 1=none to 5=all. The second item asks them to estimate, on average, how many hours per day they spend associating with friends. This item is measured on a scale of 1=zero hours per day to 5=five or more hours per day.

A single item is used to measure one’s *definitions* toward PDM. Here, respondents are asked if they believe it is acceptable for college students to use prescription drugs which have not been prescribed to them. This item is measured by likert-type agreement scales ranging from 1=strongly disagree to 5=strongly agree.

Finally, *differential reinforcement* is measured by examining both the social and non-social reinforcement that accompanies the effects of the substances being used. The first item, measuring non-social reinforcement, concerns the effects of PDM and asks respondents what type of effects they expect to experience when they use prescription

drugs not prescribed to them. This item is measured on a scale of 1=Mostly Bad to 5=Mostly Good. The second item asks how much of a risk do you think college students face (physically or in other ways) if they use prescription drugs, which were not prescribed to them. This item is measured on a scale of 1=No risk 5=Heavy risk. The final item, measuring social reinforcement, asks how the respondent feels that their peers view their PDM. This item is measured on a scale of 1=Very Negatively to 5=Very Positively.

Social Control Items

Several items are used to measure the attachment, commitment and involvement components of the social bond. Regarding *attachment*, four items are used to measure peer and educational/school attachment. The first three items, looking at affective attachment to peers, asks respondents how much they agree with the statements that they “feel close with their friends”, that they “get along well with their friends”, and that “friends are willing to listen to their problems”. These items are measured on a scale of 1=Strongly disagree to 5=Strongly agree, and for the analyses, are combined into a single additive scale measuring “peer attachment”.

The final item measuring attachment asks respondents if they know a faculty or administration member with whom they can discuss a personal problem. This item is taken directly from the Harvard College Alcohol Study (Wechsler, 2005) and had been used as a bonding measure in subsequent studies examining PDM (Ford & Arrastia, 2008; Ford & Schroeder, 2008). Having a stronger attachment to a member of the university, by the tenets of social control theory, would be less likely to do something to

jeopardize that bond such as misuse prescription drugs. Additionally, a member of the faculty or administration is seen as an individual who would otherwise be conveying conventional norms and values, thereby also decreasing the likelihood of PDM among those students to whom they are attached.

For the purposes of simplicity, *commitment and involvement* are jointly measured in this study (Krohn & Massey 1980; Akers & Lee, 1999). The joint commitment/involvement concept is measured by four items that ask respondents to indicate how much time they devote to a series of conventional activities. Respondents are asked to estimate how many hours per day in the past semester they spent on three different activities: studying for school, participating in sports (recreational, intramural, intercollegiate), participating in student organizations, and doing community service or volunteer work. These items are measured on a scale of 1=zero hours per day to 5=five or more hours per day. These items are taken from the College Alcohol Study (Wechsler, 2005) and again have been used to measure this concept as it related to PDM (Ford & Arrastia, 2008; Ford & Schroeder, 2008). These items represent a commitment to doing well in school and finishing a degree as well as involvement in conventional activities. As such, the time spent on these activities was combined into an additive scale for analytical purposes. The logic for including these items is rooted in the idea that the more time and commitment one has to conventional activities and goals, the less likely they would be to misuse prescription drugs. Their stakes in conforming behavior would indicate that they have a greater investment in conventional outcomes and would have more to lose by misusing prescription drugs.

General Strain Items

Several items are used to measure the concept of strain. This study uses a modified version of the Inventory of College Student's Recent Life Experiences (ICSRLE) (Kohn et al., 1990). This metric has been previously utilized to test the explanatory power of general strain theory on college student PDM (Vegh, 2011). This inventory measures strain and stress related to different aspects of a student's life, including academic alienation, friendship problems, time pressure, developmental problems, and general social mistreatment. Three items representing each of these concepts will be included in the survey. For *academic alienation* items include disliking one's studies, finding courses uninteresting, and dissatisfaction with school. *Friendship problems* are represented by being let down or disappointed by friends, conflicts with a friend, and having your trust betrayed by a friend. *Time pressure* measures consist of not having enough leisure time, not having enough time to meet obligations, and having a lot of responsibilities. *Developmental problems* are represented by struggling to meet one's own academic standards, receiving lower grades than hoped for, and hard effort to get ahead. Finally, *general social mistreatment* is indicated by social isolation, being taken for granted and being ignored. All strain items are measured on a scale of 1=the experience was not at all a part of my life in the past year to 4=the experience was very much a part of my life in the past semester.

In relation to GST, the respondent's negative affect will be assessed. In this effort, the K10 Psychological Distress Scale (Andrews & Slade, 2001) will be used to measure psychological distress, a negative affective state that has been connected with

substance use in other studies (Agnew, 2006; Drapela, 2006; Jang & Johnson, 2003; Ford & Schroeder, 2009). These items ask respondents how much a situation or affective state has applied to them in the past semester. The scale items consist of: being tired out for no good reason, feeling nervous, being so nervous that nothing could calm you down, feeling hopeless, feeling restless and fidgety, feeling so restless that you could not sit still, feeling depressed, feeling that everything was an effort, feeling so sad that nothing could cheer you up, and feeling worthless. The responses for this item range from 1=None of the time to 5=All of the time. While the original measurement period for this scale is on a past month basis, for consistency purposes, psychological distress will be measured on a past semester basis in this study.

Additionally, anger was also measured as a negative affective state. Four items were used to assess this: “I lose my temper easily”, “when I am angry at people, I feel more like hurting them than talking to them about why I am angry”, “when I am really angry, other people better stay away from me”, and “when I have a serious disagreement with someone, it is usually hard for me to talk calmly about it without getting upset”. These measures are derived from Grasmick et al (1993) and have been used in previous studies looking at anger as a negative affective state and its relationship to delinquency (Brezina, 1996; Mazerolle & Piquero, 1997; 1998, Piquero & Sealock, 2000). These items will be coded on a 5 point scale (1=Never to 5=Very Often), with the measurement period being within the past semester.

Control Variables

Two types of control measures are included in the survey. The first involves general demographic information. Here, gender, race, and age will be recorded as well as Greek membership. Finally, a single measure was used to assess substance use. Specifically, respondents were asked if they used other drugs besides marijuana (i.e. cocaine, crack, heroin, LSD, PCP, ecstasy, inhalants, etc) in the past semester.

Analytic Plan

To begin, a descriptive analysis is provided regarding the demographic information collected from the sample and compared to population statistics as provided by the university. Furthermore, information collected on general substance use (marijuana, alcohol, and other drugs) is also analyzed and compared to other statistics collected on college student substance use. This was done to ensure that the sample not only was representative of the university population as a whole, but also to assess whether general substance use among this sample deviates greatly from other findings, which could call into question any potential findings regarding PDM. To be consistent with the coding standards of the discipline PDM is recoded into a dummy variable, 0 = NO, 1 = YES. The PDM findings from this sample are also compared to data collected from other sources to assess similarities and differences as well as the motives for use. Furthermore, descriptive analyses are provided for all theoretically based covariates used in this study.

The multivariate analysis begins with a series of logistic regression models examining PDM with a series of different covariates. First, the prevalence of PDM is measured for each of the types of prescription medications in question as well as misuse of any kind. These regressions will include only the demographic items as covariates (baseline model). Next, each of the PDM types was examined again, this time with the social learning items added to the baseline model. Similarly, the social control items were also added to the baseline model as well and examined for their effect on each of the PDM types.

When measuring the effect of strain on past semester PDM, the indirect relationship of strain on PDM through negative affect was the primary focus. In this effort, two linear regression models are estimated using psychological distress and anger as dependent measures and the baseline items and the college strain scale as the independent predictors. Then, a series of logistic regression models were estimated examining the various PDM types, with the baseline items as predictors along with each of the types of negative affect and the college strain scale. This method allows for not only an examination of the direct effect of strain on the types of PDM, but also an assessment of the indirect relationship. To this end, if strain could explain negative affect in the linear regression model, and affect could then explain PDM in the logistic regression when controlling for strain, the case for an indirect relationship between strain and PDM mediated by negative affect can be made.

As a means to examine which theoretically based risk factors can best explain PDM, a series of logistic regression models are estimated looking at each of the types of

PDM with the baseline, social learning, social control, and general strain (with negative affect) items included. The substance use measure looking at the use of “harder” drugs is also included in this model. The choice to include this only in the full model and not in any of the others looking at risk factors relating to individual theories was made because although it is a robust correlate of PDM, it is not viewed as a necessity to control for this in the field of prescription drug research, nor does it add to the knowledge of how theory applies to PDM. It was prudent, however, to include this measure in the full model to compare the effect it has on PDM to those of all the other risk factors based in theory.

The final stage of the analysis is an exploratory investigation that separates respondents into different “types” of prescription drug misuse based on motivations for use. Respondents are separated into various groups based on misuse and motive for it: non-users, self-treatment only, recreational only, or mixed use (report both self-treatment and recreational motives). A series of multinomial logistic regression models are then estimated to determine unique correlates of the different types of use. Using misuse of any type of PDM as the dependent measure, each of the typological classes will be compared to one another in the context of the all the theoretical, demographic, and substance use predictors. Of primary interest here is whether the theoretical measures are related across the different PDM typologies, and if not, in what ways do they differ.

CHAPTER 4: RESULTS

Data Collection

Data was collected from a total of 11 courses at the university, including both lower- and upper-level courses offered in six different colleges at the university. The total enrollment of these courses was 1,033 students (485 lower-level, 548 upper-level). The final number of surveys completed and returned by students totaled 841, a response rate of 81.4%. The near 19% non-participation rate may be due to the fact that not all courses required in-class attendance. While surveys were administered during the first three weeks of the academic semester when attendance would possibly be higher than later in the term, 100% attendance was not guaranteed on the days when data was collected.

The breakdown of these courses by college and their descriptions can be found in Table 1. It should be noted that several colleges at the university were not included in the sample. The College of Hospitality Management primarily offered courses on a different campus and accounted for less than 5% of undergraduate students. The College of Nursing also makes up less than 5% of the undergraduate population. Those on a pre-med track (College of Medicine) would be taking courses in the College of Sciences (i.e., in biology or chemistry). The College of Optics and Photonics does not offer undergraduate courses and therefore was not eligible to be sampled in this study. Finally, the Honors College was not specifically sampled as many of the students enrolled in this college were likely in many of the courses that this study did choose to access.

Table 1: Sample Course Information and Enrollment Statistics

College & Course	Department	Level	Enrollment
<i>Arts & Humanities</i>			
-World Religions	Philosophy	Lower	205
<i>Business Administration</i>			
-Marketing Research & Analysis	Marketing	Upper	71
<i>Education</i>			
-Teaching Strategies and Class Management	Teaching, Learning and Leadership	Upper	32
<i>Engineering and Computer Science</i>			
-Computer Architecture Concepts	Information Technology	Upper	89
<i>Health & Public Affairs</i>			
-Criminal Justice System	Crim, Justice	Upper	49
-Criminal Justice Research Methods	Crim. Justice	Upper	50
-Prof. Development in Health Professions	Health	Upper	50
<i>Sciences</i>			
-Archeology of Sex	Anthropology	Upper	135
-Calculus with Analytic Geometry	Math	Lower	209
-Introduction to Sociology	Sociology	Lower	71
-Comparative Vertebrae Anatomy	Biology	Upper	72
Total Courses Sampled=11		Total Enrollment=1033	

Sample Characteristics

Table 2 displays the sample and university demographics. The demographic makeup of the sample was just over half female, 53%, with an average age of 21.

Regarding racial make-up, 61% was white with blacks comprising 10%, Hispanics 17%

and Asians 7%. This is comparable with university-wide statistics from the 2011-2012 school year which report a 54% female undergraduate population, with a racial composition of roughly 61% whites, 10 % Blacks, 18% Hispanics, and 5% Asians, while the average age of enrolled undergraduates 23. Greek membership was reported by one in ten respondents, slightly over the 6.5% reported by the university (University of Central Florida, 2011; University of Central Florida, n.d.). These numbers show that this sample closely matches the demographics of the undergraduate population of the university.

Table 2: Sample Demographics and Population Comparison

Item	Sample (%)	University Statistics (%)
Female	52.6	54.3
Average Age	21.02 (SD=3.42)	23
Race		
-White	61.1	60.8
-Black	10.2	9.8
-Hispanic	17.0	17.7
-Asian	7.3	5.4
-Other	4.3	6.3
Greek	10.0	6.5
N of Students	841	49,900

Prevalence of Substance Use

Table 3 shows the prevalence of substance use in the current sample along with comparison data from the 2010 Monitoring the Future (MTF), a national sample of full-time college students one-to-four years post high school graduation, and the 2009 Student Life Survey (SLS), a survey of students at the University of Michigan in which many of the survey questions for the current study were derived. Results show that nearly 46% of students in the current study reported binge drinking at least once in the previous semester. When compared to the closest approximate time frame (past year) used in the SLS, it appeared to be just under the reported rate of 52%. While MTF does not have a “binge drinking” measure, 64% of respondents did report being drunk in the past year. Past semester marijuana use was reported by roughly 31% of those in the sample. This is on par with the roughly 33% (MTF) and 35% (SLS) prevalence rates of past year marijuana use among college students in the comparison studies. The 8.3% rate of other drug use in the past semester in the sample was close to the 7% that was reported by the SLS, but was less than half of the estimated prevalence as reported by the MTF survey. This is most likely explained by the fact that the MTF measure included the misuse of prescription drugs in its definition of illicit drug use (Johnston et al., 2011a; McCabe et al., 2007; University of Michigan Substance Abuse Research Center, 2009). This is important as prescription opioids and stimulants are the prescription drugs with the highest prevalence of past year misuse in the MTF (Johnston et al., 2011a). These results show that the findings in the current study are comparable to other studies that examine prevalence of substance use among college students.

Table 3: Descriptive Analysis of Past Semester Substance Use

Item	Sample (%)	Monitoring the Future*	Student Life Survey*
Binge Drinking	45.7	n/a	52.0
Marijuana Use	30.9	32.7	35.0
Other Drug Use	8.3	17.1	7.0
N of Students	841	1,260	1,088

*Past Year Misuse

Table 4 shows sample and comparison statistics for prescription drug misuse. Data from the current study indicated that nearly one in four students (24.6%) misused prescription drugs in the past semester. This was largely driven by misuse of prescription stimulants and pain medication, with roughly 12% of students reporting misuse of each. This is higher than MTF and SLS estimates for past year misuse of these two substances, which show stimulant misuse to be between 7% and 9%, and the rate of pain medication misuse to be roughly 6%-7%. The misuse of sedatives was reported by 4.5% of the sample. Again this was higher than the estimates of the MTF (2.2%) and SLS (2.5%). Respondents misused sleeping medication in the past semester at the same rate as sedatives. This too was higher than the national estimate of 2.5% as reported by MTF and SLS (Johnston et al., 2011a; University of Michigan Substance Abuse Research Center, 2009). Finally, just one percent of respondents indicated misusing anti-depressants in the past semester, lower than the two percent reported by the SLS.

Overall, these comparisons show that the past semester PDM reported by this sample is slightly higher than those reported on a past year basis in other studies, with the exception of anti-depressant misuse. While there is not a gross difference in the findings, a potential reason for the slight variation in the findings between studies could be that the comparison samples inquired as to past year misuse in 2009 and 2010, whereas the experiences and substance use behaviors inquired upon in this study concern only the Fall 2011 academic semester. Additionally, discrepancies can also be due to comparisons to national studies as opposed to those that sample one school. As these investigations report national averages, they show that substance use, including alcohol use and binge drinking, is higher at some schools than others (Wechsler & Nelson, 2008).

Table 4: Descriptive Analysis of Past Semester PDM

Item	Sample (%)	Monitoring the Future*	Student Life Survey*
Sleeping Medication	4.5	2.5	2.5
Sedatives	4.5	2.2	2.5
Stimulants	12.4	7.4	9.0
Pain Medication	12.1	6.0	7.2
Anti-Depressants	1.0	n/a	2.0
N of Students	841	1,260	1,088

*Past Year Misuse

Motives for Prescription Drug Misuse

A descriptive analysis of PDM motives can be found in Table 5. Here the results showed that of those who reported misuse of any prescription drugs in the past semester, 77.3% can be classified as instrumental users, with 4.3% having recreational only motives, and 18.4% having mixed motivations for PDM. Among instrumental motives, help with studying and relieving pain were the most common motives, seemingly attached to prescription stimulants and painkillers, which were the most frequently misused types of prescription drugs. Experimentation and getting high were most common among recreational motives. Both the trends seen here regarding individual motives and also the distribution of user types have been shown in several other studies looking at adolescent and young adult misuse of various types of prescription drugs (Babcock & Byrne, 2000; Teter et al., 2005; Boyd et al., 2006; Teter et al., 2006; White et al., 2006; McCabe et al., 2007).

Risk Factors for Prescription Drug Misuse

Among the social learning covariates (means and ranges displayed in Table 6), nearly 87% of respondents reported that either none or just some of their friends misuse prescription drugs. There was about an even distribution in the sample of hours per day that respondents spend with their friends ranging from 1-2 hours to over five hours per day. Both of these items were measures of one's differential association. When looking at definitions that one holds of PDM, roughly 30% of the sample agreed in some fashion that it was acceptable to misuse prescription drugs.

Table 5: Descriptive Analysis of PDM Motivations and Typologies

Motive	Sample (%)
Instrumental Motives	77.3
-Helps me study	44.8
-Helps relieve pain	34.5
-Helps increase alertness	19.2
-Helps me sleep	17.7
-Helps decrease anxiety	15.3
-Helps me lose weight	3.4
Recreational Motives	4.3
-Experimentation	14.3
-Gets me high	10.8
-Counteract effect of other drugs	2.0
-Because I'm addicted	1.5
-Safer than street drugs	1.0
Mixed Motives	18.4
N of Users	207

In regards to reinforcement (both social and non-social), half of the sample reported that they perceive either bad or mostly bad experiences with PDM. About a quarter of respondents associated heavy risk with PDM while roughly just 7% believed that PDM came with little or no risk. Nearly 60% of respondents believed that their peers would react in some negative fashion if they knew that they misused prescription drugs. Conversely less than 2% believed their friends would react in some sort of positive manner if they knew. Two items included in the survey asking about PDM perception and acceptability by comparison to other drugs were omitted due to the fact that they overlapped with other items (conceptually and statistically) and that those used in their

stead were overall better representations of the intended theoretical concepts. Overall, stronger peer associations and number of friends who misuse prescription drugs as well as holding definitions favorable toward PDM and experiencing positive reinforcement of PDM is expected to raise the odds of past semester misuse.

Table 6: Descriptive Analysis of Social Learning Covariates

Item	Mean (Std. Dev.)	Item Range
Friend PDM	1.76 (.81)	1=None→5=All
Time with Friends	3.40 (1.14)	1=0 Hours/day→5=5+Hours/day
PDM Acceptability	2.02 (1.00)	1=Strongly Disagree→5=Strongly Agree
Perceived Experiences	2.42 (1.00)	1=Bad→5=Good
Perceived Risk	3.79 (.90)	1=No Risk→5=Heavy Risk
Peer Attitudes	2.23 (.81)	1=Very Negative→5=Very Positive

*N=841

Concerning the social control covariates (displayed in Table 7), one-third of the respondents reported knowing someone on the faculty or in school administration to whom they could go to with a problem, representing the social bond of school attachment. The average combined score on conventional activities scale was 8.37. This translates to just over 4 hours per day spent on studying, participating in sports, student organizations, and volunteer work combined, based on the coding scheme. Again, this item was an indicator of both the commitment and involvement aspects of the social

bond. Overall, there was a high level of peer attachment among this sample with the average score on this scale being 12.79 out of 15. With a rough mean of 4 on each of the items in the scale, respondents agreed that they felt close with their friends, got along well with them and that they were willing to listen to their problems. The assumption is that those with stronger social bonds will have lower odds of past semester PDM. Measures of future aspirations and commitments (job, graduate school, marriage and family, romantic relationships) were measured on the survey, but omitted from the analysis because they are wholly socially promoted goals, there was little variation in responses of the agreement of their importance.

Table 7: Descriptive Analysis of Social Control Covariates

Item	Mean (Std. Dev.)	Scale Range
Faculty Attachment	33.1 (%)	
Conventional Activities ($\alpha=.53$)	8.37 (2.83)	4-20
-Studying for school	3.07 (1.16)	
-Participating in sports	1.98 (1.13)	
-Participating in Student organizations	1.73 (1.09)	
-Community service or volunteering	1.59 (.99)	
Peer Attachment Scale ($\alpha=.70$)	12.79 (2.10)	3-15
-Feel close with friends	4.18 (.85)	
-Get along well with friends	4.40 (.69)	
-Friends willing to listen	4.21 (.82)	

*N=841

Finally, when looking at strain experienced by college students in the past semester (Table 8), the mean of the scale measuring this in its various forms was closer to the lower end of the response range with a score of roughly 30 out of 60. When further

examining the 5 subscales that comprise it (academic alienation, friendship problems, time problems, developmental problems, and general social mistreatment), the results show that developmental problems and time problems had the highest means of roughly 7 out of a possible 12, while the strain of friendship problems were experienced least in the past semester with a mean of just under 5 out of 12.

Table 8: Descriptive Analysis of College Strain Scale and Subscales

Item	Mean (Std. Dev.)	Scale Range
College Strain Scale ($\alpha=.84$)	29.95 (7.64)	15-60
Academic Alienation ($\alpha=.76$)	5.88 (2.04)	3-12
-Dislike studies	2.00 (.77)	
-Courses uninteresting	2.08 (.85)	
-Dissatisfaction with school	1.80 (.87)	
Friendship Problems ($\alpha=.84$)	4.79 (2.14)	3-12
-Being let down by friends	1.72 (.84)	
-Having conflicts with friends	1.61 (.79)	
-Trust betrayed by friends	1.47 (.84)	
Time Problems ($\alpha=.74$)	7.06 (2.37)	3-12
-Not enough leisure time	2.17 (1.01)	
-No time to meet obligations	2.02 (.93)	
-A lot of responsibility	2.88 (.99)	
Developmental Problems ($\alpha=.77$)	7.17 (2.60)	3-12
-Struggle to meet academic standards	2.49 (1.07)	
-Receiving lower grades than desired	2.35 (1.07)	
-Hard effort to get ahead	2.35 (.99)	
General Social Mistreatment ($\alpha=.76$)	5.01 (2.21)	3-12
-Social isolation	1.72 (.92)	
-Taken for granted	1.74 (.93)	
-Being ignored	1.56 (.84)	

*N=841

When looking at the individual items that comprise these subscales, we see that the majority of the items have a mean of roughly 2, signifying that these individuals “only slightly” experienced these particular itemized forms of strain in the past semester. The expectation here is that those who experience higher levels of strain will be more likely to have misused prescription drugs in the past semester.

Regarding negative affective states as they relate to PDM (displayed in Table 9), the scale used to measure anger showed a 7.54 average out of a possible 20 and psychological distress (depression and anxiety) showed a mean of 18.65 out of a possible high of 50.

Table 9: Descriptive Analysis of Negative Affect Covariates

Item	Mean (Std. Dev.)	Scale Range
Anger Scale ($\alpha=.77$)	7.54 (2.79)	4-20
-Lose temper easily	2.13 (.95)	
-Feel like hurting people when angry	1.64 (.88)	
-Want other to stay away when angry	1.76 (.88)	
-Hard to talk calmly in disagreement	2.13 (1.06)	
Psychological Distress ($\alpha=.88$)	18.65 (6.75)	10-50
-Tired for no reason	2.65 (1.07)	
-Nervous	2.46 (.97)	
-Nervous and cannot calm down	1.54 (.89)	
-Hopeless	1.66 (.97)	
-Restless and fidgety	2.04 (1.03)	
-Restless and cannot sit still	1.54 (.88)	
-Depressed	1.80 (1.04)	
-Everything is an effort	2.12 (1.12)	
-Sad and cannot be cheered up	1.44 (.84)	
-Worthless	1.40 (.83)	

*N=841

Respondents experienced the greatest amount of anger in the forms of losing their temper and finding it hard to talk calmly in a disagreement. Distress was most felt in the forms of being tired and being nervous. When looking at PDM as it relates to the negative affective states of anger and distress, one could expect to see an indirect relationship whereby strain leads to negative affect (anger and/or distress) which then significantly raises the odds of past semester PDM.

The next step was a progression to the multivariate analyses. Again, the purpose of this was to examine how sociological/criminological risk factors-derived from theory are related to PDM. In this effort a series of logistic regression models were estimated to examine the explanatory powers of demographic controls, as well as the items representing the theoretically-based risk factors of concern in this study. The goal was to facilitate greater insight into the problem and more clearly inform policy and prevention efforts regarding PDM.

Demographics

The first regression model examines the impact of the demographic covariates on PDM (Table 10), the results showed that those in the Greek community had nearly 2.5 times greater odds of past semester misuse of any prescription and roughly 3.3 times greater odds of misuse of prescription stimulants. There were no significant demographic correlations regarding the misuse of pain medication, while being older raised the odds of the misuse of “other” prescription drugs (OR=1.071). This category represents a combination of the misuse of prescription sedatives, sleeping pills, and anti-depressants due to the low number of respondents reporting their misuse, as compared to prescription

stimulants and pain medications. Surprisingly, neither gender, nor race was significantly related to any of the types of PDM examined (even at the bivariate level) given that previously discussed studies have shown gender and race/ethnicity are significantly related to PDM.

Table 10: Baseline Model-Logistic Regression Analysis of Past Semester PDM

Item	Any Misuse	Stimulant	Pain	Other
Female	.095 (.165) [1.099]	-.068 (.214) [.935]	-.136 (.214) [.873]	.276 (.264) [1.317]
Age	.018 (.023) [1.018]	-.085 (.046) [.919]	.024 (.028) [1.024]	.069 (.029) [1.071]*
Non-White	-.095 (.170) [.910]	-.277 (.228) [.758]	.152 (.217) [1.165]	-.351 (.277) [.704]
Greek	.904 (.239) [2.468]***	1.172 (.271) [3.280]***	.240 (.333) [1.272]	.525 (.368) [1.691]
Model X ²	14.765**	23.829***	2.030	8.647
Nagelkerke R ²	.026	.053	.005	.024

N=829; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets

Social Learning

When adding Social Learning correlates to the baseline model the results (Table 11) showed that multiple elements of the theory can explain PDM. Regarding measures of differential association, greater perception of misuse by peers resulted in roughly twice

the odds of misuse in the past semester by respondents of any type of prescription and “other” prescription drugs and 2.5 times greater odds of misuse of stimulants.

Table 11: Social Learning and PDM-Logistic Regression

Item	Any Misuse	Stimulant	Pain	Other
Female	.370 (.191) [1.448]	.315 (.252) [1.371]	.060 (.229) [1.062]	.521 (.288) [1.684]
Age	.044 (.030) [1.045]	-.077 (.055) [.926]	.048 (.034) [1.049]	.107 (.036)** [1.113]
Non-White	.160 (.194) [1.173]	-.106 (.261) [.899]	.342 (.231) [1.408]	-.260 (.298) [.771]
Greek	.797 (.278)** [2.219]	.986 (.327)** [2.680]	.000 (.357) (1.000)	.336 (.394) [1.400]
Friend PDM	.743 (.125) [2.102]***	.876 (.152) [2.402]***	.135 (.129) [1.145]	.652 (.169) [1.919]***
PDM Acceptability	.166 (.106) [1.181]	.155 (.144) [1.168]	.124 (.129) [1.132]	.111 (.491) [1.117]
Perceived Experiences	.580 (.122) [1.786]***	.669 (.162) [1.952]***	.668 (.149) [1.951]***	.439 (.177)* [1.551]
Perceived Risk	-.238 (.117)* [.788]	-.249 (.155) [.780]	-.105 (.140) [.900]	-.221 (.171) [.802]
Peer Attitudes	-.033 (.148) [.968]	.036 (.207) [1.037]	.041 (.179) [1.042]	-.003 (.225) [.997]
Time Spent With Friends	.170 (.084)* [1.186]	.249 (.112)* [1.283]	.155 (.102) [1.168]	-.036 (.122) [.965]
Model X ²	170.716***	157.716***	57.843***	60.697***
Nagelkerke R ²	.282	.329	.131	.168

N=812; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses.

Exp(B) is displayed in brackets

In addition, more time per day spent socializing with friends was associated with higher odds of any type of PDM (OR=1.186) and stimulant misuse (OR=1.283). Furthermore, differential reinforcement also appeared to have an effect on one's past semester PDM. Perceiving more positive experiences resulted in higher odds of PDM for any type of misuse (OR=1.786), stimulant misuse (OR=1.952), pain killer misuse (OR=1.951) and the misuse of other types of prescription drugs (OR=1.551). Perceived risk when misusing prescription drugs was also related to past semester PDM as higher perceived risk resulted in a lower odds of use (OR=.788). Overall, with multiple significant risk factors representing two of the three measured concepts relating to social learning theory, these results indicate partial support for the theory as it relates to PDM.

Social Control

Next, social control covariates were added to the baseline model to determine the effect that the various parts of the social bond had on past semester PDM. These results (Table 12) showed that when looking at attachment to peers and faculty (school attachment) as well as involvement in conventional activities, their relationship to PDM was not significant. Overall, it appears as if Social Control theory as it is measured in this study, is not a suitable theoretical premise to explain PDM among college students. Potential explanations for this finding, particularly as it relates to its theoretical applicability and implications for studying this population, will be discussed in the next chapter.

Table 12: Social Control and PDM-Logistic Regression

Item	Any Misuse	Stimulant	Pain	Other
Female	.107 (.166) [1.113]	-.067 (.215) [.935]	-.114 (.215) [.892]	.299 (.265) [1.349]
Age	.017 (.024) [1.017]	-.080 (.046) [.923]	.017 (.029) [1.018]	.063 (.029)* [1.065]
Non-White	-.114 (.171) [.892]	-.298 (.229) [.742]	.140 (.219) [1.150]	-.365 (.279) [.694]
Greek	.830 (.244)** [2.293]	1.101 (.279) [3.007]***	.181 (.341) [1.198]	.528 (.378) [1.696]
Faculty Attachment	-.198 (.180) [.820]	-.124 (.284) [.883]	-.243 (.238) [.784]	-.013 (.045) [.987]
Conventional Activities	.046 (.029) [1.047]	.033 (.037) [1.033]	.047 (.037) [1.048]	.021 (.045) [1.022]
Peer Attachment	-.011 (.040) [.989]	.012 (.054) [1.012]	-.040 (.051) [.961]	-.085 (.058) [.919]
Model X ²	17.770*	24.189**	4.591	10.926
Nagelkerke R ²	.032	.055	.011	.031

N=821; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses.

Exp(B) is displayed in brackets

General Strain: Psychological Distress

In an effort to test the applicability of General Strain Theory on PDM, several regression models were estimated focusing on the indirect effect that strain has on past semester misuse through the negative affective states of anger and psychological distress (depression and anxiety). As Agnew (1992) posited, the rationale here is that strain is positively related to negative affect, which then has a positive relationship with PDM.

Several steps were necessary to test the complete nature of this relationship. Beginning with looking at psychological distress, a linear regression model was estimated to examine the explanatory power of college strain (ICSRLE) on reported psychological distress among respondents. Table 13 shows that this relationship was both significant and positive ($b=.526$, $p<.001$), meaning that as levels of strain increased, so did reported distress.

Table 13: Strain and Psychological Distress-OLS Regression

Item	b (S.E.)
Female	-.136 (.383)
Age	.023 (.055)
Non-White	-.358 (.392)
Greek	-.505 (.624)
College Strain	.526 (.025)***
Model F	90.185***
Adjusted R ²	.358

N=802; * $p <.05$, ** $p<.01$, *** $p<.001$

When looking then at the effect of distress on past semester PDM (Table 14), the results showed that psychological distress only significantly increased the odds of misuse among “other” types of prescription drugs (OR=1.076), but not among stimulants, painkillers, or overall misuse. In addition, college strain demonstrated no direct effect on

past semester PDM. This finding that only “other” types of PDM appears to be associated with strain and affect is perplexing and merits a deeper exploration.

Table 14: Psychological Distress and PDM-Logistic Regression

Item	Any Misuse	Stimulant	Pain	Other
Female	.087 (.168) [1.091]	-.108 (.217) [.897]	-.125 (.219) [.883]	.181 (.271) [1.198]
Age	.015 (.024) [1.015]	-.085 (.046) [.918]	.019 (.029) [1.019]	.070 (.030)* [1.072]
Non-White	-.135 (.174) [.874]	-.293 (.231) [.746]	.108 (.223) [1.114]	-.426 (.289) [.653]
Greek	.929 (.242) [2.531]***	1.188 (.273) [3.282]***	.257 (.335) [1.293]	.607 (.376) [1.835]
Psychological Distress	.023 (.015) [1.024]	.031 (.019) [1.032]	.009 (.019) [1.009]	.073 (.022)** [1.076]
College Strain	.003 (.014) [1.003]	-.007 (.018) [.993]	.014 (.017) [1.014]	-.015 (.022) [.985]
Model X ²	20.011**	26.659***	3.359	23.400**
Nagelkerke R ²	.037	.061	.008	.067

N=802; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets

In order to assess if this was a valid pattern within the data or was a result of statistical coding, the psychological distress scale was dummy coded and then the analysis (not shown) was re-run using this recoded item as a measure of strain. Those with a distress score of 10-19 were coded as 0 and termed “likely to be well” while those with a score of 20-50 were coded as 1 and dubbed “likely to have a mental disorder” (Andrews & Slade, 2001). The results were the same and distress still only had a

significant relationship with “other” PDM in the past semester. Overall, these results only show support for an indirect Strain-PDM relationship with regards to “other” prescription drug misuse through psychological distress.

General Strain: Anger

Table 15 displays a linear regression model that estimated the effect of college strain on the negative affective state of anger. As with the model focusing on psychological distress, the results here also showed that college strain was significantly and positively correlated with anger ($b=.103, p<.001$). Essentially, as the level of experienced strain increases, so too does one’s anger level.

Table 15: Strain and Anger-OLS Regression

Item	b (S.E.)
Female	-.195 (.194)
Age	-.001 (.028)
Non-White	.085 (.199)
Greek	-.323 (.315)
College Strain	.103 (.013)***
Model F	13.431***
Adjusted R ²	.073

N=785; * $p <.05$, ** $p<.01$, *** $p<.001$

However, unlike the model looking at the effect of psychological distress, anger could not significantly explain past semester PDM. This is not surprising given that

aforementioned research on strain seems to indicate that anger is generally related to delinquency and crime, whereas depression/distress is more closely related to substance use. Table 16 displays the Anger-PDM regression results.

Table 16: Anger and PDM-Logistic Regression

Item	Any Misuse	Stimulant	Pain	Other
Female	.086 (.170) [1.090]	-.108 (.219) [.898]	-.084 (.221) [.920]	.223 (.274) [1.249]
Age	.011 (.024) [1.011]	-.093 (.047) [.911]	.018 (.029) [1.018]	.066 (.029) [1.068]
Non-White	-.098 (.174) [.906]	-.255 (.232) [.775]	.131 (.224) [1.140]	-.389 (.289) [.678]
Greek	.885 (.243)*** [2.423]	1.121 (.276)*** [3.069]	.153 (.346) [1.166]	.462 (.386) [1.587]
Anger Scale	.035 (.031) [1.035]	.012 (.040) [1.012]	.044 (.040) [1.045]	.067 (.047) [1.069]
College Strain	.008 (.011) [1.009]	.007 (.015) [1.007]	.012 (.015) [1.013]	.011 (.018) [1.011]
Model X ²	15.765*	22.398**	3.721	10.636
Nagelkerke R ²	.030	.052	.009	.032

N=785; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets

In order to examine the strain-anger-PDM relationship in greater detail, regression models were estimated for each measure of anger individually. These results showed that one item, inquiring about maintaining calmness in a disagreement with someone, was significantly explained by strain. The results are displayed in Table 17.

Table 17: Strain and Calmness-OLS Regression

Item	b (S.E.)
Female	.153 (.075)
Age	-.007 (.011)
Non-White	-.006 (.076)
Greek	-.003 (.122)
College Strain	.028 (.005)***
Model F	7.937***
Adjusted R ²	.043

N=806; *p <.05, **p<.01, ***p<.001

Subsequently, lack of calmness was then significantly related to any misuse (OR=1.177) and “other” misuse (OR=1.438) of prescription drugs in the past semester. The any misuse was driven by the “other” misuse finding which makes substantive sense as an individual who would be misusing prescription drugs for instrumental purposes might be more likely to take sedatives if they developed or had a persisting pattern of not being able to keep calm during confrontations or disagreements. This could have the potential to make difficult simple day to day action, particularly if the strain that caused this feeling was omnipresent. Furthermore, if this demeanor was also affecting an individual’s ability to simply rest (aka sleep), the misuse of sleeping pills could also occur. See Table 18 for these results.

Table 18: Calmness and PDM-Logistic Regression

Item	Any Misuse	Stimulant	Pain	Other
Female	.065 (.169) [1.068]	-.130 (.217) [.878]	-.132 (.220) [.876]	.143 (.270) [1.153]
Age	.016 (.023) [1.016]	-.082 (.045) [.922]	.019 (.029) [1.019]	.070 (.029) [1.072]
Non-White	-.134 (.173) [.875]	-.310 (.231) [.733]	.096 (.222) [1.101]	-.390 (.284) [1.072]
Greek	.919 (2.506)*** [2.056]	1.172 (.273) [3.227]	.259 (.334) [1.295]	.539 (.374) [1.715]
Calmness	.163 (.078)* [1.177]	.102 (.100) [1.108]	.008 (.103) [1.009]	.363 (.117)* [1.438]
College Strain	.010 (.011) [1.010]	.007 (.015) [1.007]	.018 (.014) [1.018]	.016 (.017) [1.016]
Model X ²	21.628**	25.486***	3.108	20.881**
Nagelkerke R ²	.039	.058	.007	.060

N=806; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets

Strain Subtypes

Considering the fact that strain has both directly and indirectly (through negative affect) been shown to significantly predict both substance use and general delinquency in other investigations (Agnew and White, 1992; Keane, 1993; Paternoster & Mazerolle, 1994; Brezina, 1996; Broidy & Agnew, 1997; Mazerolle & Piquero, 1997; Hoffman & Miller, 1998; Piquero & Sealock, 2000; Aseltine et al., 2000; Broidy, 2001; Hay, 2003; Jang & Johnson, 2003; Drapela, 2006; Preston, 2006; Jang, 2007; Piquero et al., 2010), the seemingly lack of significant findings warrants a closer look. One possible reason

why these findings seem counterintuitive is the way in which strain was measured. The ICSRLE measures five different types of strain that are common among college students: academic alienation, friendship problems, time problems, developmental problems, and general social mistreatment. There were three measures of each of these concepts, fifteen total items, used in the measure of college strain in this study. While it is indeed possible that strain both directly or indirectly has no relationship with PDM in this sample, it is possible that the effects (or lack) of certain kinds of strain might have skewed the effect of the overall strain scale. The tactic of looking at specific types of strain in relation to forms of crime and delinquency has been used in previous studies looking to examine the effect of strain on these behaviors (Asletine et al., 2000; Mazerolle et al., 2000; Piquero & Sealock, 2000; Agnew, 2001). A supplemental analysis was conducted looking at each of the different types of strain individually to ascertain the effect that might have on PDM. This tactic of finding a relationship between specific types of strain and behaviors can serve to strengthen the theory by providing greater detail as to the strain-outcome relationship.

Strain Subtypes and Distress

Utilizing the same method as before, the indirect effect of strain on PDM was measured by estimating a series of linear regressions on each of the negative affective states. Each of these models contains demographic controls as well as one of the subscales of strain comprising the ICSRLE scales used as the overall strain measure in this study. Regarding psychological distress (Table 19), the results showed that all five of the strain subtypes were significantly and positively related to psychological distress at

the $p < .001$ level. These results give cause to further explore if distress is then related to PDM and ascertain which, if any of these strain subtypes is then indirectly related to PDM.

Table 19: Psychological Distress and Strain Subscales-OLS Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Academic Alienation	1.141*** (.108)				
Friendship Problems		1.241*** (.102)			
Time Problems			.814*** (.098)		
Developmental Problems				1.118*** (.081)	
General Social Mistreatment					1.738*** (.089)
Model F	23.270***	30.995***	14.915***	39.060***	77.436***
Adjusted R ²	.120	.156	.079	.190	.320

N=802; * $p < .05$, ** $p < .01$, *** $p < .001$

Note: Demographic control variables included in each regression model

The next step was to see then if affect or the subscales themselves, could explain the various forms of PDM measured in this study. Table 20 displays these results as related to any misuse in the past semester, looking at the explanatory power of psychological distress. Here, distress had a positive relationship to any past semester misuse in model 1 (OR=1.028), model 3 (OR=1.029), model 4 (OR=1.030) and model 5 (OR=1.030). While no direct effects were found between any of the strain subscales and

any past semester misuse, the findings here showed that academic alienation, time problems, developmental problems, and general social mistreatment were positively related to psychological distress, which was then positively and significantly related to any past semester PDM.

Table 20: Psychological Distress, Strain Subscales, and Any PDM-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Psych. Distress	.028(.013)* [1.028]	.019 (.013) [1.019]	.028 (.012)* [1.029]	.030 (.013)* [1.030]	.029 (.014)* [1.030]
Academic Alienation	-.003 (.043) [.997]				
Friendship Problems		.066 (.040) [1.069]			
Time Problems			-.002 (.037) [.998]		
Developmental Problems				-.019 (.036) [.981]	
General Social Mistreatment					-.011 (.046) [.989]
Model X ²	20.147**	22.614**	20.218**	19.638**	19.647**
Nagelkerke R ²	.036	.041	.036	.036	.035

N=802; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model

Next, this same relationship was tested regarding past semester stimulant misuse (Table 21). Similar to the previous model looking at any misuse over the past semester, there was no direct relationship seen between the strain subscales and past semester

stimulant misuse. In this analysis distress did explain stimulant misuse in model 3 (OR=1.034), model 4 (OR=1.036), and model 5 (OR=1.037). These results suggest that time problems, developmental problems, and general social mistreatment explains psychological distress, which then explains past semester stimulant misuse.

Table 21: Psychological Distress, Strain Subscales, and Stimulant Misuse-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Psychological Distress	.029 (.016) [1.030]	.023 (.016) [1.023]	.033 (.015)* [1.034]	.036 (.017)* [1.036]	.037 (.018)* [1.037]
Academic Alienation	.011 (.055) [1.011]				
Friendship Problems		.060 (.051) [1.023]			
Time Problems			-.033 (.049) [.967]		
Developmental Problems				-.050 (.047) [.951]	
General Social Mistreatment					-.034 (.060) [.967]
Model X ²	27.290***	28.105***	27.383***	28.101***	27.107***
Nagelkerke R ²	.062	.064	.062	.064	.061

N=802; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model

Table 22 displays the results of past semester painkiller misuse as it is related to the strain subscales. Here, none of the subscales had a direct relationship with past

semester painkiller misuse, nor was there evidence of an indirect relationship as psychological distress was not significant in any of the models.

Table 22: Psychological Distress, Strain Subscales, and Painkiller Misuse-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Psychological Distress	.022 (.016) [1.022]	.010 (.017) [1.010]	.020 (.016) [1.020]	.022 (.017) [1.022]	.012 (.018) [1.012]
Academic Alienation	-.005 (.055) [.995]				
Friendship Problems		.084 (.051) [1.088]			
Time Problems			.024 (.048) [1.024]		
Developmental Problems				-.022 (.046) [.978]	
General Social Mistreatment					.047 (.057) [1.048]
Model X ²	3.763	6.273	3.871	3.290	4.327
Nagelkerke R ²	.009	.015	.009	.008	.010

N=802; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model.

This picture changes however when looking at “other” past semester PDM.

These results, displayed in Table 23, show that while there is no direct effect of strain subscales on “other” PDM, that psychological distress in model 1, (OR=1.069), model 2 (OR=1.065), model 3 (OR=1.072), model 4 (OR=1.074), and model 5 (OR=1.086) raised

the odds of past semester misuse of “other” prescription drugs. Substantively, each of the college strain subscales significantly explained distress, which significantly explained past year use, thereby giving further support the idea of an indirect relationship between college strain and PDM facilitated by negative affect, and therefore support for general strain as suitable theory of explanation for PDM.

Table 23: Psychological Distress, Strain Subscales, and “Other” Misuse-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Psych. Distress	.067(.018) [1.069]***	.063 (.018) [1.065]**	.070(.017) [1.072]***	.071(.019) [1.074]***	.082(.021) [1.086]***
Academic Alienation	.001 (.067) [1.001]				
Friendship Problems		.030 (.062) [1.031]			
Time Problems			-.037 (.058) [.963]		
Developmental Problems				-.045 (.058) [.956]	
General Social Mistreatment					-.082 (.072) [.921]
Model X ²	24.756***	24.809***	25.093***	24.009**	26.092
Nagelkerke R ²	.070	.070	.071	.069	.074

N=802; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model.

Strain Subscales and Anger

Each of the subtypes of strain was significantly and positively related to anger at the $p < .001$ level (Table 24). This finding reflects those of the distress-strain analysis as well, and makes the argument for a further examination into the indirect relationship of strain and PDM.

Table 24: Anger and Strain Subscales-OLS Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Academic Alienation	.244*** (.049)				
Friendship Problems		.262*** (.046)			
Time Problems			.193*** (.042)		
Developmental Problems				.213*** (.038)	
General Social Mistreatment					.290*** (.044)
Model F	5.202***	6.744***	4.450**	6.681***	8.803***
Adjusted R ²	.026	.035	.021	.035	.047

N=785; * $p < .05$, ** $p < .01$, *** $p < .001$

Note: Demographic control variables included in each regression model

Tables 25-28 display no significant relationship between anger and the odds of past semester misuse of any prescriptions drugs, nor stimulants, painkillers, or “other” prescription drugs specifically. This shows that there was no indirect relationship between strain and PDM as mediated by anger among this sample.

Table 25: Anger, Strain Subscales, and Any PDM-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Anger Scale	.038 (.030) [1.039]	.029 (.030) [1.029]	.041 (.030) [1.042]	.041 (.030) [1.042]	.037 (.030) [1.038]
Academic Alienation	.007 (.042) [1.007]				
Friendship Problems		.074 (.038) [1.077]			
Time Problems			.003 (.036) [1.003]		
Developmental Problems				-.003 (.033) [.997]	
General Social Mistreatment					.012 (.039) [1.012]
Model X ²	15.215*	18.268**	15.279*	14.764*	14.750*
Nagelkerke R ²	.028	.034	.028	.027	.027

N=785; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model.

The same analyses also show that there was no significant direct effect of any of the strain subscales on any of the types of PDM examined in this study. This reflects the results of the relationship between distress and strain subscales as well, where no direct relationship was found.

Table 26: Anger, Strain Subscales, and Stimulant Misuse-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Anger Scale	.010 (.039) [1.010]	.005 (.039) [1.005]	.020 (.038) [1.020]	.022 (.039) [1.022]	.016 (.039) [1.016]
Academic Alienation	.047 (.055) [1.048]				
Friendship Problems		.077 (.049) [1.080]			
Time Problems			-.022 (.048) [.978]		
Developmental Problems				-.017 (.043) [.983]	
General Social Mistreatment					.009 (.051) [1.009]
Model X ²	23.567**	24.762***	22.611**	22.558**	22.346**
Nagelkerke R ²	.055	.057	.053	.053	.052

N=785; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model.

Overall, while college strain was a significant correlate of anger, anger could not explain PDM of any type, thereby challenging the assertion of an indirect strain-PDM effect, at least as it relates to this particular type of negative affect. Furthermore, there were no significant direct effects of any of the strain subscales on PDM.

Table 27: Anger, Strain Subscales, and Any Painkiller Misuse-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Anger Scale	.048 (.038) [1.049]	.038 (.039) [1.039]	.052 (.038) [1.053]	.054 (.039) [1.055]	.042 (.039) [1.043]
Academic Alienation	.013 (.055) [1.013]				
Friendship Problems		.080 (.048) [1.083]			
Time Problems			.015 (.047) [1.015]		
Developmental Problems				-.015 (.043) [.985]	
General Social Mistreatment					.044 (.049) [1.045]
Model X ²	3.026	5.657	3.174	3.098	3.717
Nagelkerke R ²	.007	.014	.008	.007	.009

N=785; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model.

Based on these findings, anger, as compared to psychological distress, appears to be a type of affect that is less suitable for explaining this particular form of substance use. However, the earlier findings regarding the calmness measure on the anger scale seem to indicate a further, supplemental analysis may be warranted.

Table 28: Anger, Strain Subscales, and “Other” Misuse-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Anger Scale	.072 (.046) [1.075]	.065 (.046) [1.067]	.075 (.046) [1.078]	.077 (.046) [1.080]	.071 (.023) [1.074]
Academic Alienation	.032 (.066) [1.032]				
Friendship Problems		.070 (.059) [1.072]			
Time Problems			.005 (.058) [1.005]		
Developmental Problems				-.001 (.053) [.999]	
General Social Mistreatment					.023 (.060) [1.024]
Model X ²	10.574	11.565	10.237	10.434	10.529
Nagelkerke R ²	.031	.034	.030	.031	.031

N=785; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model.

Strain Subscales and Calmness

Since previous findings indicate a relationship between calmness and any and “other” PDM, it appears necessary to look at each form of PDM and assess whether breaking down the stressors by subscale can shed any additional light on the details of this relationship. Initial results (Table 29) indicated that each of the individual types of strain could predict lack of calmness in a disagreement, further displaying evidence for a possible indirect relationship between these subscales of strain and past semester PDM.

Table 29: Calmness and Strain Subscales-OLS Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Academic Alienation	.069*** (.018)				
Friendship Problems		.077*** (.017)			
Time Problems			.053** (.016)		
Developmental Problems				.056*** (.014)	
General Social Mistreatment					.074*** (.017)
Model F	4.302***	5.502***	4.450**	4.479***	5.214***
Adjusted R ²	.020	.027	.016	.021	.025

N=806; *p <.05, **p<.01, ***p<.001

Note: Demographic control variables included in each regression model

When looking at this relationship with regard to any past semester misuse, the results showed that lack of calmness was positively related to PDM in each of the models where a single strain subscale was present, demonstrating evidence of an indirect effect of each of the types of strain measured here on PDM via an inability to remain calm in a disagreement. Table 30 displays these results.

Table 30: Calmness, Strain Subscales, and Any Misuse-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Calmness	.190 (.076) [1.209]**	.164 (.077) [1.178]***	.194 (.076) [1.214]**	.186 (.076) [1.204]**	.186 (.038) [1.205]**
Academic Alienation	.013 (.041) [1.013]				
Friendship Problems		.076 (.037) [1.079]*			
Time Problems			.009 (.036) [1.009]		
Developmental Problems				.001 (.032) [1.001]	
General Social Mistreatment					.026 (.038) [1.026]
Model X ²	21.473**	24.723***	21.410**	10.434**	21.363**
Nagelkerke R ²	.039	.044	.038	.037	.038

N=806; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model.

Concerning this relationship with regard to stimulant misuse, the results showed that lack of calmness could not significantly explain the misuse of this particular type of prescription drug in the past semester. This finding is similar to the one concerning the whole of the anger scale as it relates to PDM in that no indirect relationship was found between types of strain and PDM via anger as well. The results are displayed in Table 31.

Table 31: Calmness, Strain Subscales, and Stimulant Misuse-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Calmness	.120 (.098) [1.128]	.108 (.098) [1.114]	-.014 (.047) [.986]	-.014 (.042) [.986]	.126 (.098) [1.134]
Academic Alienation	.034 (.053) [1.035]				
Friendship Problems		.080 (.047) [1.083]			
Time Problems			.135 (.097) [1.145]		
Developmental Problems				.117 (.099) [1.124]	
General Social Mistreatment					.021 (.049) [1.021]
Model X ²	25.896***	27.795***	25.178***	25.521***	25.164***
Nagelkerke R ²	.058	.063	.057	.058	.057

N=806; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model.

Similar findings were also demonstrated regarding painkiller misuse in the past semester as well. Again, these subscale findings reflect those of the entire anger scale and make the case that the strain-affect relationship cannot explain, directly or indirectly, PDM in this sample. These results are displayed in Table 32.

Table 32: Calmness, Strain Subscales, and Painkiller Misuse-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Calmness	.068 (.100) [1.070]	.027 (.101) [1.027]	.066 (.100) [1.068]	.051 (.101) [1.053]	.052 (.100) [1.053]
Academic Alienation	.016 (.052) [1.016]				
Friendship Problems		.096 (.047) [1.101]			
Time Problems			.033 (.046) [1.034]		
Developmental Problems				.002 (.042) [1.002]	
General Social Mistreatment					.063 (.047) [1.065]
Model X ²	2.413	5.984	2.638	1.908	4.022
Nagelkerke R ²	.006	.014	.006	.004	.009

N=806; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model.

The misuse of “other” types of prescription drugs demonstrated a relationship to lack of calmness in each of the separate strain subscale models. In the same manner as any misuse, it appears, that the misuse of “other” prescription drugs can be explained by each of the types of strain examined in this study. These results are displayed in Table 33.

Table 33: Calmness, Strain Subscales, and “Other” Misuse-Logistic Regression

Item	Model 1	Model 2	Model 3	Model 4	Model 5
Calmness	.395 (.114) [1.484]**	.384 (.115) [1.469]**	.412 (.113) [1.510]***	.383 (.116) [1.466]**	.395 (.114) [1.485]***
Academic Alienation	.055 (.062) [1.057]				
Friendship Problems		.082 (.057) [1.086]			
Time Problems			.002 (.056) [1.002]		
Developmental Problems				.012 (.051) [1.012]	
General Social Mistreatment					.049 (.057) [1.050]
Model X ²	22.414**	23.595**	21.556**	20.236**	22.404**
Nagelkerke R ²	.063	.066	.061	.057	.063

N=806; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses. Exp(B) is displayed in brackets. Demographic control variables included in each regression model.

All PDM Risk Factors

In the final logistic regression analysis, all demographic and theoretical risk factors were included in the same model along with a measure of other substance use in the past semester. This was done in an effort to examine, when controlling for all other items of concern, which covariates and/or theories could best explain PDM in the past semester. Table 34 shows that regarding any PDM in the past semester, being female (OR=1.560) and Greek membership (OR=2.278) raised the odds of past semester misuse among demographic items. Concerning the theoretical risk factors, it is clear that the social learning items were more applicable to PDM than those of social control or general strain. Perceptions of friend PDM (OR=2.002) and more positively perceived experiences with PDM (OR=1.756) led to higher odds of past semester misuse, while higher perceived risks from PDM (OR=.760) lowered the odds of misuse. None of the social control, general strain or negative affect items demonstrated significant relationships with any past semester PDM in the full model. Other substance use also raised the odds of past semester misuse of any prescription drugs (OR=2.600).

Concerning stimulant misuse, the results are much the same. In the full model, Greek membership (OR=3.120) and other substance use (OR=4.442) significantly raised the odds of past semester misuse of stimulants. While the social control, general strain and affect items again could not significantly explain misuse, several social learning items could. As with any PDM, misuse by friends (OR=2.141) and greater perceived experiences (OR=1.950) significantly raised the odds of stimulant misuse.

Table 34: Complete Model-Logistic Regression

Item	Any Misuse	Stimulant	Pain	Other
Female	.445 (.202)* [1.560]	.473 (.269) [1.604]	.181 (.240) [1.198]	.531 (.309) [1.700]
Age	.053 (.031) [1.054]	-.073 (.057) [.930]	.052 (.034) [1.054]	.110 (.037)** [1.116]
Non-White	.125 (.202) [1.133]	.010 (.270) [1.010]	.330 (.241) [1.390]	-.268 (.320) [.765]
Greek	.823 (.291)** [2.278]	1.138 (.348)** [3.120]	-.079 (.379) [.924]	.342 (.432) [1.408]
Friend PDM	.694 (.132)*** [2.002]	.761 (.160)*** [2.141]	.034 (.157) [1.035]	.562 (.185)** [1.753]
PDM	.146 (.113) [1.157]	.097 (.156) [1.102]	.108 (.134) [1.115]	.080 (.174) [1.083]
Acceptability Perceived Experiences	.563 (.127)*** [1.756]	.668 (.171)*** [1.950]	.666 (.155)*** [1.946]	.412 (.191)* [1.511]
Perceived Risk	-.275 (.123)* [.760]	-.290 (.164) [.748]	-.111 (.255) [.895]	-.315 (.180) [.730]
Peer Attitudes	-.029 (.154) [.972]	.045 (.218) [1.047]	.026 (.186) [1.026]	-.070 (.242) [.932]
Time Spent with Friends	.162 (.094) [1.176]	.269 (.124)* [1.039]	.121 (.113) [1.129]	.018 (.140) [1.019]
Faculty Attachment	.003 (.208) [1.003]	.047 (.278) [1.048]	-.111 (.255) [.895]	.344 (.308) [1.410]
Conventional Activities	.012 (.035) [1.012]	-.045 (.045) [.965]	.019 (.042) [1.020]	-.024 (.053) [.977]
Peer Attachment	.060 (.054) [1.061]	.082 (.074) [1.085]	-.004 (.062) [.953]	.034 (.080) [1.035]
College Strain	-.008 (.016) [.993]	-.020 (.022) [.981]	.007 (.019) [1.007]	-.025 (.025) [.975]
Anger	.047 (.036) [1.048]	.032 (.047) [1.032]	.060 (.042) [1.061]	.065 (.052) [1.068]
Psychological Distress	.006 (.018) [1.006]	.021 (.025) [1.021]	-.003 (.022) [.997]	.049 (.026) [1.050]
Other Drug Use	.995 (.305)** [2.600]	1.491 (.333)*** [4.442]	.653 (.342) [1.921]	.671 (.397) [1.956]
Model X ²	177.665***	168.595***	58.581***	63.476***
Nagelkerke R ²	.306	.364	.139	.188

N=768; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses.

Exp(B) is displayed in brackets

Furthermore, greater time spent with friends (OR=1.039) also raised the odds of past semester stimulant misuse. For pain killer misuse, the only significant covariate in the full model was the social learning item of perceived experiences (OR=1.946). Concerning “other” prescription drug misuse, greater proportion of one’s friends misusing prescription drugs (OR=1.753) and greater perceived experiences with PDM (OR=1.511) raised the odds of past semester misuse. As has been the pattern thus far with this specific type of misuse, being older also raises the odds of misuse as well (OR=1.116). Overall, it remains clear that across all PDM types, when examining the effects in the context of one another the social learning items appear to best explain PDM among this sample.

User Typologies

Another aim of this study was to examine motivations for PDM. The goal of this part of the study was to identify potential user typologies into which the individuals in this sample could be grouped, in order to discover any inherent differences between those who have varying motives for misusing prescription drugs. Identifying generally why students are misusing prescription drugs and what factors are associated with these motives can have far reaching implications in prevention efforts. To accomplish this, four distinct categories of users were identified based on the motivations they provided for misusing prescription drugs. Mimicking the method used by McCabe et al. (2009) to create the typologies, the first group, termed “instrumental users” (N=160) consisted of those who misused prescription drugs only for the purposes in which they were medically intended. Compared to the McCabe et al (2009) study, this sample had 5 times the

proportion of users who were classified under this label (19% vs. 3.8%). The second group, termed “recreational users” (N=9) was comprised of those who used only for social or recreational reasons (getting high, to counter the effects of other drugs, experimentation, a safer alternative to street drugs and addiction). The proportion in this sample was on par with those in the McCabe et al. (2009) study (1.1% vs. 1.4%). Third was a “mixed motive” group (N=38) who made up half the proportion compared to the findings in the McCabe et al (2009) study (4.5 vs. 7.0%). Individuals here cited both recreational and instrumental motives for PDM. Lastly, there was the “no use” group (N=634), which was made up of individuals who did not misuse prescription drugs of any kind in the past semester. Compared to the McCabe et al. (2009) study there was a lower proportion of respondents in this sample who report no past semester PDM (75.4% vs. 87.8) Because of the low number of respondents in the recreational type group, these respondents were combined with the mixed group in the analysis bringing the total recreation/mixed motive group to 45. It should be noted that compared to the McCabe et al study, along with the prevalence of PDM being higher in this sample, that routes of administration, and co-ingestion with drugs or alcohol was not part of the criteria for assessing user type. The lack of additional criteria potentially limits the ability of this study to make the most accurate assessment of user typology and could possibly account for the differences in findings between the two investigations. To examine the degree to which these groups in this sample potentially differed from one another, a series of multinomial logistic regression models was estimated comparing each of the user types (See Table 35).

Overall, the model shows that there were indeed significant differences between users based on motivation for use. When examining the differences between instrumental and recreational/mixed motive users (instrumental=0, recreational/mixed=1), the only significant factor to differentiate them was their reported use of other drugs. Here those who reported recreational or mixed motivations were nearly 5 times as likely to have misused prescription drugs in the past semester (OR=4.705, $p<.001$). When looking at non-users as the reference group more factors appear to come into play. Compared to non-users (non-users=0), those who misused prescription drugs solely for instrumental reasons (instrumental=1) were more likely to be female (OR=1.822, $p<.01$), have Greek affiliation (OR=2.127, $p<.05$), have a higher proportion of friends who misuse prescription drugs (OR=1.841, $p<.001$) and perceive more positive experiences from PDM (OR=1.780, $p<.001$). Compared to non-users, those who cited recreational or mixed motives (recreational/mixed=1) also had higher odds of misuse if they had higher proportions of misusing friends (OR=2.850, $p<.001$), perceived more positive experiences (OR=2.326, $p<.001$), or had used other drugs in the past semester (OR=8.043, $p<.001$). Again, it appears that social learning items, specifically those representing differential association and differential reinforcement, mark the delineation between users of any type and non-users, highlighting specific aspects where prevention efforts can focus. In addition, recreational or mixed users appear to be at a higher risk for other drug use, a fact that may indicate a larger substance use problem among these users, not necessarily specific to PDM.

Table 35: Typology Comparison of Any Misuse-Multinomial Logistic Regression

Item	Recreational/Mixed vs. Instrumental Users ¹	Instrumental Users vs. Non-Users ¹	Recreational/Mixed Users vs. Non-Users ¹
Female	-.517 (.397) [.597]	.600 (.216)** [1.822]	.084 (.381) [1.087]
Age	-.007 (.064) [.993]	.047 (.033) [1.048]	.040 (.061) [1.041]
Non-White	.314 (.404) [1.368]	.086 (.215) [1.090]	.399 (.387) [1.491]
Greek	.014 (.546) [1.014]	.755 (.304)* [2.127]	.769 (.549) [2.157]
Friend PDM	.437 (.231) [1.548]	.610 (.141)*** [1.841]	1.047 (.228)*** [2.850]
PDM Acceptability	-.022 (.229) [.978]	.143 (.577) [1.154]	.121 (.219) [1.128]
Perceived Experiences	.267 (.253) [1.307]	.577 (.135)*** [1.780]	.844 (.245)** [2.326]
Perceived Risk	.080 (.238) [1.083]	-.241 (.130) [.786]	-.161 (.232) [.852]
Peer Attitudes	-.436 (.325) [.647]	.033 (.164) [1.034]	-.403 (.310) [.669]
Time Spent with Friends	-.108 (.181) [.796]	.032 (.037) [1.208]	-.039 (.075) [.962]
Faculty Attachment	.702 (.399) [2.018]	-.052 (.223) [.949]	.650 (.382) [1.916]
Conventional Activities	-.108 (.070) [.898]	.032 (.037) [1.033]	-.076 (.069) [.927]
Peer Attachment	.112 (.111) [1.119]	.038 (.056) [1.038]	.150 (.108) [1.161]
College Strain	-.037 (.033) [.964]	-.003 (.017) [.997]	-.040 (.032) [.961]
Anger	.090 (.069) [1.094]	.038 (.038) [1.038]	.127 (.067) [1.136]
Psychological Distress	.056 (.035) [1.058]	-.006 (.020) [.994]	.050 (.034) [1.051]
Other Drug Use	1.551 (.449)*** [4.715]	.534 (.349) [1.706]	2.085 (.433)*** [8.043]
Model $X^2=221.313$ ***		Nagelkerke $R^2=.332$	

¹Reference Group

N=768; *p <.05, **p<.01, ***p<.001

Note: Table includes unstandardized coefficients with standard errors in parentheses.

Exp(B) is displayed in brackets

CHAPTER 5: DISCUSSION

Hypothetical Conclusions

The findings show mixed support for the hypotheses. With regard to risk factors derived from social learning theory, perceived peer PDM as well as perceived experiences and perceived risk all demonstrated significant relationships, in the expected direction, with past semester PDM among respondents. Time spent with friends also demonstrated significance with regards to any PDM and stimulant misuse. Furthermore, perceived risk and perceived experiences regarding PDM also demonstrated significance with PDM. Each of these findings is consistent with hypotheses regarding social learning based items. While not all of the reinforcement measures nor the measure of definitions towards misuse were related to PDM, the results show support for differential association and partial support for differential reinforcement as explanations for PDM.

As no social control measures were significantly related to past semester PDM, each of the hypotheses concerning the items representing attachment, commitment and involvement were not supported. The hypothesis regarding general strain was partially supported. Findings indicated that strain was indirectly related to certain types of PDM through psychological distress. This same relationship did not hold when examining it through anger, with the exception of a solitary measure of the concept. Overall, these findings show that risk factors related social learning and strain theories can reasonably explain PDM in this sample in a manner in which the theory suggests.

Demographic Characteristics

Of all the demographic covariates, Greek membership appeared to have the most consistent relationship with any PDM and stimulant misuse in nearly all of the analyses. This supports the findings of previous studies that have shown fraternity and sorority membership to be related to greater prevalence of PDM (McCabe 2008; 2008a, McCabe et al. 2005; 2005a; 2006). This result is also not surprising in the sense that Greek membership has been associated with higher levels of substance use among college students (Bell, Wechsler & Johnston, 1997; Strote et al., 2002; Mohler-Kuo et al., 2003; Yacoubian, 2003). However, 80% of the Greeks in this study who reported PDM had instrumental motives for use, speaking to the differential nature that members of this community are misusing prescription drugs compared to other substances. In addition, being in a fraternity or sorority has been shown to carry with it a norm of heavy substance use in general as well as the fact that those within this group are heavily influenced by the peers within this social network (Carter & Kahnweiler, 2000). This data shows that respondents who have friends whom they believe misused prescription drugs in the past semester increases by 15% among Greeks compared to non-Greeks. Given the findings regarding peer associations and PDM combined with the heightened influence of those in this particular social circle on their peers, it stands to reason that substance use can have a greater impact in the Greek system than outside of it.

Age was only significantly related to “other” PDM at the multivariate level when social learning and social control were included. Overall, the slightly higher odds of misuse of sedatives, anti-depressants, and sleeping medication as one ages could be

attributed to the fact that one takes on more responsibilities, even in a college setting, as time goes on. Taking “core” courses, greater pressure to decide on post-graduation plans, and greater involvement in school related activities are just a few things that can foster feelings of anxiousness, negative mood, and sleep aberrations, which could partially explain at least the instrumental misuse of “other” prescription drugs as it relates to age. In addition, college students who report PDM are qualitatively different than college students who report marijuana and other drug use as most of the use of these substances is to get high or for other recreational reasons, while this data suggests that PDM by and large is for used instrumental reasons. However, this pattern still runs contrary to what we know regarding age and substance use as a whole which peaks between the ages of 18 and 20 (SAMHSA, 2010). A further analysis of age showed that PDM in this sample peaked between the ages of 19-21, with the highest frequency reported among 21 year olds. This could possibly account for this finding, especially given that the relationship, though significant, is not very strong.

In comparison to other studies on PDM, the current research showed little or no significant differences in misuse in the context of gender or race. Despite the fact that prior research indicates that gender is significantly related to PDM, the gender covariate did not approach significance at the bivariate or multivariate level in this investigation. Furthermore, the literature paints a less conflicted picture in regards to the race-PDM relationship in that whites are almost exclusively associated with higher frequency of use and odds of misuse. However, like gender, race did not show any significant relationship with past semester misuse, even when reducing the measure to a white/non-white

dichotomy (possibly due to the fact that the university sampled in this study is more racially/ethnically diverse than most schools). Statistically, this finding for gender and race can simply be explained by the fact that for both genders and each racial category included in the survey, there was very little variance in the reported prevalence of PDM with each group reporting roughly a rate of roughly 1 in 4, therefore ensuring non-significant differences between categories. While there were marked differences between genders and race in marijuana, other drug use, and binge drinking within this sample (males and whites having significant higher rates), PDM seemed immune from this trend. This could speak to an increasing normative nature of PDM across gender and racial groups even when compared to other, more established forms of substance use. Like the findings for age, these results indicate the merit for further study to understand these trends and risk factors as we do with other drugs of abuse.

Social Learning

Of all the theoretically derived risk factors examined in this study, the ones rooted in social learning theory appeared to possess the greatest explanatory power for past semester PDM. When focusing on the importance of peer influences (differential association), greater proportions of friends that a respondent reported as misusing prescription drugs was associated with greater personal misuse of any prescription drugs as well as the misuse of stimulants or “other” prescription drugs specifically. This finding lends merit to the idea that one’s associates can have an effect on the behavior one chooses to engage in. The greater number of friends that one associates with who misuse prescription drugs could seemingly raise the frequency of exposure to the behavior as

well as those who hold positive definitions toward it. The greater duration, priority or intensity of these associations would also play a part in raising one's odds for PDM.

Overall, with drug or alcohol using peers being cited as the most common factors in one's own substance use (Kandel, 1978; Biddle, Bank & Marlin, 1980; Lang, 1985; Barnes & Welte, 1986; Newcomb et al, 1986; Kandel & Andrews, 1987; Oetting & Beau, 1987; Newcomb & Bentler, 1989; Agnello-Linden, 1991; Hawkins et al., 1997), this finding appears to be substantively and theoretically supported.

In addition, time spent with friends each day raised the odds of misuse for any PDM as well as for stimulant misuse. This makes substantive sense as this time would be more likely to be unsupervised as compared to the other options for time spent on various activities. Furthermore, turning back to the peer PDM/peer influences aspect, if the friends that one was spending time with were misusing prescription drugs, then the respondent would also be raising their odds of misuse in that manner as well. Again, with substance using peers being such a large risk factor for substance use, it stands to reason that greater frequency and duration of association with these individuals would increase one's own risk for misuse.

The only other social learning based factor that appeared to exert greater influence over those who misused prescription drugs was that of perceived experiences. Not surprisingly, those who felt that they would have more positively rated experiences due to the effects of the drug(s) they were misusing were more likely to generally misuse prescription drugs as well as misuse, stimulants, painkillers or "other" prescriptions specifically. Overall, the idea of choosing to behave in a certain way is to maximize

reward and minimize punishment. Using this logic, when an individual perceives the use of any substance as positive in relation to its effects, their odds of use would increase. Conversely, less positive experiences would not be as enticing to the (potential) user and their odds of use would seemingly decrease.

The relationship that perceived risk had with any PDM over the past semester was weak but nonetheless significant, and shows that sensibility, safety, and caution still do factor into the PDM decision. While these substances may be seen as safe for use to treat medical conditions, not all individuals may see that as a suitable reason to use it without a doctor's orders for either the purpose that it was intended or for recreational reasons.

The findings in this study support those of previous investigations on PDM and social learning risk factors as Peralta & Steele (2010) concluded that peer associations do influence PDM among college students in the manner in which they did in this study. Furthermore, Ford & Arrastia (2008) also found that the greater amount of time socializing with friends was associated with PDM. Ford (2008) also found peer influences to be a significant factor in PDM among high school students as well as definitions favorable to PDM, which this study did not. In addition, Ford (2008) also found support for differential reinforcement. However, measures significantly related to PDM in that investigation, such as peer reactions to substance use, did not demonstrate significance in this study.

Overall, it appears that peer influences, as they were measured in this study, were the most consistent risk factor for PDM across age groups and investigations. These findings add to the extant literature regarding social learning risk factors and PDM in that

it provides a multi-item assessment of two of social learning theory's more influential factors: differential association (peer influences), and differential reinforcement. This along with a minimal measurement of definitions toward PDM expands on the examinations of single aspects of the theory and provides a more complete, multi-measure, multi-concept test of social learning as applicable to PDM.

Social Control

Social control risk factors had no significant bearing on past semester PDM among this sample. Compared to other studies looking at PDM and social control risk factors, this study displays contrary results. Ford & Arrastia (2008) found less time spent on conventional activities to be associated with PDM among college students. However, this study, using identical measures, showed no such relationship. Furthermore, Ford (2009) showed school bonds to be a protective factor of PDM among adolescents. Again, neither faculty attachment nor any of the conventional activities relating to school (studying, student organizations etc.) demonstrated a significant relationship in this study.

One reason why social control might not have been supported in this study is due to the fact that it is a college population. As previously mentioned, social control/bonding theory was constructed for and has been typically applied to children and adolescents as a means to assess risk factors for delinquency. As college students enter the emerging adulthood phase of their life, the agents of control change (i.e. parental influence), their agents of socialization change (i.e. peer influence), and they experience more autonomy to make their own decisions regarding which types of social control to be associated/involved in, compared to being forcibly placed within the constructs of

control. Furthermore, with changing influences, ideas of convention can begin to sharply differ at this point with regards to normative beliefs and behaviors. It is in this anomic period that sources of bonding and agents of social control also can shift rapidly and sharply. Common elements included as measures of the social bond such as parents, school, religion, etc. now shift in priority, and run the risk of being replaced or ignored altogether in lieu of bonds that may not foster conforming behavior (i.e. delinquent peers). Without these pillars social control and common elements across the lives of individuals (typically adolescents and children), it becomes difficult to wholly apply these risk factors to an entire population of this type. While there has been some evidence related to the presence of adult social bonds (Laub & Sampson, 2003), college students still remain too proximal to their youth to have taken on many of these adult responsibilities that foster these bonds. Therefore, according to this study, it appears that social control theory is not applicable to PDM among college students.

General Strain

There was no direct effect of college strain as it was wholly measured in this study on past year PDM; hence, the decision to assess the indirect relationship of strain on PDM through negative affect. When it came to looking at the mediating ability of psychological distress, the misuse of “other” types of prescription drugs demonstrated the only significant relationship. That is to say that college strain was related to psychological distress, which demonstrated a significant relationship with “other” PDM in the past semester.

After breaking the strain scale down into its subscales, a tactic that has been used in other studies to look at the effects of specific types of strain (Petraitis, Flay & Miller, 1995; Allison, Adlaf & Bates, 1997; Agnew, 2001), one can see more detailed results as it relates to the individual types of strain and the magnitude of effect it can have on PDM. Each of the individual types of strain were related to psychological distress, while psychological distress had a weak, yet still significant relationship with any past semester PDM in all models except the one containing the friendship problems subscale.

Regarding stimulant misuse, there was a significant indirect relationship found between PDM and time problems, general social mistreatment, and developmental problems (see Appendix A for a list of the exact measures). Stimulant misuse to deal with time problems or constraints makes substantive sense, as does using stimulants for developmental problems as they are measured here. Social mistreatment does not appear, on the surface, to have a logical connection to stimulants in particular. However, cocaine use has been associated with various stressors, including those that are socially related (Sinha, Catapano & O'Malley, 1999). As prescription stimulants can be chemically and effectually similar to cocaine, the motives for use can be similar with this particular type of drug.

No form of indirect relationship was found between any of the strain subtypes and painkiller misuse. This finding is strange as painkillers can be used, misused, and abused for both physical and emotional purposes, yet distress shows no association with its use in the context of any of the types of college strain. Even more perplexing is that this is the second most prevalent prescription drug recorded in this study, and while social

learning has a single item with a direct significant relationship to its misuse, social control demonstrated no relationship and strain, in both direct and indirect manners also shows no significant relationship to its use. This begs the question of whether theoretically-based risk factor(s) can reasonably account for painkiller misuse in the manner in which they do others types of prescription drugs.

When looking at distress and “other” PDM in the context of the subscales, we can see that distress explained PDM in the each of the models where a strain subscale is controlled. This is not surprising as the whole of the scale was significantly related to “other” PDM though psychological distress. Nor is it surprising given the types of substances that qualify in this study as “other”: sedatives, anti-depressants, and sleeping pills. Each of these, especially when taken for instrumental purposes would seemingly be to ward off some form of strain such as lack of sleep, negative mood, or anxiety. These forms of affect can be brought on specifically by strains and stressors specific to college students and college lifestyle. These include added and more difficult responsibilities as it relates to academics and the problems that go along with keeping pace with those. In addition, the social aspect of college may provide negative experiences and adjustment hardships along the way which can translate into feelings such as these. For instrumental reasons, one might turn to a coping mechanism with some utility that would help alleviate these feelings. With this logic, the use of sedatives, anti-depressants and sleeping pills would make substantive sense. As this is cross sectional data, causal ordering cannot be definitively established, however, the correlation between these items does suggest an indirect relationship between strain and affect (at least in this form), and

PDM, demonstrating at least partial support for the theory as applicable to this type of substance use.

Unlike psychological distress, anger did not facilitate a significant relationship between strain (or the strain subscales) and PDM. This finding is not surprising given previously mentioned research that cites forms of psychological distress to relate better to substance use and anger to be more closely associated with other, more expressive forms of crime and delinquency. However, when looking at the single measure centered on maintaining calmness in a disagreement, the results showed that not only was strain associated with lack of calmness, but that this measure of anger could also explain any past semester PDM and “other” misuse. This indirect relationship held true not only when using the entire strain scale to explain lack of calm, but also when using each of the subscales to explain it, and then subsequently explain any or “other” PDM. While any misuse was significantly associated with this calmness measure, it was clearly “other” PDM that drove this finding and demonstrated the greatest association. If a negative mood was the underlying cause of this lack of calmness, then anti-depressant misuse would make sense here, as would the misuse of sleeping pills if one’s demeanor was giving them sleeping problems, or vice versa. However, before any conclusive interpretations can be made regarding a finding such as this, more measures that resemble this type of anger-based mindset and demeanor should be examined in the context of strain and PDM.

When comparing the findings of general strain risk factors in this study to previous investigations, Ford & Schroeder (2009) showed that PDM was related to

academic strain and depression among college students, similar to the relationship PDM had in this study with psychological distress and academic alienation. Vegh (2011) also noted a relationship between anger, anxiety and PDM. Overall it appears that depression or anxiety (or distress as it's measured here) is a suitable medium for the strain-PDM relationship. The fact that there have been findings in other studies regarding anger and delinquency, including PDM (Vegh, 2011), demonstrates that the relationship between strain and PDM should still be further explored while examining different facets of anger. Schroeder & Ford (2012) found direct relationship between strain (operationalized as negative life events) and PDM among high school students. Despite the fact that this sample did not demonstrate any such direct relationship, it should be noted that the Schroeder & Ford (2012) study made no attempt to look at negative affect as a mediator, and again, sampled high school students, not those in college.

Based on the findings regarding academic-based strain and the ability to measure various other types of strain that also yielded significant results in this study, it may be more advantageous to focus the scope of strain as it relates to negative affect and PDM in future investigations to ascertain if different types yield different relationships to both affect and substance use. This analysis adds to the literature in that it provides both direct and indirect tests of strain on PDM, finding a good deal of support for the latter, especially as it relates to psychological distress. In addition, it tests multiple forms of affect as the medium by which strain contributes to this type of substance use. One of the important things to note about this analysis is that it tests not only multiple forms of strain, but also strains which are directly applicable to this particular population. This

allows for findings that are more applicable and representative of the target population.. This type of detailed information can go a long way in tailoring prevention efforts toward what types of strains merit the most attention due to their effect on PDM.

Full Model

The full model containing all items of interest did provide some supplemental information that was not previously established in the independent models. Greek membership still demonstrated increased odds in use for any PDM and stimulants while being older still slightly raised the odds of the misuse of “other” prescription drugs. Concerning the social learning items, friend PDM, perceived experiences, and risk were still significantly associated with the various forms of PDM in the manner that they were in the social learning-specific model, with the magnitudes of their relationships remaining similar. Time spent with friends was no longer significantly related to any PDM in the past semester, but still maintained a significant relationship in regards to stimulant misuse in the full model. One change that is noticeable now in the full model is that females now have 1.5 times the odds of any PDM compared to males. This is the first time gender demonstrated significance this study. This presents a query as to what exactly needs to be controlled for in order for gender to be significantly related to PDM. This is a topic that will be discussed in a later section. Lastly, the added substance use item was large in magnitude and positively related to any PDM and stimulant misuse. In both cases, this measure had a stronger relationship with misuse than any of the theoretical risk factors, highlighting the importance of the use of “harder” substances as it relates to PDM and confirming earlier literature that uncovered similar associations (Ford, 2008;

2009; Ford & Schroeder, 2009; Ford & Arrastia, 2008; Harrell & Broman, 2009; McCabe et al., 2007). Concerning the theoretically based risk factors, it appears as if the social learning measures were able to demonstrate the greatest explanatory power compared to those representing constructs of other theories. Again, with the importance of peers in terms of exposure and influence in the college setting, it is not surprising that these risk factors showed the most utility. Even if individuals did misuse prescription drugs based on perceived or actual strain and the subsequent negative moods, peer associations would still play a part in regards to exposure to this choice of behavior as a coping mechanism, reinforcement of the behavior, and assumedly source for the drugs themselves.

Typologies

While there have been other studies that have identified risk factors related to user types of other forms of drugs (Huizinga & Elliott, 1981; Brennan et al., 1981; Huizinga, 1982; Johnson & Huizinga, 1983), there has been no major effort to date to look at differences in risk between PDM user types. McCabe et al. (2009) compared basic demographic differences as it related to his typological analysis, but nothing to the depth of this investigation. In regards to the differences between users based on motivation, the results showed that the only factor that significantly differentiates instrumental users from those who use for recreational or mixed purposes is the use of other, harder drugs. In fact recreational or mixed users were nearly 5 times more likely to use other drugs than instrumental users. This result appears to make sense as harder street drugs would typically be used for recreational purposes as they have little to no medical use. Those with instrumental motives for PDM might not have any interest in recreationally using

substances of any kind, as they only misuse prescription drugs for their intended effects and for no other purpose. In addition, while some prescription drugs that mimic the effects of street drugs, instrumental users may choose prescription substances over other options as they may be viewed as safer, easier to obtain and a more guaranteed effect.

Compared to non-users, those who misuse prescription drugs for instrumental purposes were over twice as likely to be in a fraternity or sorority, supporting previous literature regarding PDM, substance use and those in the Greek system. This shows that despite the social norm and supported findings of substance use within fraternities or sororities, PDM occurred primarily for the intended effects of the drugs. This notion is only strengthened by that fact that this relationship is not significant among recreational/mixed users. Instrumental users were also nearly twice as likely to be female compared to non-users, supporting McCabe et al's (2009) findings regarding women using prescription drugs for "self-treatment". This justification also applies when noticing that being female was not significantly related to recreational/mixed users. Compared to non-users, having more friends who misuse prescription drugs and greater perceived experiences of PDM was demonstrated among instrumental users. This makes substantive sense when framed in the differential association and reinforcement tenets of Social Learning Theory.

Finally, recreational or mixed users were over 8 times more likely to use other, harder drugs than non-users. This too makes substantive sense, as those who are misusing prescription drugs not for their medical purposes would assumedly be more likely to misuse other drugs with similar effects or that have no medical purpose,

compared to those who are using for a legitimate reason. Similar to the findings regarding instrumental users, recreational/mixed users were also more likely to have more friends who misused prescription drugs and more positive perceived experiences as well compared to non-users. Again this shows support differential associations and reinforcement as factors in PDM.

Overall, when it comes to PDM it appears that motives have a large connection to substance use behaviors in general, and that compared to non-users, risk factors based in social learning play a significant factor in use, regardless of motive. This type of analysis is important in that it allows for a more detailed look at the dynamics of PDM and can inform prevention efforts regarding the different ways in which to approach techniques and treatment by having more thorough understanding of the risk factors specifically associated with each user type. In the next section, I will discuss the limitations of this study, practical and theoretical implications for the findings as well as propose future investigations that can be conducted in the light of this study.

CHAPTER 6: LIMITATIONS, IMPLICATIONS, AND FUTURE DIRECTIONS

Overall this study sought to accomplish a few tasks. The first was to assess the prevalence of PDM in an independently collected sample of college students. In addition to this, examining motives and basic demographic and behavioral correlates added to the current body of literature on PDM. Stemming from this was the attempt to group users into typologies and assess any similarities or differences between users based on motive, something that has been done before (McCabe et al., 2009), although not extensively and not to the depth in which this study included several different types of risk factors when examining differences between the groups.

Finally, the primary goal of the study was to assess the applicability of sociological-based risk factors on PDM. Essentially, to what extent could oft-tested risk factors based in various theoretical frameworks explain PDM in this sample? This portion of the investigation provides the greatest novel contribution to the literature as it looks at risk factors based in multiple theories, and relates the risk factors closely to the population being measured (college strain, college-typical peer associations, activities and involvement that would be characteristic of the college crowd, etc.) as opposed to general inquiries into these risk factors. Furthermore, the original sample and survey helped to ensure that the data were carefully controlled, and the measures used were close representations of the constructs they were meant to reflect. This helps to add validity to the findings by reducing the uncertainty of proxy variables that are typically used when developing an original research question, but analyzing secondary data to answer it.

The fact that there were significant findings with regard to the theory-based risk factors demonstrates partial support for learning and strain based explanations of PDM. Future research on PDM can and should continue the use of theory as a tool of explanation for this behavior, especially when looking beyond epidemiological patterns and more at social and behavioral correlates and for attempting to determine possible causations of PDM. Additionally, future work on typology investigations and what distinguishes them is also important in order to stay current on the dynamics of use as well as to provide those in the practical realm with the most detailed and accurate information by which to structure their prevention efforts toward a particular group.

Limitations

There are a few limitations to this investigation that should be noted as they could impact the interpretability of the findings and call into question the quality of certain aspects of this study. The first is the use of cross sectional data to assess the impact of various risk factors for PDM. While, this study allows us to discover and examine significant associations and connections between the two, the fact that the data does not allow for the interpretation of causation becomes problematic for proposing concrete ways in which the problem can be addressed. This can be especially troublesome when assessing an indirect relationship between PDM and strain, as this study lacks the ability to say concretely that strain led to negative affect, and that this negative affect then led to PDM. These results can only say that there was a correlation between these concepts, but not causation. This also calls into question the interpretability of the findings regarding differential association risk factors. While several times in this study having a greater

amount of friends who misused prescription drugs was associated with higher odds of misuse in the past semester, it cannot assess whether this association pre-empted one's own PDM or if PDM somehow facilitated the formation of these peer groups. Again, assessing the difference between causation and correlation can have a marked difference on the practical applications of the findings in areas such as law enforcement and public health. Furthermore, with regards to peer PDM, this study measures perceived misuse amongst the respondents' peers and has no way in which to accurately measure the PDM of one's peers nor the attitudes toward it. This can prove problematic when attempting to accurately measure peer substance use and attitudes, especially when this results from individuals projecting their own behavior onto that of their peer group (Norton, Lindrooth & Ennett, 2003). While the estimates made by respondents may indeed be genuine and close to accurate, concrete implications cannot be made using measures such as these, as they are based in subjective observation.

Next, the fact that this survey, no matter how comprehensive in both response size and content, was distributed to a sample from a single institution raises concerns about generalizability at the national level across all geographical regions and college types (public, private, religious, etc.). While the scope of this investigation was not the national level, it was nonetheless understood that this study could serve as a springboard to future projects based on the same topic. As such, it is important to determine whether the results from which conclusions are drawn are not only valid, but also reliable. Using a single institution as a sample can be a hindrance to that endeavor. Although the sample characteristics regarding PDM did not highly differ from those of national samples, the

fact still remains that this environment and geographical location is unique for a number of reasons and any sort of practical applications of these findings implemented outside this should take that into consideration.

Finally, the limitations of the self-report survey method cannot be ignored. As this study relied on honesty and transparency though anonymity to collect valid data, there is no way to verify if the responses were genuine. There may be underreporting or over reporting of many key elements of this study. By comparing things like prevalence to other self-report studies across college populations, we can loosely assess the validity of this data, but this does not guarantee accurate reporting. The fact that much of what we know comes from self-report surveys such as this nonetheless demonstrates this to be a widespread and time-tested method by which to collect this type of data. Given that there was indeed some form of uniformity in the findings compared to other studies of the like lends validity to the data garnered from this sample.

Implications

To begin in a theoretical scope, these results show partial support for theoretically based risk factors in their ability to explain PDM. This is important as it represents a lightly explored area of research regarding this type of substance use. As previously stated, much of the investigative work on PDM has centered on examining prevalence and correlations with various demographic characteristics and other behaviors. While this study looks at both of these things, it also assesses how risk factors based in sociological theory are connected with PDM. In this sense, it gives researchers the ability to assess whether theory can adequately explain PDM as it has other types of delinquency

and substance use, and if so, to what degree does it accomplish this, and how it is similar or different from the relationship to other types of drug use. This is important not only in that it can give further support to theories that have been utilized in the explanation of other forms of delinquency and substance use over past decades, but also that it can provide researchers and policy makers with a common blueprint by which to examine this particular form of substance use, and how to tailor prevention efforts. When examining these risk factors and their ability to differentiate user-types, we see that only the use of other, harder substances significantly changes the odds of past semester misuse (raising it for recreational or mixed users). This suggests that while theoretically based risk factors can partially explain differences between users and non-users, that amongst those who use, theory is of limited utility when it comes to assessing group differences. Due to this, it would seem fruitful, once a user population has been established, to examine differences between user groups based on their other measurable behaviors (substance use, delinquent behavior, etc.).

Research like this is quite useful when it comes to the application of prevention efforts and can go a long way informing them on how to tackle a problem like this through practical means. Garnering information directly from a population that is to be targeted for treatment is advantageous in that it allows for more specific and more justifiable action based on information that has been gathered, thereby increasing the effectiveness of subsequent action. In this sense, the results pertaining to the theoretically based risk factors also have applications in the practical and prevention dimensions. For the social learning based risk factors, it appears that reducing the

number of peers with whom one associates that misuse prescription drugs would be one way to reduce use. This is obviously accomplished by reducing the number of those who misuse overall. One way that is college specific that this could occur is through the use of campus and student education. Most colleges and universities have campus health and/or wellness departments with initiatives that include maintaining physical and mental health and well-being. Including as an important component of their substance use prevention information on prescription drug misuse, its consequences, and facts behind the phenomenon could help discourage many potential users. This is particularly true if individuals have misconceptions about the safety of misusing prescription drugs or in what manner they resemble/differ from street drugs.

The nature of PDM reinforcement, however, is not necessarily something that can be easily fixed, especially considering the nature of prescription drugs compared to other substances. With most of the respondents reporting taking prescription drugs for their intended effect, pending an overdose or a negative experience resulting from polydrug use or other health complication, they are assumedly satisfied with how it made them feel. With this effect being seemingly unavoidable due to the medical intent of the drug, it appears difficult to try and curb the problem from an experience angle without changing what the drug is meant to do for those to whom it has been legally prescribed by a doctor. As such, students need to have information as to the negative effects as well as to factor that into their decision of whether or not to misuse. According to these results, if perceived experiences are less positive, then this would be associated with less misuse. From a punitive perspective, the fear and certainty of sanctions (legal or

otherwise) for possession and diversion of these types of drugs without a prescription would result in a greater risk perception of use, which was shown here to be associated with lower past semester misuse. In general, education and factual campaigns focusing on social norms at the college level would be the ideal first step in reducing recreational users and providing other, safer avenues by which users can gain desired effects of the drugs they intend to misuse. Similar type programs have been researched and proposed regarding alcohol misuse on college campuses (Perkins, 2002; Wechsler et al., 2003). These can range from actually encouraging students to see a physician for a diagnosis that would require medication, or suggesting alternative, non-pharmacological ways in which an individual can handle pain, focus, improve mood, attain sleep, etc. By following this up with these aforementioned sanctions for PDM related violations, both socially and non-socially, individuals would now have reasons to rethink their decisions to misuse. The overarching goal in this case would be to change the mentality and normative definitions toward PDM. In this sense, using peer feelings and reinforcement to make clearly viewed as a norm-violating behavior, on par with the extant laws that concern it.

As far as interpreting the practical application of the strain based findings, the results show a definite connection between strain and psychological distress (and anger, to a small extent). At the very least, health and wellness initiatives on campus should focus on proper coping tactics, and preparing students for the stressor that are inherent to college life. Based on the findings, it appears that added focus should be placed on time constraints, developmental problems and general social mistreatment in the college setting, as the results showed these to be common triggers across different types of PDM.

This, in addition to presenting students with clear resources in which they can deal with distress brought on by these various strains in supportive, healthy, and legal ways can help prevent students from turning to PDM based on these negative feelings. In addition, with the clear connection between the use of other, harder drugs and PDM, especially considering the magnitude of the raise in PDM odds that other drug use brings, prevention initiatives related to all kinds of substance use must remain a priority with those promoting college health and wellness. School-based sanctions also can play an active role in this by, again, making clear that punitive action accompanies substance use and that the behavior even in the college environment still has its own sets of consequences, regardless of student norms or perceived permissiveness.

Finally, the consistent finding across most models that demonstrates that members of fraternities and sororities have a higher risk for PDM should not be overlooked in regards to policy and prevention efforts. As these groups can comprise quite large proportions of the student body at a college or university, it lends itself to reason that given the influence members of this group can have on their peers, special attention needs to be paid to members of this community with regards to substance use prevention. In this effort, a social norms approach (Carter & Kahnweiler, 2000) could be used by colleges and universities to correct norm misperceptions regarding PDM in general and in this population specifically. This has shown mixed reviews in its effectiveness of reducing binge drinking. However, as PDM is not as social engrained in the life, reputation, and stigma of traditional social fraternities and sororities as alcohol, PDM prevention might fare better using this approach. In addition, several colleges and

universities have prevention programs that target students interested in the Greek system before fraternity and sorority rush periods. These schools attempt to convey alcohol education and information to these groups of would-be Greeks before they enter the social network. This tactic takes a bottom-up approach of changing norms regarding substance use beginning with its potential new members and all those who follow in the future. PDM specific reduction efforts may be a worthwhile venture using this method.

Furthermore, mandatory substance use education for all officers of fraternities and sororities can take a top-down approach by placing the responsibility of substance use policing, education, and sanctioning in the hands of those in power at the respective houses. However, the success of this tactic relies on the fact that said officers are committed to maintaining a substance free environment, which, given the substance use norms that surround Greek life, might be too optimistic of an assumption. Therefore, sanctions that fall directly on these individuals from the university or higher governing Greek bodies for substance use infractions of the organization (including PDM) might serve as incentive for them to properly keep those in their social group compliant with any policies set forth regarding drug and alcohol use.

Among colleges and universities that desire to have comprehensive substance use prevention initiatives, it appears that ones that focus heavily on education, the promotion of physical and mental health resources, as well as punitive action for violations would best serve to deal with PDM specifically. Many schools have the funding, protocols, and collegiality between the necessary departments (health and wellness, campus education,

public safety, etc.) to see to it that initiatives such as this can be logistically designed and practically executed.

Future Directions

While this study had its own unique characteristics and novel additions to the body of literature regarding PDM, there are a few paths in which this investigation can be furthered. This is especially true considering the original data that has been collected to look at PDM among college students for this study. First, a more in depth examination of gender differences in PDM appears warranted not only because of the unique sample and depth of information gathered from it, but also because it appeared on the surface that gender was not a factor in many of the analyses done in this study with regards to PDM, the full model being the exception. This goes against the majority of the literature regarding demographic correlates and PDM that demonstrates significant differences in regards to gender and PDM. Given the fact that this study also collects a plethora of information on peer associations, social ties and, stressors, it would be fortuitous to see if any of these plays a factor in potential differences or similarities between the genders.

When it comes to using the same methodology but expanding the study into other areas related to PDM, the potential for future research expands considerably. As mentioned earlier, it would seem prudent to conduct the same study elsewhere, garnering another independently collected sample to compare to the current one used here. This would allow us to examine any potential differences in PDM based on college type, size, and geographical location. In addition, it would also add more data to the current pool

and allow the findings to be more reliably representative across different college populations.

Next, this study should be repeated on graduate students to assess any differences between the populations in question as it related to PDM. While typically graduate students are at the high end of the “emerging adulthood” age range, if not over it, the fact remains that they still have a certain level of exposure to college typical norms and behaviors. It would be interesting to see how risk factors affect this group compared to undergraduates. While substance use and binge drinking typically decrease in the post college years, graduate school for many still can represent a transitional period, where responsibilities are greater than those of an undergraduate, but perceived as less than those already involved in a career, family life, future planning, etc. In addition, the stressors that graduate students feel, particularly as it relates to school related issues, can arguably be much greater than those at the undergraduate level. This alone, combined with the fact that graduate students are relatively ignored in college level research on substance use, provides a sound justification for examining this particular group.

One aspect of PDM that was not addressed in this study was source/diversion. Especially considering the impact of differential association as a risk factor for misuse, where the prescription drugs are coming from could also be important for assessing not only misuse, but user types as well. While peers and parents have been shown to be the primary source of diversion among those who misuse prescription drugs (McCabe & Boyd, 2005), it still seems a necessary endeavor to investigate even more detailed differences in this regard across states and schools with regard to where these drugs are

coming from (close peers vs. acquaintances, primary caregivers vs. other relatives, etc.). This is especially important when taking into consideration differential access to physicians, differing prescription rates of certain drugs between states, as well as existing sanctions for PDM.

In addition, expanding the line of questioning to look at specific details of simultaneous and polydrug use in conjunction with PDM, would shed greater light on the marked association between PDM and the use of other drugs, in addition to seeing how it might relate to motives for use, specifically for recreational or mixed motive users. This is also important from a public health perspective as many substances when used in the same time period or in conjunction with one another can have antagonistic or synergistic effects. The opposing effects of two or more substances can result in a plethora of adverse health effects due to the opposing interactions of the substances within the body. Conversely, two or more substances that with similar properties can enhance the effects of one another to levels not intended by the user or that can be harmful or fatal to the user. With the rising level of PDM among college students combined with the normative use of substances like alcohol among this population, this appears to be a worthwhile venture in order to assess and prevent negative consequences related to PDM.

Finally, to address this study's inability to ascertain causes of PDM based on the use of cross sectional data, an attempt should be made to study change over time of many of the social and behavioral correlates included in this study as it relates to PDM. Examining even a smaller sample over a longer period of time (e.g. a full academic year) and in smaller intervals than a semester basis, could go a long way into looking at not

only the predeceasing correlates of PDM, but also at the causal relationship of strain and negative affect on PDM as well. A study of this type can also be used to garner novel information on temporally based motives for misuse as well over the course of a predetermined window of time.

APPENDIX: SURVEY INSTRUMENT

Instructions

- Do not write your name on this questionnaire, your responses are anonymous.
- Please circle or write in the appropriate response (you may use a pen or pencil).
- Your participation is voluntary. You do not need to answer any question which makes you feel uncomfortable

1. Please indicate your gender. Male Female

2. Please indicate your race/ethnicity. White
Black
Hispanic
Asian
Other _____

3. How old are you (in years)? _____

4. Were you enrolled in any type of school during the **FALL 2011** Semester? No Yes

5. Are you a member of a fraternity or sorority? No Yes

6. What is your cumulative grade point average? _____

7. What is your current year in school? Freshman
Sophomore
Junior
Senior
Other _____

8. Do you have an Associate's degree? No Yes

9. Do you know a faculty member, advisor, or member of the administration at UCF with whom you can discuss a personal problem? No Yes

How important is it to you to do the following after you graduate...	Not at all	A Little	Somewhat	Very
10. Get a good job or go to graduate school?	1	2	3	4
11. Get married and start a family?	1	2	3	4

On average how many hours per day did you spend on the following activities during the **FALL 2011** academic semester?

	Zero	1-2	2-3	3-4	5+
	hours	hours	hours	hours	hours
12. Studying for school	1	2	3	4	5
13. Associating with friends	1	2	3	4	5
14. Participating in sports (recreational, intramural, or intercollegiate)	1	2	3	4	5
15. Participating in student organizations	1	2	3	4	5
16. Doing community service or volunteer work	1	2	3	4	5

The following questions are about your alcohol and other drug use during the **FALL 2011** academic semester.

17. Did you participate in binge drinking? Binge drinking is defined as 5 or more drinks in a single occasion for males, 4 or more for females. One drink is equal to a 4-ounce glass of wine, a 12-ounce can or bottle of beer, a 12-ounce can or bottle of wine cooler, or a shot of liquor straight or in a mixed drink

No
Yes

18. Did you use marijuana?

No
Yes

19. Did you use other illicit drugs? (e.g., cocaine, crack, crystal methamphetamine, heroin, psychedelics, hallucinogens, ecstasy, or inhalants)

No
Yes

Sometimes people use prescription drugs that were meant for other people, even when their own doctor has not prescribed it for them. On how many occasions during the **FALL 2011** academic semester did you use the following types of prescription drugs, not prescribed to you?

	Never	1-2	3-5	6-9	10-19	20-39	40+
		times	times	times	times	times	
20. Sleeping medication (e.g., Ambien, Halcion, Restoril, temazepam, triazolam)	1	2	3	4	5	6	7
21. Sedative/Anxiety medication (e.g., Ativan, Xanax, Valium, Klonopin, diazepam, lorazepam)	1	2	3	4	5	6	7
22. Stimulants (e.g., Ritalin, Dexedrine, Adderall, Concerta, methylphenidate)	1	2	3	4	5	6	7
23. Pain medication (e.g., Vicodin, OxyContin, Tylenol 3 with codeine, Percocet, Darvocet, morphine, hydrocodone, oxycodone)	1	2	3	4	5	6	7
24. Anti-depressants (e.g., Prozac, Paxil, Zoloft, Wellbutrin, Effexor)	1	2	3	4	5	6	7

25. For what reasons did you use prescription drugs that were not prescribed to you in the **FALL 2011** academic semester (check all that apply)?

- Helps me sleep
- Helps decrease anxiety
- Gets me high
- Counteract the effects of other drugs
- Experimentation
- Safer than street drugs
- I am addicted
- Helps increase my alertness
- Helps me lose weight
- Helps me study
- Helps relieve pain
- Other _____
- Not applicable – Did not use prescription drugs

The following questions also deal with the use of prescription drugs that are not prescribed to you.

26. What percent of college students do you think use prescription drugs that are not prescribed to them?	0-10%	11-25%	25-50%	51-75%	76-100%
27. How many of your close friends use prescription drugs that are not prescribed to them?	None	Some	Half	Most	All
28. Do you agree that it is acceptable for college students to use prescription drugs which have not been prescribed to them?	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
29. Do you agree that using prescription drugs without a prescription is more acceptable than using illegal drugs like cocaine, crystal methamphetamine, or heroin?	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
30. What types of experiences would you expect to have when using prescription drugs that have not been prescribed to you?	Bad	Mostly Bad	Both Bad and Good	Mostly Good	Good
31. How much of a risk do you think college students face (physically, socially, or legally) if they use prescription drugs that are not prescribed to them?	No Risk	Little Risk	Some Risk	More Risk than Not	Heavy Risk
32. How do you feel that your peers would view you using prescription drugs without a prescription?	Very Negative	Negative	Neither Negative Nor Positive	Positive	Very Positive

Please indicate for each of the following how much it was part of your life during the **FALL 2011** academic semester?

	Not at all	Only Slightly	Distinctly	Very Much
33. Disliking your studies	1	2	3	4
34. Finding courses uninteresting	1	2	3	4
35. Dissatisfaction with school	1	2	3	4
36. Being let down or disappointed by friends	1	2	3	4
37. Conflicts with a friend	1	2	3	4
38. Having your trust betrayed by a friend	1	2	3	4
39. Not having enough leisure time	1	2	3	4
40. Not having enough time to meet obligations	1	2	3	4
41. Having a lot of responsibilities	1	2	3	4
42. Struggling to meet one's own academic standards	1	2	3	4
43. Receiving lower grades than hoped for	1	2	3	4
44. Hard effort to get ahead	1	2	3	4
45. Social isolation	1	2	3	4
46. Being taken for granted	1	2	3	4
47. Being ignored	1	2	3	4

How much do the following statements apply to you?

	Never	Rarely	Sometimes	Often	Very Often
48. I lose my temper easily	1	2	3	4	5
49. When I am angry at people, I feel more like hurting them than talking to them about why I am angry.	1	2	3	4	5
50. When I am really angry, other people better stay away from me.	1	2	3	4	5
51. When I have a serious disagreement with someone, it is usually hard for me to talk calmly about it without getting upset.	1	2	3	4	5

Please indicate how much you agree with the following statements...

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
52. I feel close with my friends	1	2	3	4	5
53. I get along well with my friends	1	2	3	4	5
54. My friends are willing to listen to my problems	1	2	3	4	5
55. It is important to maintain a relationship with a significant other (i.e., boyfriend/girlfriend)	1	2	3	4	5

Please indicate how often you felt the following during the **FALL 2011** academic semester.

	None of the Time	A Little of the Time	Some of the Time	Most of the Time	All of the Time
56. Tired out for no good reason	1	2	3	4	5
57. Nervous	1	2	3	4	5
58. So nervous that nothing could calm you down	1	2	3	4	5
59. Hopeless	1	2	3	4	5
60. Restless and fidgety	1	2	3	4	5
61. So restless that you could not sit still	1	2	3	4	5
62. Depressed	1	2	3	4	5
63. Everything was an effort	1	2	3	4	5
64. So sad that nothing could cheer you up	1	2	3	4	5
65. Worthless	1	2	3	4	5

THANK YOU

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