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Intrinsic and Extrinsic Factors of Illicit Prescription Drug Use: Where You Spend Your College Years Matters

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LINFIELD COLLEGE

Intrinsic and Extrinsic Factors of Illicit Prescription Drug Use: Where You Spend Your College
Years Matters

A thesis submitted in partial satisfaction of the requirements for Departmental Honors in
Psychology

By

Robyn A. Dolson

2012

The thesis of Robyn A. Dolson is approved.

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Thesis Advisor

May, 2012

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DATE: April 23, 2012

TO: Robyn Dolson

FROM: Kay Livesay

Committee for Human Research Participation (CHRP)

Institutional Review Board (IRB)

IORG0002606

RE: **CHRP/IRB 201112-46**

Title of research: Intrinsic and Extrinsic Factors Associated with Illicit

Prescription Drug Use: Does Building a Community Mean Building Health?

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Thank you,

Kay Livesay

Associate Professor of Psychology

Chair IRB

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Intrinsic and Extrinsic Factors of Illicit Prescription Drug Use: Where You Spend Your College
Years Matters

Robyn Dolson

Linfield College

Abstract

With college students' rates of illicit prescription drug use higher than any other groups, it is imperative that factors associated with use be explored. The current study aims to expand and integrate a currently disjointed literature that is predominately focused on individual characteristics. Social development model and social control theory are discussed throughout as theoretical support. A national sample of 454 college students took an anonymous web-based survey assessing intrinsic and extrinsic factors. Intrinsic factors were perceptions of harm, gender, stress and depressive symptoms. Extrinsic factors were type of institution, living situation, sense of school community and peer norms. Those attending private institutions or living on-campus used illicit prescription drugs significantly less and those living on-campus also had higher perceptions of harm. Multiple regression analyses and Sobel tests showed perceived peer norms fully mediated the relationship between type of institution and use, living situation and use, and living situation and perceptions of harm. Implications for these and other findings for prevention and future research in the area of illicit prescription drug use in college populations are discussed.

Intrinsic and Extrinsic factors of illicit prescription drug use: Where you spend your college years matters.

According to the 2010 National Survey of Drug Use and Health, young adults aged 18 to 25 have higher rates of illicit drug use than any other age bracket (Substance Abuse and Mental Health Service Administration [SAMHSA]). Illicit prescription drug use, defined as non-medical use of prescription drugs is the single biggest contributor to this status behind marijuana (SAMHSA, 2010). Although the results from this survey indicate illicit prescription drug use is a significant contributor to overall illicit use, they report use in the last month for prescription drugs at only 5.9% (SAMHSA, 2010). However, how illicit prescription drug use is assessed in this survey, use of household interviewing methods and a sample that includes both college and non-college populations may be undervaluing the actual prevalence for this former group. Vulnerability for college populations toward illicit prescription drug use has been supported by the 2008 installation of the Monitoring the Future (MTF) study (Johnston, O'Malley, Bachman, & Shulenberg, 2009). MTF data revealed illicit prescription drug use for college populations aged 18 to 25 is significantly higher than non-college populations in this same age range (Johnston et al., 2009). McCabe, Teter and Boyd (2006) found annual illicit use to be much higher at 14% compared to the 2010 SAMHSA result of 5.9%. Another study done in a region outside of McCabe et al.'s (2006) work also found illicit prescription drug use in the past 6 months to be 13.9% (Dolson, Tompkins, & Tompkins, 2011).

While illicit use of these substances in and of itself is not as immediately alarming as other issues that college campuses face like alcohol poisoning or rape, once the intentions and ramifications of use are considered it becomes increasingly concerning. Those intending to use prescription drugs, notably stimulants to enable them to stay up to study or complete papers in a

condensed amount of time can be viewed as using these substances in the same ways athletes have used anabolic steroids because these substances give the consumer an unfair advantage in the targeted activity. Students may also be consuming these prescription drugs as a means to get a buzz, relax or feel normal as other users do with different drugs. While this is likely a smaller population of users on college campuses, this could be the most problematic group as their behavior is congruent with precursors for later abuse and addiction (Perkins, 1997). Even those simply self diagnosing and self medicating with their previous prescriptions or those of friends and family, do not give themselves the opportunity to garner the expertise of a physician (Friedman, 2006). This missing step could easily allow them to inadvertently take something they have an allergy too or potentially create dangerous adverse effects by mixing the illicitly used drug with a current medication or medical condition (Friedman, 2006). Finally, these drugs can be a tool for more criminal behavior on college campuses like the use of Ketamine or other tranquilizers in drinks for the purpose of creating an incapacitated victim, more vulnerable to sexual assault. Thus, illicit use of prescription substances on college campuses has numerous ramifications that make it an issue every student, parent and school administration should be concerned with.

The strongest theoretical support to explain use is provided by the social development model and social control theory. These theories also provide guidance for what types of factors to investigate to better understand use. Hawkins and Weis's (1985) social development model argues that an individual's behavior is influenced by their environment. In adolescence and early adulthood the most pronounced influence tends to be peer groups, suggesting that perceived norms may play an important part in shaping an individual's willingness to partake in substance use (Hawkins & Weis, 1985; Petraitis, Flay, & Miller, 1995). If an individual has already formed

an attachment to or is just beginning to establish their role within a group of peers that use illicit substances, they are more likely to partake in an effort to adhere to the expectations of their environment (Petraitis et al.,1995). This model offers insights into the potential importance of extrinsic factors like perceived peer norms on increased illicit prescription drug use.

Similar to the social development model, social control theory also suggests the strongest predictor of use likely lies in the environment around the individual (Elliot, Huizinga, & Ageton, 1985). Essentially, as controlling forces (i.e. religious affiliation, parents, institutions like high school) in adolescence and young adulthood dissipate, the individual is more likely to explore what they could not under such controls (Elliot et al., 1985). The finding that stimulant and analgesic use increased respectively by 300% and 85.7% from the first year of college to the second gives support to this theory (Arria, Caldeira, Vincent, O'Grady, & Wish, 2008). As an individual transitions from the first to the second year of college they are typically gaining independence from parents and other controls present prior to leaving for college. As this occurs, they are able to determine their actions on their own within their increased environmental freedom. Under social control theory, the lack of these controlling factors can account for the increased substance use. Those that continue to be exposed to these controlling factors are theoretically less likely to partake in the substance use (Elliot et al., 1985).

The outlined theories advocate the importance of the environment on behavior in this age group. Thus investigating extrinsic factors that can be attributed to the college environment may provide insight into student illicit prescription use. However, the current literature is presently centered on more intrinsic factors that can be attributed to the individual. These intrinsic factors of interest have predominately been stress, GPA, Greek life participation, perceptions of harm, race, socio-economic status and athletic participation. Often, these factors have been looked at

individually across different studies carried out with different samples and methods and some have only be measured in studies assessing substance use rather than illicit prescription drug use specifically. Together, social development model and social control theory suggest intrinsic and extrinsic factors may interact to explain thoughts and behaviors, underscoring the importance of investigating intrinsic and extrinsic factors in tandem with the same sample in order to get at the nuances of college life that may play a role in this use and perceptions of harm.

Intrinsic Factors

Perceptions of Harm. Arria, Caldeira, Vincent, O'Grady and Wish (2008) conducted a study assessing perceptions of harm, defined as how harmful an individual perceives non-medical use of prescription drugs to be and illicit use of prescription drugs within a college population. In line with previous studies focusing on illicit drugs, perceptions of harm and subsequent use were found to be inversely correlated (Arria et al., 2008). This association has been replicated by other studies (Dolson et al., 2011). Echoing the findings of Arria et al. (2008), Friedman (2006) argues climbing rates of illicit prescription drug use are due to increased availability and lowered perceptions of harm. He further explicates lower perceptions of harm surrounding prescription drugs stem from the assumption that because they are legal and approved for medical consumption, they must be safe and therefore acceptable to take (Friedman, 2006).

Hypothesis 1: Consistent with past theory (Friedman, 2006; Petraitis et al., 2006) and research (Arria et al., 2008; Dolson et al., 2011), perceptions of harm will again be inversely associated with illicit prescription drug use.

Gender. A consensus on gender differences in illicit prescription drug use has yet to be reached. Both of the major national drug use surveys have men reporting higher rates of use but

this is for general illicit drug use (Johnston et al., 2008; SAMHSA, 2010). Further, both studies have issues with their assessment of illicit use because certain prescription drug categories are omitted or obscured (i.e. tranquilizers but not stimulants or stimulants are lumped in with methamphetamine). Another issue is the detailed gender findings beyond prevalence are not offered. Thus these studies do not allow proper examination of potential gender differences for illicit prescription use as a whole. A smaller scale study has replicated gender differences for illicit drug use but did not find gender differences for illicit prescription use (Simoni-Wastila, Ritter, & Strickler, 2004). Dolson, Tompkins and Tompkins (2011) also did not find gender difference in use but did find females were higher on perceptions of harm than males.

Hypothesis 2: Findings will reflect previous research with no significant gender differences for use but females will report higher perceptions of harm than males.

Stress. Broman (2005) examined the relationship of life-stress and traumatic-stress on drug use. Increased levels of life-stress were significantly associated with drug use as were levels of traumatic stress (Broman, 2005). These relationships varied by gender and race with life-stress and drug use maintaining the strongest relationship for Caucasians (Broman, 2005). In another study, stress was found to be positively associated with use but its relationship with perceptions of harm was not significant (Dolson et al., 2011).

Hypothesis 3: Stress will again be positively associated with illicit use but no relationship will emerge for stress and perceptions of harm.

Depressive Symptoms. Much of the research done on drug use and depressive symptoms has either focused on drug abuse or clinical diagnoses of depression (e.g. Deykin, Levy, & Wells, 1987). As the current study uses a healthy college population and measures the general occurrence of use, not abuse, much of this literature is not relevant to the typical college

population. However, depressive symptoms are a reality of college life as the majority experience their first depressive symptoms in their late teens and early 20's (Kessler et al., 2007). Only a few studies in the literature have used age ranges close to college population and have found a positive association between depressive symptoms and drug use (Kandel, Raveis, & Davies, 1991; Swanson, Linskey, Quintero-Salinas, Pumariega, & Holzer, 1992).

Hypothesis 4: Depressive symptoms will be positive associated with illicit use. By default of the relationship between use and perceptions of harm, depressive symptoms will be negatively associated with perceived harmfulness.

Extrinsic Factors

Type of Institution. Public or private is one of simplest extrinsic factors that can be attributed to colleges but because it is the foundation for the environment in which students are living and the theories guiding this research emphasize the importance of environment, it could be one of the most important as well. Multiple studies examining use of certain illicit prescription drugs, specifically stimulant and opioid use, with college characteristics have not shown use to differ significantly between public and private schools (McCabe, Knight, Teter & Wechsler, 2005; McCabe, Teter, Boyd, Knight, & Wechsler, 2005). Competitiveness was also measured and conceptualized in terms of less competitive, competitive and most competitive (McCabe, Knight et al. 2005; McCabe, Teter et al., 2005). Use was shown to differ significantly for competitiveness (McCabe, Knight et al. 2005; McCabe, Teter et al., 2005). In contrast, findings from Dolson et al. (2011) found general illicit prescription drug use did significantly vary by type of institution.

Hypothesis 5: Illicit prescription drug use will vary by type of institution with public school students reporting higher rates of use. Again drawing from Arria et al.'s (2008)

previously demonstrated relationship of use and perceptions of harm, public universities will also have lower perception of harm. Social control theory supports this as there is arguably more distance between authority figures and the student body on a public school campus.

Living Situation. Only a handful of studies have assessed living situation and illicit use of specific prescription drugs, finding for both stimulants and opioids, reported illicit use was higher for those living off-campus than those living on-campus (McCabe, Knight et al. 2005; McCabe, Teter et al., 2005). This is congruent with findings for general illicit prescription drug use (Dolson et al., 2011). Again following social control theory, those living off-campus would be distanced from controlling sources like resident advisors and campus security so they would be more likely to use if other factors in the environment like perceived peer norms supported such a behavior.

Hypothesis 6: In line with previous findings and theory, students living off-campus will report more illicit use than those living on-campus and will have lower perceptions of harm.

Sense of School Community. A minuscule amount of research exists on sense of community in college populations. Even less has been done with sense of school community and its association with illicit prescription drug use in this population. Broadly, sense of community has been defined as a spirit of belonging, trust in the governing structure, consciousness that trade is possible and beneficially symbiotic and finally that all these are preserved in art (McMillan, 1996). This definition has less utility when using with a sample of students. Thus, Battisitch and Hom (1997) adapted this idea into school sense of community. Using this adapted concept, it has been found that both elementary school and middle school students who had a higher school sense of community were less likely to partake in problem behaviors including

illicit drug use. Another study with children assessed school sense of community via school bonding and also found students that were more bonded to their school had lower rates of illicit substance use (Simons-Morton, Crump, Haynie, & Saylor, 1999).

Hypothesis 7: Sense of school community will differ on the dimensions of type of institution and living situation with those attending public schools and living off-campus scoring lower on sense of community. Further, it will serve as a mediator for these dimensions with use and perceptions of harm.

Peer Norms. Martens et al. (2006) assessed college students' perceived peer norms and the students' subsequent behaviors. Perceived peer norms were found to predict drug use and other risky behaviors (Martens et al., 2006). Other studies evaluating peer norms through peer involvement have also demonstrated peer activity as a predictor for future use (Boys et al., 1999). Through meta-analytic work, it has also been stated that the effect of peer influence on illicit drug use is more pronounced than for any other risky behavior (Perkins, 1997). Even when all these significant findings for the importance of peers, there is still a gap in the literature as seemingly no current research has assessed if these vary across type of institution or living situation.

Hypothesis 8: Considering the previously demonstrated differences for use and perceptions of harm for type of institution and living situation by Dolson et al. (2011) as well as how strong the empirical base for peer norms and use is as laid out above, peer norms will vary by type of institution and living situation. Peer norms reflecting more approval toward illicit prescription drug use will be present for public school students and those living off-campus. While no work has been done on perceived harmfulness and perceived peer norms, based on the

importance of peers as held by the social development model, this study hypothesizes perceived peer norms will be significantly associated with perceived harmfulness.

Rationale and Aims

With the National Center for Education Statistics (NCES) (2010) reporting 13,335,251 young adults enrolled in four year institutions in the 2010 fall quarter and given the higher use occurring for college students than their non-college peers, a diploma may now be accompanied by a substance abuse problem, PTSD from illicit prescription drug involved sexual assaults or a potentially hazardous habit of self medicating for many members of society (Johnston et al., 2008). As underscored by social development model and social control theory, it is paramount to consider the individual in their environmental context. For college students, investigating extrinsic factors that can be attributed to the school they attend captures this need to understand the environment if a behavior from an individual is hoped to be comprehended. Hence, this study aims to investigate intrinsic factors attributable to the individual as well as extrinsic factors attributed to the educational institution as a means of understanding illicit prescription drug use in college populations. Due to the narrowly applied research scope of previous studies from only studying one risky behavior like alcohol use and often just one potential intrinsic explanatory factor, the literature has become disjointed with studies from a host of different researchers using measures and samples with little attention paid to consistency and integration. Thus this study also seeks to unify the current state of research through an investigation of multiple factors, both internal and external using the same sample. Finally, with Hawkins, Catalano and Miller's (1992) research suggesting targeted prevention toward risk and protective factors have the best chance of decreasing illicit drug use, it is essential to identify these factors and their relationships

among each other. Information gathered on these from this study can then be applied to improve the prevention efforts of U.S. colleges and universities.

Method

Participants

Undergraduate and graduate students from across the nation were recruited using a variety of internet mediums. Students from the same academic institution that this study was conducted at were recruited via an email invitation containing the survey link distributed through student services. These students were compensated with participation credit for an introductory psychology class and/or entrance into a drawing for a \$50, \$75 and \$100 cash prize. Students from other colleges and universities were recruited through an invitation containing the survey link posted on Facebook by several public university students from schools across the country and on the psychology and sample size pages of an internet community called Reddit that has become exorbitantly popular with college students. Students recruited via Facebook and Reddit were offered the chance to enter into a drawing that would provide a new Kindle to two of the participants once they completed the survey. Means of recruitment different than that used for the students attending the study's institution were necessary because the public universities that were contacted to send out the email invitation had declined to do so for administrative reasons.

The final sample consisted of 454 undergraduate and graduate college students, 32.6% male, 67% female and .2% identified as other. Ages ranged from 18-25 ($M = 20.04$). The sample was predominately Caucasian at 80.6%, 8.4% were Asian, 4% were Hispanic, 2% were Native Hawaiian, 1.8% were Native American, 1.8% were African American and .9% were Middle Eastern. Participants were from 70 different colleges and universities, encompassing all regions

in the U.S. with over half of the sample attending 5 of these institutions. The majority of the sample attended private institutions (72.5%) and lived on-campus (68.5%).

Measures

The online survey received IRB approval, was completely anonymous and required informed consent to participate. The survey addressed demographic information, illicit prescription drug use, perceptions of harm pertaining to these drugs, stress, school sense of community, perceived peer norms and depressive symptoms.

Demographics assessed SES, GPA, gender, ethnicity, living situation, honor society involvement and which school the participant was currently attending.

Illicit Prescription Use. To avoid social desirability biased responses and to provide a clear definition, illicit prescription drug use was assessed by asking participants in a yes/no format if they had consumed any prescription drug in the past 6 months that were either not prescribed to them or were taken for a purpose other than what they were originally prescribed to them for. Phrasing questions in this way made it possible to avoid the word “illicit”. Those that answered affirmatively were also asked to indicate in a yes/no format which categories of prescription drugs they had consumed in the past 6 months that were either not prescribed to them or that were taken for a purpose other than what they were originally prescribed to them for. These categories were opioids, tranquilizers, stimulants and mood enhancers. Each category included examples of popular drugs that were included within them as well as alternative names for the categories provided when applicable (e.g. analgesics for opioids).

Perceptions of Harm. Perceptions of harm were assessed with items adapted from the Monitoring the Future Study (Johnston et al., 2008). On a 4-point Likert scale, ranging from 1 (*no harm*) to 4 (*a lot of harm*) and 0 (*I don't know*), participants rated how harmful they

perceived each of the four categories of illicit prescription drugs to be if taken once in the course of 6 months as well as if on a regular basis. How harmful participants perceived illicit prescription drug use in general to be if consumed once in the course of 6 months and on if a regular basis was also assessed using this scale. An item from this measure would include “How much do you think people harm themselves if they use Analgesic/Opioids (ex. Vicodin, Codeine, Oxycontin/Oxycodone, Percocet) for non-prescription purposes once in the course of 6 months”. The perceptions of harm general questions of 6 months and regular use were summed with higher scores reflecting higher perceptions of harm.

Stress. The Student-life Stress Inventory (SSI) was used to assess stress because it is especially tailored for the life stress of college students. This measure consists of 51 items with an alpha of .92 (Gadzella & Baloglu, 2001). These items are divided into nine areas within two subcategories of “stressors” (e.g. I have experienced pressures as a result of competition (on grades, work, relationships with spouse and/or friend) and “reactions to stressors” (e.g. When under stressful situations, I have cried) (Gadzella, 1991). These nine areas are frustrations, conflicts, pressures, changes, self-imposed stress, physiological reactions, emotional reactions as well as behavioral and cognitive appraisals. Each item is rated on a 5-point Likert scale ranging from 1 (*never*) to 5 (*most of the time*) (Gadzella, 1991). Two items are reverse scored before summing all items for a total stress score. Higher scores on this measure reflect higher levels of stress.

Depressive Symptoms. Depressive symptoms were measured using the Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). It contains 21 items that offer a set of 4 statements each. Each set of statements represents a facet of depressive symptoms. Respondents select the statement that best matches how they feel. Statements range

from 0 to 3, with 0's statements indicating a non-depressive response and a 3 indicating a very depressive response. For example, the BDI asks "Check the option that is most applicable to you: I do not feel sad, I feel sad, I am sad all the time and I can't snap out of it, I am so sad and unhappy that I can't stand it". Items are then summed with higher scores reflecting more severe depression. With non-psychiatric populations like the non-clinical college sample used in the current study, the BDI has a .81 coefficient alpha (Beck, Steer, & Carbin, 1988).

Sense of Community. Battistich and Hom's (1998) measure Sense of School Community (SSC) for grades 6-8 was used to assess college sense of community because it is the most widely used measure of its kind. Additionally the period schedule of middle school put the focus of the items on the school rather than a single classroom which made all the items easily read as applicable to college. The SSC consists of 18 items with an internal consistency of .82 (Battistich & Hom, 1998). This measure is broken into a "school supportiveness" sub-scale (e.g. Students at this school are willing to go out of their way to help someone) and an "autonomy and influence" sub-scale (e.g. Students have little chance to have their ideas heard at this school) (Battistich & Hom, 1998) Responses to these items are on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Seven items are reverse scored before summing all items for a total sense of school community score with higher scores reflecting a higher sense of school community.

Perceived Peer Norms. Perceived peer norms were assessed using a composite of techniques that have been used in previous research. Both how participants perceived how friends felt (e.g. Johnston et al., 2008) and how participants perceived friends' behavior (e.g. Boys et al., 1999; Martens et al., 2006) was included in this measure. Specifically, participants were "How do your friends at the school you attend feel about using prescription drugs illicitly"

and “How many of your friends at the school you attend use illicit prescription drugs”. These questions were also asked for the specific categories of prescription drugs including opioids, tranquilizers, stimulants and mood enhancers. These items were scored on a 5-point Likert scale ranging from 1 (*strongly opposed*) to 5 (*strongly in favor*). Participants were also asked how many friends they had at the school they attend that used prescription drugs illicitly as well as how many friends they had at the school they attend that illicitly used each category. These items were also scored on a 5-point Likert scale ranging from 1 (*all*) to 5 (*none*). Categorical substance use items were reverse scored before they were summed with categorical how friends felt items to produce a total peer norms score. Lower scores reflect peer norms less approving of illicit prescription drug use.

Procedures

Each link provided in the e-mail invitations and the invitations posted to Facebook and Reddit directed students to the online anonymous survey. The survey was housed on a secure site on a password protected account until it was transferred for statistical analysis. Once transferred it was maintained on a password protected drive.

Procedures for data and variable handling were also implemented. Gender was re-coded into a dichotomous variable for any analysis using it because only one participant reported their gender as “other”, preventing any effective group comparisons between “other”, male and female. Although 70 colleges and universities participated in the survey only 5 had a sizable number of students participate. Accordingly, to make group comparisons meaningful, all data from participants across the 70 academic institutions were collapsed into a dichotomous variable of private vs. public institutions based on the school’s self designation provided on their website. Any participants with less than 75% of their items completed for SSI, BDI, SSC, peer norms and

perceptions of harm, were excluded from any analysis pertaining to their incomplete measure. Participants within this acceptable threshold with missing data had their missing items on a particular measure replaced with their overall mean on that measure. Additionally, one item from both the SSI and BDI had to be omitted as the item pertained to suicidal ideation and given the anonymous nature of the study, duty to report could not be fulfilled. Those that answered 0 (*I don't know*) to one of the questions assessing perceived harm were not included in any analysis that used that particular question. General perceptions of harm were computed by summing only the general items. This was done because a good portion of the sample did not answer the questions for the specific categories but most answered the two general perceptions of harm questions thus summing it in this way allowed more of the sample to be included and eliminated the need for mean imputation.

Results

General Sample

Illicit prescription drug use was reported by 13.9% of the sample. Average scores on the SSC ($M = 64.13$; $SD = 8.66$) and SSI ($M = 135.85$; $SD = 23.35$) were relatively high for the sample while BDI scores ($M = 28.91$; $SD = 8.13$) and peer norms scores ($M = 16.64$; $SD = 5.03$) were low. Average perceptions of harm scores ($M = 3.06$; $SD = .56$) indicated the sample felt there was at least some harm in consuming prescription drugs illicitly.

Intrinsic Factors

Perceptions of Harm. A point biserial correlation computed for general use and perceptions of harm showed a significant inverse relationship (see Table 1).

Gender. A chi-square to assess gender differences in use showed there were no significant differences between males and females $\chi^2(1, N = 405) = 1.14, p > .05$. An

independent groups *t*-test for gender and perceptions of harm revealed females ($M = 3.09$; $SD = .53$) have significantly higher perceptions of harm toward illicit prescription drugs than males ($M = 2.98$; $SD = .60$), $t(395) = -1.97$, $p = .05$.

Stress. Using a point biserial correlation, no significant relationship between general use and stress was found. There were no significant differences in stress levels between public and private institutions nor were there significant differences in stress levels between on-campus and off-campus participants.

Depressive symptoms. A point biserial correlation signified no significant relationship between use and BDI. An independent groups *t*-test showed BDI was not significantly different for types of institutions or living situations. BDI scores did however, share a significant inverse relationship with sense of school community (see Table 1).

Extrinsic Factors

Type of Institution. A chi-square assessing use and institution type showed use was higher at public schools compared to private schools $\chi^2(1, N = 404) = 4.77$, $p < .03$. However, an independent samples *t*-test did not find significant differences between institution types for perceptions of harm.

Living Situation. A chi-square assessing use and living situation showed use was higher for those living off-campus $\chi^2(1, N = 406) = 10.60$, $p = .001$. Significant differences between living situations on perceptions of harm were found using an independent groups *t*-test. Those living on-campus ($M = 3.10$; $SD = .54$) had higher perceptions of harm than those living off ($M = 2.95$; $SD = .57$), $t(396) = 2.54$, $p < .02$.

Sense of Community. A point biserial correlation found no significant relationship between use and sense of community. An independent groups *t*-test found significant differences

between sense of community and types of institution as well sense of community and living situation. Public school participants ($M = 61.40$; $SD = 9.90$) scored lower on the measure than private school participants ($M = 65.04$; $SD = 8.04$), $t(396) = 3.67$, $p = .0001$. Those living off-campus ($M = 61.88$; $SD = 9.55$) scored lower on the measure than those living on-campus ($M = 65.11$; $SD = 8.06$), $t(397) = 3.47$, $p = .001$.

Peer Norms. A point biserial correlation showed a positive association between use and peer norms (see Table 1). A significant negative relationship between peer norms and perceptions of harm as well as with sense of community was found using a Person's correlation (see Table 1). An independent samples t -test showed public school participants ($M = 17.77$; $SD = 4.99$) had peer norms that were more approving of illicit use than private school participants ($M = 16.28$; $SD = 4.98$), $t(397) = -2.56$, $p = .01$. Another independent samples t -test showed off-campus participants ($M = 18.60$; $SD = 4.84$) had peer norms that were approving of illicit use than their on-campus counterparts ($M = 15.80$; $SD = 4.88$), $t(399) = -5.26$, $p = .0001$.

Multiple regression analyses were conducted for peer norms with institution type, living situation, use and perceptions of harm. Baron and Kenny's (1986) guidelines for mediation and determining the strength of a mediation were employed for all three models. Institution type predicted use $R^2 = .01$, $F(1, 403) = 4.81$, $p < .03$. Institution type also predicted peer norms $R^2 = .02$, $F(1, 398) = 6.56$, $p < .02$. Finally, peer norms predicted use, controlling for type of institution $R^2 = .06$, $F(2, 397) = 13.03$, $p < .0001$. When peer norms were controlled for, the relation between institution type and use dropped. A Sobel test was used to determine if this drop when peer norms were controlled for was significant. Because the test came back as significant, $z = 2.19$, $p < .03$, peer norms is a mediator for institution type and use. The multiple regression also showed controlling for peer norms caused use and institution type to drop to non-

significance ($p = .15$), indicating full mediation. See Figure 1 for a model of this meditational relationship.

Living situation also predicted use $R^2 = .03$, $F(1, 405) = 10.83$, $p = .001$ and peer norms $R^2 = .07$, $F(1, 400) = 27.71$, $p < .0001$. Finally, peer norms predicted use controlling for living situation $R^2 = .07$, $F(2, 399) = 14.77$, $p < .0001$. When peer norms were controlled for, the relation between living situation and use dropped. A Sobel test was used to determine if this drop was significant. Because the test came back as significant, $z = 3.14$, $p = .001$, peer norms is a mediator for living situation and use. Further, the multiple regression showed controlling for peer norms caused use and living situation to drop to non-significance ($p = .053$), indicating full mediation. See Figure 2 for a model of this meditational relationship.

Living situation predicted perception of harm $R^2 = .02$, $F(1, 397) = 6.43$, $p = .012$. Living situation also predicted peer norms $R^2 = .07$, $F(1, 400) = 27.71$, $p < .0001$. Finally, peer norms also predicted perceptions of harm controlling for living situation $R^2 = .07$, $F(2, 394) = 13.56$, $p < .0001$. When peer norms were controlled for, the relation between living situation and perceptions of harm dropped. A Sobel test was used to determine if this drop was significant. Because the test came back as significant, $z = -3.27$, $p = .001$, peer norms is a mediator of living situation and perceptions of harm. Further, the multiple regression showed controlling for peer norms caused perception of harm and living situation to drop to non-significance ($p = .17$), indicating full mediation. See Figure 3 for a model of this meditational relationship.

Discussion

General Sample

Illicit prescription drug use was reported by 13.9% of the overall sample. This prevalence rate is identical to a 2011 study of pacific northwest public and private academic institutions as

well as a 2006 study using a single public institution in the Midwest (Dolson et al., 2011; McCabe et al., 2006). However, this rate is far higher than the 5.9% reported by the National Survey of Drug Use and Health (SAMHSA, 2010). Because the National Survey of Drug Use and Health includes participants within the ages 18 to 25 that are college and non-college attending, the 13.9% prevalence in the present study likely reflects Johnston et al.'s (2008) finding that those attending college used prescription drugs illicitly more than their non-college attending peers. The differences in methodology between the national Survey of Drug Use and Health and the present study's methodology is striking in that the former uses an in-home interview rather than an anonymous online survey (SAMHSA, 2010). Research has found responses to interview based surveys to be less accurate than anonymous web based surveys because web surveys had less social desirability response bias (Chang & Krosnick, 2008). Accordingly, social desirability bias in an interview assessing a risky or embarrassing behavior is likely to be high, reducing the number of those reporting use. This could indicate the current study's finding of 13.9% is a potentially more accurate reflection of national illicit prescription drug use in college aged populations. It has been argued the rates of illicit use are so high because of accessibility, affordability in comparison to street drugs and perceived safety in their recognition as a legitimate treatment (Friedman, 2006). Disagreement between the current findings and those reported by previous research continue within the intrinsic factor results as perceptions of harm and gender are the only intrinsic variables that ran parallel to previous work.

Intrinsic Factors

Perceptions of Harm. As predicted and in accordance with Arria et al. (2008), as perceptions of harm scores increased, use decreased. This finding extends Arria et al.'s (2008) work because it generalizes it to a national sample rather than the single state university used in

his original work. The relationships between perceptions of harm and other considered factors will be discussed below as each related factor presents.

Gender. In accordance with previous research and the current hypotheses, no gender differences were found for illicit use but females did have higher perceptions of harm (Simoni-Wastila et al., 2004; Dolson et al., 2011). A lack of gender difference in use compared to findings of gendered use in a host of other drugs, could be due in part to the popularity of prescription drugs on college campuses as seen in the higher rates of use compared to non-college samples in the same age (Johnston et al., 2008). This combined with women now outnumbering men in college enrollment, could mean these unique circumstances encourage more female participation (NCES, 2010). Additionally extrinsic factors specific to characteristics of being a college student or characteristics attributable to particular kinds of colleges (i.e. public vs. private) may be acting on both genders in similar ways so that it is college related factors encouraging both genders to take them rather than factors that differ between males and females. This would produce no significant gender differences of use but it would produce differences between users and non-users on other dimensions which is supported by other findings within this study. It seems illicit prescription drug use may be an equal opportunity substance and prevention should treat it as such by targeting both genders. While perceptions of harm did have a significant inverse relationship with use with females reporting higher perceptions of harm, this likely this did not translate into females having lower rates of use because other extrinsic factors attributable to college might have stronger relationships with use than perceptions of harm does. This idea is further supported by the gendered difference found on perceptions of harm just meeting the cut-off of significance at $p = .05$.

Stress. In contrast to previous findings (Broman et al., 2005; Dolson et al., 2011) and hypothesized results, stress did not have a significant relationship with use or perceptions of harm. As previously mentioned, the total SSI score for the sample was relatively high. Upon reviewing the sample from my previous study (Dolson et al., 2011), the sample stress scores in the current study is several points higher ($M = 135.40$ vs. $M = 131.8$). As users are typically from public institutions and the original sample only had one public university while over half of the participating schools in the new sample are public institutions, it is possible this caused the previous relationships between stress, use and perceptions of harm to dropped to non-significance. This would suggest a correlation between stress and use was more pronounced at that particular institution. Thus with a national sample, it seems to be extrinsic factors that have a significant relationship with use and perceptions of harm. Additionally, while both surveys were given at around the same time in the year, the one public institution that participated in the first study was in the midst of mid-terms when the survey was in circulation. With a national sample in the current study, there is a wide range of stages of testing and completion that universities are in. Thus, some private schools in this sample may have been in their final's week while some public schools may have already been out for summer. If this is the case, there could have been lessened stress among some participants in the public schools, a group that typically uses more, and increased stress among some participants from private schools, a group that typically uses less. This shift in some participants could have evened the levels of stress enough to dissipate the relationship that was previously found. Future research that examines stress and uses a national sample should match participants from public and private schools based on their testing time Tables for mid-terms and finals to possibly get a more reliable indication of whether stress is associated with use or perceptions of harm. Finally, a non-significant relationship for stress is

potentially because this study looks only at prescription drugs. Had the scope been expanded to drinking, cigarettes or marijuana, a relationship between stress and use would have most likely emerged as these are more commonly used (SAMHSA, 2010).

Depressive Symptoms. Contrary to the hypotheses and other research findings that have shown depressive symptoms to be predictive of substance use (Kandel et al., 1991; Swanson et al., 1992), depressive symptoms in the current study were not found to be associated with illicit use or perceptions of harm. One reason this may have occurred is the majority of the research that has found these associations between depressive measure scores and use was done with adolescents rather than early adulthood participants. Additionally, other studies have had a good portion of their sample qualify as depressed (48.08%) as opposed to only 13% who qualified for cut-off scores indicating clinical levels of symptoms in the current study (Swanson et al., 1992). It seems possible that perhaps depressive symptoms don't have a significant relationship with use or other factors like perceptions of harm until they reach clinically meaningful levels. In a predominately healthy college sample, it makes sense that these relationships would be less salient. Likewise, if the survey was not anonymous and the suicidal ideation question was left in, this item might have predicted use, similar to other findings (Kandel et al., 1991). Type of drug may again come into play as current research has not examined depressive symptoms and general illicit use of prescription medication. Hence, if this study had included drinking or marijuana use, relationships may have emerged. While few intrinsic factors demonstrated a connection with use or perceptions of harm, extrinsic variables revealed many factors associated with illicit use and perceptions of harm.

Extrinsic Factors

Type of Institution. Higher reports of use for public school campuses are in line with the hypotheses of this study and replicate prior (Dolson et al., 2011). However, the only other researchers I can locate who have looked at type of institution and its relationship with specific illicit prescription drug use did not find public or private status to be a significant factor (McCabe, Knight, et al., 2005; McCabe, Teter, et al., 2005). They did however find competitiveness to be significant. It is possible that as both their studies and the current study used national samples, that the current study just happens to have private schools that are considerably competitive and public schools that are considerably not, inducing a seemingly different result between the two. However, as this finding has replicated from previous work with schools in the pacific northwest, it seems more likely that public and private is a significant factor for general use and perhaps just not for specific substances as emphasized by the other work in this area (Dolson et al., 2011; McCabe, Knight, et al., 2005; McCabe, Teter, et al., 2005). Higher rates of use at public schools aligns well with social control theory because those attending public institutions are more likely to have separation from the controlling forces of administration, campus police and resident advisors present at their school simply due to the size of the student population and campus. By comparison it seems far more difficult to keep track of student behaviors at public schools because of this size as opposed to private school campuses where proximity to controlling facets would be arguably much closer.

Unexpectedly and in contrast to prior findings, perceptions of harm did not significantly vary between institution types. With the demonstrated association between perceptions of harm and use both presently and elsewhere with Arria et al. (2008) as well as use differing between institution types, it follows that perceptions of harm should vary by institution type as well. Parsimoniously, perceptions of harm not varying on the same dimensions of use can be

explained by their lack of a perfect relationship. While the .16 correlation coefficient for use and perceptions of harm is significant, it one of the smallest significant correlations in the study.

Another possibility is a different factor can partially account for type of institution and use beyond perceptions of harm. The discrepant findings between last year's study and this year's could be due, in part, to the use of a single public institution in the first study. This public school, for whatever reason, may have had an exceptionally lower perception of harm than that which is found when scores are aggregated across many public institutions in the U.S. as it does in the current study.

Living Situation. Congruent with current hypotheses and studies that have found participants living on campus report less illicit use than those off-campus (Dolson et al., 2010; McCabe, Knight, et al., 2005; McCabe, Teter, et al., 2005), reported use did vary by living situation. The chi-square for living situation and use was more significant than the chi-square for institution type. This fits with the idea put forth in the previous paragraph regarding social control theory's role in use at public schools. Essentially the same lack of proximity and theoretical support of social control theory is present for living off-campus as going to a public school but living off-campus completely removes students from resident advisors. This added distance from authority beyond that offered by public schools alone could account for the more significant finding here. Additionally, although schools vary widely on their requirements for their residents to live on campus, nearly every school does require freshman to take a health class or attend a prevention and college safety lecture. These educational programs set the boundaries for school tolerance and expectation. Those that continue to live on-campus remain in the presence of these expectations set by the institution early on. Under social control theory, the

institution acts as an authority Figure and as such those living on-campus adhere to the expectation instilled by their institution more than those living off-campus (Petraitis et al., 1995).

Previous research has found commitment to school to be a significant factor for drug use, citing a lack of engagement as a predictor of use (Hawkins, Catalano, & Miller, 1992).

Accordingly, those living on-campus may have more opportunities to participate in school activities or be active in more school organizations that give them a heightened sense of responsibility to the institution as an authority and a healthy alternative to drug use. Schools with the capability may consider requiring students to live on-campus longer or requiring those living off-campus to be involved in at least one school organization to renew this sense of responsibility to these constraining forces.

Differences in use may also be due to the division in public and private schools. Private schools require students to live on campus longer than public schools. The current study exemplifies this as 62% of the private schools in the current study require students to live on campus for at least 2 years. It is then reasonable to question if the same differences are seen for those living off-campus as type of institutions, the driving factor behind it may not be related to living situation at all, and rather it may be the type of school attended. However, the opposite is also possible. Living off-campus could in and of itself contribute to higher rates of use and lower perceptions of harm and as there are more students living off-campus at public institutions, it may appear as though the school is a driving factor in differences of use when it is actually living situation. If living situation were merely mirroring type of institution then living situation would not be a more significant finding ($p = .001$ vs. $p = .029$), suggesting living situation may matter more for use than type of institution does. This fits with previous studies that have only found differences for living situation (McCabe, Knight, et al., 2005; McCabe, Teter, et al., 2005).

Further, if the variables were inadvertently measuring the same thing, perceptions of harm should also be mirrored and they are not.

Perceptions of harm did match the original hypothesis as well as the findings of Dolson et al. (2011) and Arria et al. (2008). Perceptions of harm did vary by living situation with participants living on-campus possessing higher perceptions of harm. The continued presence of authority figures after the initial health or drug class has made clear the rules and perceptions the campus holds toward illicit prescription drug use may serve to maintain perceptions of harm for those that remain on campus. If the campus's perception of harm serves as a piece of initial education that receives maintenance by remaining on campus and if perceptions of harm was found to be significantly associated with peer norms, the campus perceptions of use propagated by these classes may act as a peer norm with the campus functioning as a peer for those living on it. Future research should assess perceptions of harm for freshman following the education program used by the school and then re-assess perceptions of harm each year until the student moves off-campus to see if this shift in perceptions of harm can actually be observed as the student gets further away from the authority of the campus. This would provide less speculative evidence in this particular case for social control theory as it applies to illicit prescription drug perceptions of harm and use in college.

Sense of School Community. In light of Dolson et al.'s (2011) finding of differences in use for type of institution and living situation, the current study hypothesized there would be differences in sense of school community for type of institution and living situation. It was also hypothesized that sense of community would be associated with use and act as a mediator for living situation and use as well as for type of institution and use. However, this was not the case because while sense of community did vary between types of institutions and living situations, it

was not associated with use. However, it was associated with perceptions of harm. Studies that have shown sense of school community is associated with illicit drug use are not necessarily contrary to these findings because they cannot be directly compared (Battisitch and Hom, 1997; Simons-Morton, Crump, Haynie, & Saylor, 1999). These previous studies only looked at risky behaviors and illicit drug use in children and adolescents. As their samples and specific risky behaviors are different from this study's college sample and focus on illicit prescription drug use, these studies provide more of an initial basis for hypothesis formation.

While sense of community was not directly associated with use, it is associated with perceptions of harm and peer norms which are both associated with use, may suggest sense of community plays an indirect role in use by potentially acting on an indirect pathway via these other variables. For instance, type of institution is associated with sense of community; sense of community is associated with peer norms which are in turn associated with use. Elliott, Ageton and Canter's (1979) blending of social control theory into an integrative approach highlights how community is important in understanding risky behaviors. Of course, as no direct relationship with use was found, this would apply to the indirect pathways to use that sense of community might operate on. Elliott et al. (1979) explains how social bonds, comprised of what they call integration and commitment to these bonds as well as attenuation experiences, particularly failing to fit in with the conventional setting or in this case, the conventional community can prompt an individual to pursue delinquent behavior. This seems particularly salient for lowered sense of community for those living off-campus. Under this integrative theory, it is possible that low sense of community due to an individual's failure to fit into the conventional setting or failure to make social bonds is why some individuals move off campus in the first place (Elliott et al., 1979). This could suggest lowered sense of community comes from an internal inability to

adapt and the physical location is a byproduct of that rather than lowered sense of community being a byproduct of different living situations. Future research should investigate these in direct pathways in an attempt to create comprehensive model for illicit prescription drug use for college populations. The application of Elliott et al.'s (1979) integrative theory as suggested here should also be explored, likely by gathering motivations for living off-campus and selecting public universities over private ones.

Peer Norms. This study only hypothesized peer norms would be positively associated with use and that peer norms would differ between types of institutions and living situation. Both of these were validated in the findings but peer norms were also found to play the meditational role that sense of community was expected to. Peer norms is now the factor aiding in explaining use for living situation and type of institution as well as for living situation and perceptions of harm. What else wasn't expected was the negative relationship between perceptions of harms and peer norms. This relationship prompts the question- is perceiving believing? This finding makes it a possibility that internalized perceptions of harm are rooted in external perceived norms. However, it could easily be more complicated than this. Pre-existing internal perceptions of harm could shape peer group selection so that peer norms are in line with the selector's own perceptions of harm rather than the external transforming the internal. This interesting interaction between intrinsic and extrinsic factors is precisely why it is so essential to assess both types of factors in tandem within the same sample.

Through multiple regression and Sobel tests, peer norms were found to fully mediate the relationship between type of institution and use as well as living situation and use. Peer norms also fully mediated the relationship between living situation and perceptions of harm. This finding potentially extends the work of Martens et al. (2006) because they also found peer norms

to predict use but did not attempt to measure a third variable so no mediational relationships could be investigated. The current study does measure several other variables which allowed such exploration. Given the predictive relationship found by Martens et al. (2006) it is possible that if they had extended their sample outside of a single institution or included living situation, they could have found similar mediational relationships to this study's findings. The mediational status of peer norms and its strength is in direct correspondence to the social development model's emphasis on social relationships as a means of understanding behavior. For this age group, social development model places the most influence on peers which seems patently true given that peer norms are a mediator of the behavior of use as well as the cognitive component of perceptions of harm in this sample. Findings for an effect of peer norms on behaviors and cognitions are strong support for social development model's tenant that the individual as a whole can be understood by considering their environment.

Peer norms also fully mediated the relationship between living situations and perceptions of harm. Peer norms are a stronger mediator for living situation and perceptions of harm than living situation and use. Because the study assessed peer norms by asking how friends at the school participants attended felt and behaved toward illicit use and considering peer norms are negatively associated with perceptions of harm, this stronger mediator for perceptions of harm than use is likely due to the peer norms being tied to the school campus. Peer norms being a weaker mediator for use and living situation is likely because other components are in play like increased accessibility to these drugs and distance from authority Figures. These are aspects that are actually tied to living off-campus that could minimize effects for peer norms whereas peer norms and perceptions of harm are linked back the campus in the way the question is asked so

there are fewer outside variables that may be lessening the effect of peer norms on perceptions of harm.

Because perceptions of harm do not differ for types of institution like they do for living situations, it is likely that different factors act on the relationship between these variables and use so perhaps prevention programs should be tailored for on/off campus rather than just a blanket program for the school. However, regardless of how tailored a program may be, because peer norms cuts across both variables and mediates their relationships with use, peer norms are paramount to have included in any prevention. This suggestion is in agreement with Martens et al.'s (2006) belief that interventions should target peer norms. Zeroing in on a factor that has been shown to fully mediate the relationship between two extrinsic factors and use as well as one extrinsic factor and perceptions of harm is probably the most pragmatic way to see results. This is particularly important because targeted prevention in this instance is far cheaper and requires less reorganization on a school's part. This is due to the variables that peer norms mediate. To change requirements on living situations especially if the school does not have enough on-campus housing to support the student body or to institute a program on a large public campus that would split areas of study into smaller residential colleges are enormous undertakings. They should certainly be done because of the protective factors they could offer students but if targeted prevention is effective, it might be worth implementing instead so that reorganizational costs do not get reflected in already high college education costs. This type of focused prevention should be seriously considered by schools that have a clear problem with illicit prescription drug use specifically because it has been identified that the effect of peer influence is more pronounced on illicit drug use than for any other risky behavior (Perkins, 1997).

Findings pertaining to public institution attendees and off-campus dwellers using prescription drugs illicitly more as well as both groups having peer norms more approving of illicit use partially answer Perkins's (1997) call for the need to identify groups that are more susceptible to following negative peer norms and who have the most distorted peer norms. Further research should be done on the efficacy of peer norm targeted prevention in relation to current prevention methods and placebo conditions. Research also needs to question beyond if perceived peer norm are accurate or what perceived peer norms are at a certain institution, it needs to be actively exploring the relationship of these mediators to other intrinsic or extrinsic factors. This is especially apt in light of all the relationships found in the current study and potential indirect pathways involving peer norms with sense of community and perceptions of harm as previously discussed.

Limitations. The use of a web and email based convenience sample in this study makes it vulnerable to statistical inference limitations. However, the convenience sample did not rely on those who would be willing to volunteer to take the survey. A chance for two of the Reddit and Facebook recruited participants to win a new kindle and e-mail recruited participants at the institution where the study originated offered entrance into a cash drawing and participation credit for an introductory psychology class, could have opened the door to more participants who would not have otherwise volunteered without incentive. It was the hope that offering an incentive would broaden the representativeness of the convenience sample but there is no way to ensure that was the case.

Reddit, an online community this study used to recruit participants has only caught on in popularity in the last year so the research is still catching up with this technology. Currently, there is no data on how representative a sample recruited from here may be and how it compares

to other methods of recruitment like RDD telephone surveys. This leaves the representativeness of the sample a bit questionable for the time being. However, the pages the survey was posted to had 52,505 and 3,043 subscribers respectively. This is far more than those that would have seen it on Facebook or had access to it via email. One study has found posting to the an online community was effective for targeting 18-25 year olds engaging in substance use, the same age range as the current study (Ramo, Hall, & Prochaska, 2010).

Although the sample was national, the small participant pool from the vast majority of the schools made collapsing the variable essential to useable comparisons. However, the comparison of public and private hinges on the assumption that collapsing all public institutions and private institutions is of beneficial comparison rather than potentially obscuring findings if there are restrictions to how schools can be collapsed into public and private (i.e. only within each region). Larger sampling from each school could allow for procedures to check that there are no significant differences within the different state schools or within the different private schools prior to collapsing them into a dichotomous variable.

Finally, this study only assessed use in the past six months. Although this time frame was selected to prevent inclusion of drug use that may have predated college entry, it may have underrepresented the number of students actually engaging in use in a given school year.

Strengths. All limitations considered, this study also offers considerable strengths. The present sample includes both public and private institutions in a national sample, something rarely found in the literature. This extends past research discussed throughout that has focused solely on single public institutions or adolescents prior to college entry. While the use of an unstudied online community was used to recruit participants, it acts as a strength in that it allowed access to students at schools that would otherwise be inaccessible. In trying to recruit

through universities themselves, many barriers presented themselves as the schools contacted had strict policies that required surveys to be from their institution only or had to be developed in collaboration with one of their faculty members. Several participants from these schools opted into the survey via the post on Reddit. Thus this means of recruitment allowed access to participants whose data would be inaccessible by other, more validated means.

The current study also assesses intrinsic and extrinsic factors within the same sample which allows for a better perspective of which type of variable are holding the most potential influence and what interactions may be occurring between them. This is something that is being done by only one other group of researchers and even then they did not consider peer norms which was shown here to be highly pertinent to use and perceptions of harm (McCabe et al., 2005).

Given the sensitive nature of the topics assessed (i.e. drug use and depressive symptoms) a web based survey is a strength as a multitude of research has demonstrated responses to web based surveys are comparable to paper and pen surveys, provide higher response rates, decrease social desirability bias for sensitive issues like drug use, and provide smaller unit and item non-responses (Chang & Krosnick, 2008; de Leeuw, 1992; Fricker, Galesic, Tourangeau & Yan, 2005; Knapp & Kirk, 2003). The considerations in this study also integrate theory and research, this makes prevention efforts easier to engineer because the ideology behind the findings and implications is already built in.

Conclusion

While the social development model and social control theory prompted an investigation of intrinsic factors in tandem with extrinsic factors, only one intrinsic factor examined yielded a relationship with use and only one with perceptions of harm. Further, none of these functioned as

possible mediators or moderators. Based on the results and subsequent discussion it seems that extrinsic factors, at least for the factors examined here, are far more important in understanding illicit prescription drug use and perceptions of harm than intrinsic factors for college populations. A shift in the focus of research from intrinsic to extrinsic variables attributable to the college or environment over the individual must occur if a clear perspective on how to improve prevention programs is the goal. Hawkins et al. (1992) advocate for the need to not only identify and study risk factors but also identify and study protective factors. The findings of this study suggest that protective factors should be broadly defined to account for the complexity of potential indirect pathways of influence. Future research should implement structural equation modeling to get at these indirect pathways and formulate a more comprehensive picture of use in college populations. Presently, this study suggests protective factors should be defined beyond anything significantly associated with use to also include anything that use significantly differs between or anything significantly associated with the factors just described. Under this definition, type of institution (private), living situation (on-campus), sense of community (high), depressive symptoms (low), perceptions of harm (high) and peer norms (low), can all serve as protective factors.

With such a wealth of factors, college and university prevention programs would be best advised to target the whole person, including their environment because the two are constantly interacting. Generally, the best approach is promoting overall health for their students, including psychological well being which would mean boosting sense of community. Specifically, schools should aim to adapt themselves to be as conducive to the protective factors put forth by these findings as possible. For instance, a study by Lounsbury and DeNeui (1996) suggests sense of community varies by the size of an institution. If size mediates the relationship between type of

institution and sense of community and sense of community is associated with use, then bigger schools could look to create smaller sub-communities. Conducting research at large institutions that already have these measures in place like the use of residential colleges at large university in the south would be monumentally helpful in understanding if sub-communities have an effect on sense of community, illicit prescription drug use and perceptions of harm. While this change as well as the others prescribe throughout the discussion can be costly, they would also likely be the most effective and sustaining as they actually alter the environment. Schools should be striving for these lasting alterations but given the immediacy of the illicit use issue, schools can take a small and immediate step in the right direction by overhauling education based prevention programs. Particularly because these education based programs have shown to create more savvy users than change or prevent behavior (Moskowitz, 1989; Tobler, 1986). These education based programs should be replaced with targeted prevention centered on the protective factors of this study. While targeting peer norms would likely provide the biggest results for prevention, all the protective factors identified here must be integrated into these programs to best impact the entirety of the student population and correlates of use. These programs should then be subjected to a process similar to randomized clinical trials for psychotherapies so schools can be sure what they are teaching will be effective in preventing and reducing illicit prescription drug use, even if much work still needs to be done to understand more clearly the mechanism by which these targeted protective factors work.

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Table 1

Point Biserial and Pearson's Correlation Coefficients for General use, Perceptions of Harm, BDI, Sense of School Community and Peer Norms

Variable	1	2	3	4	5
1. General Use	--				
2. Perceptions of Harm	-.16*	--			
3. BDI	.02	-.20	--		
4. SSC	.07	.15*	-.25*	--	
5. Peer Norms	-.25*	-.25*	.10	-.14*	--

*p < .01.

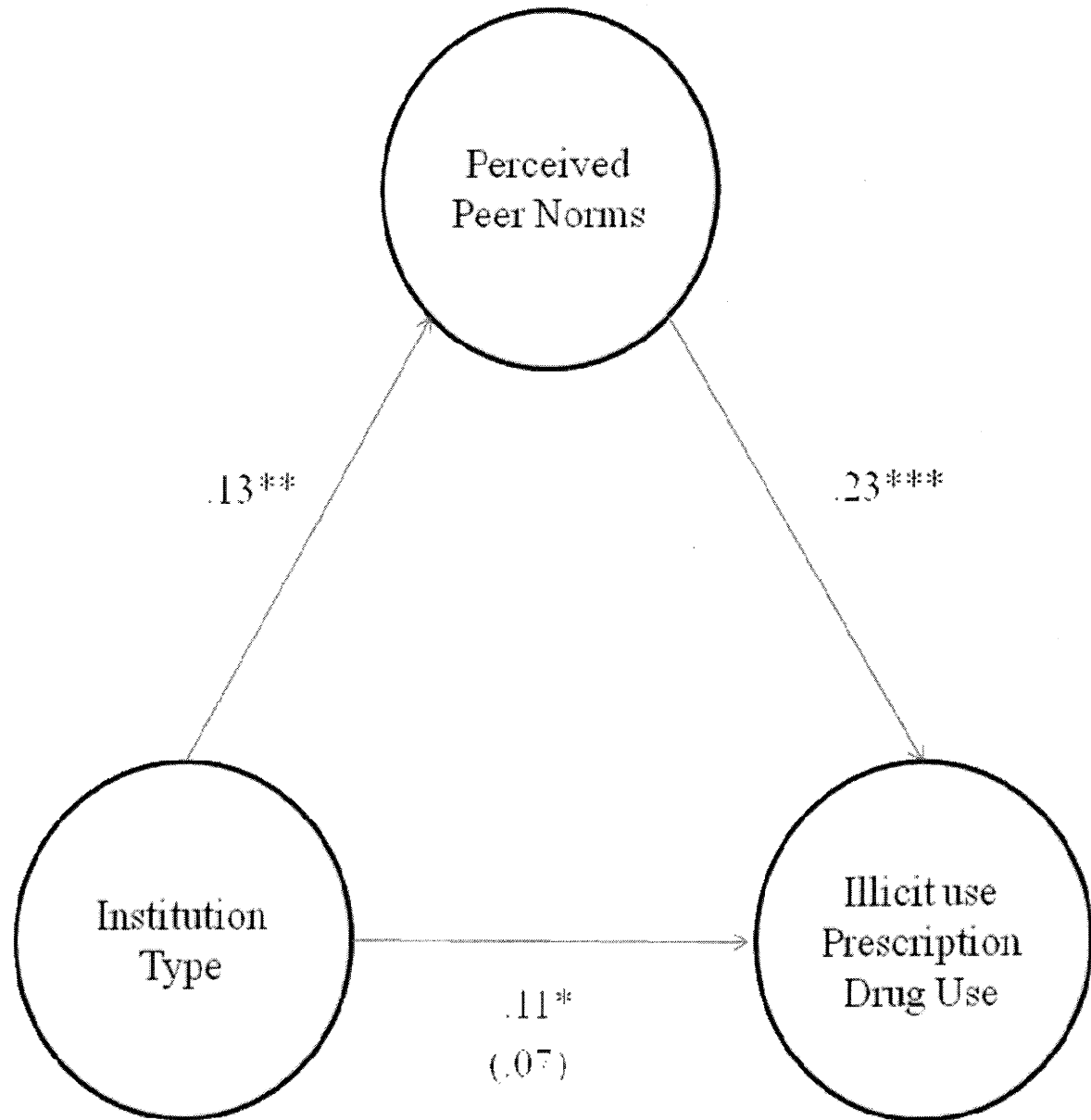


Figure 1. Peer norms as a mediator for institution type and use. Numbers in this figure represent standardized b coefficients from multiple regression analyses; b weight for the relation between peer norms and use was computed controlling for institution type. The number in parentheses represents a b weight computed in regression analyses where institution type predicted use while peer norms were controlled for. Use was coded as 1 and no use was coded as 0. Institution type was coded as 1 private and 2 public. Peer norms was coded as a summed score with lower scores reflecting peer norms less favorable toward use. $^*p < .03$; $^{**}p < .01$; $^{***}p < .001$.

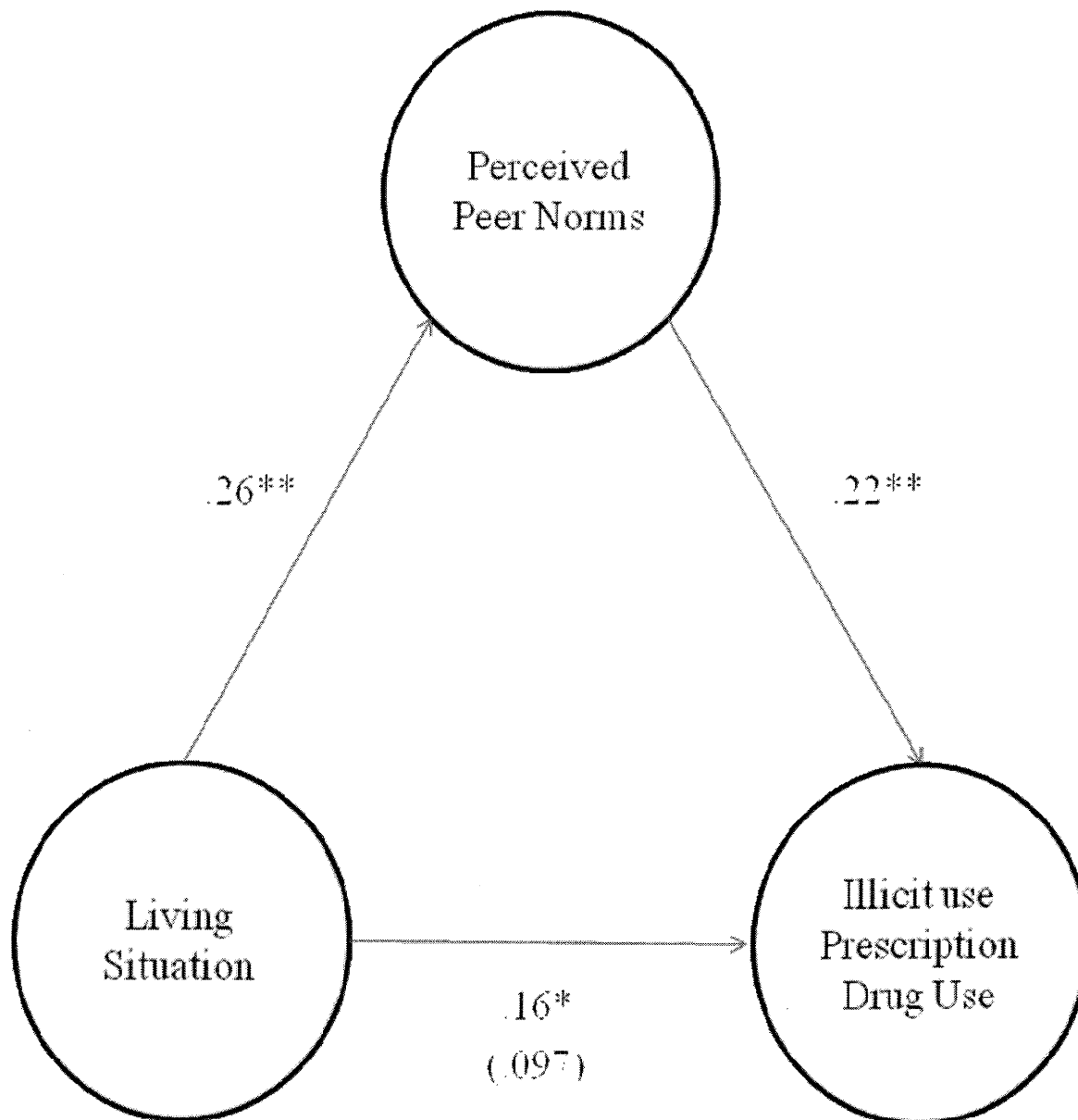


Figure 2. Peer norms as a mediator for living situation and use. Numbers in this figure represent standardized b coefficients from multiple regression analyses; b weight for the relation between peer norms and use was computed controlling for living situation. The number in parentheses represents a b weight computed in regression analyses where living situation predicted use while peer norms were controlled for. Use was coded as 1 and no use was coded as 0. Living situation was coded as 1 on-campus and 2 off-campus. Peer norms were coded as a summed score with lower scores reflecting peer norms less favorable toward use. $^*p = .001$; $^{**}p < .001$.

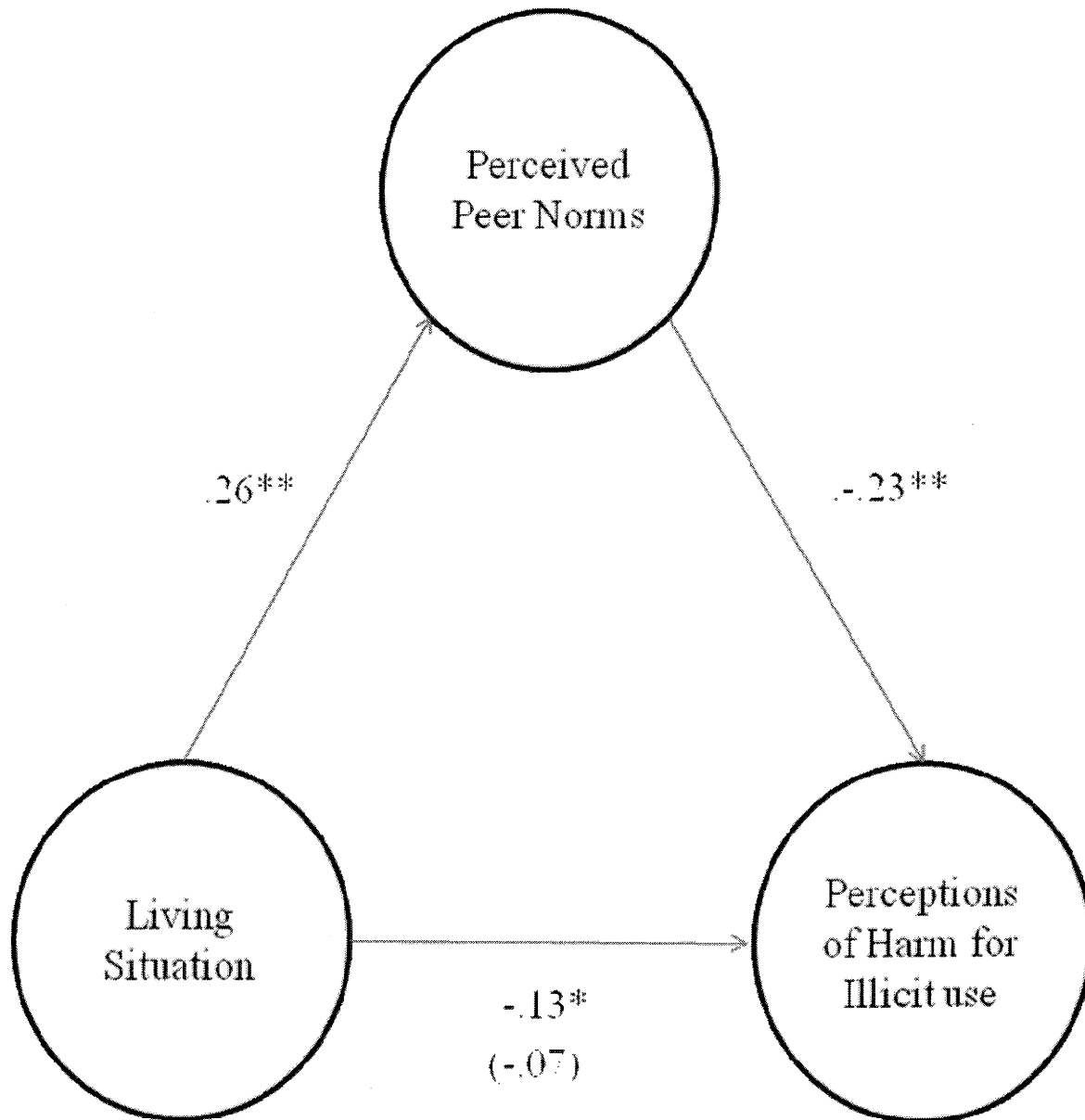


Figure 3. Peer norms as a mediator for living situation and perceptions of harm. Numbers in this figure represent standardized b coefficients from multiple regression analyses: b weight for the relation between peer norms and perceptions of harm was computed controlling for living situation. The number in parentheses represents a b weight computed in regression analyses where living situation predicted perceptions of harm while peer norms were controlled for. Use was coded as 1 and no use was coded as 0. Living situation was coded as 1 on-campus and 2 off-campus. Perceived harm was coded as a summed score with higher scores reflecting higher perceptions of harm. * $p = .012$; ** $p = .001$.