



# Power of the Peer and Parent: Gender Differences, Norms, and Nonmedical Prescription Opioid Use Among Adolescents in South Central Kentucky

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## Abstract

This study examined risk factors of nonmedical prescription opioid use (NMPOU) among adolescents and how risk factors differ by gender. In the fall of 2017, adolescents attending 6th through 12th grades across 44 schools in 10 south central Kentucky counties were invited to participate in an anonymous, school-based survey. A total of 11,761 adolescents completed the survey. Logistic regression was conducted to examine the association between NMPOU and constructs of the Theory of Reasoned Action (i.e., attitudes and subjective norms), descriptive norms (i.e., peer use), and parental control of prescription medications in the home. There were 297 (2.7%) adolescents who reported NMPOU in the past 12 months. In the adjusted multivariate logistic regression model, for both males and females, the adolescents who perceived that more of their peers engaged in NMPOU were significantly more likely to endorse NMPOU, whereas male and female adolescents who perceived their peers disapproved of use were significantly less likely to report NMPOU. Parent disapproval was significantly associated with decreased NMPOU for females only. Moderated regression analyses revealed that gender moderated the relationship between parental disapproval and NMPOU. We found that during adolescence, NMPOU is influenced by peer norms for both genders and parental norms for females. These results indicate that prevention efforts should focus on changing adolescents' peer and parental norms related to NMPOU.

**Keywords** Prescription drug · Opioid · Adolescent · Norm · Availability

## Introduction

The prevalence of nonmedical prescription opioid use (NMPOU), the use without a prescription or in ways other than prescribed, is second to marijuana use among adolescents (Center for Behavioral Health Statistics and Quality 2017). The most recent National Survey on Drug Use and Health (NSDUH) found that 3.5% of adolescents ages 12 to 17 reported NMPOU in the past 12 months and 1.6% in the past

30 days (Center for Behavioral Health Statistics and Quality 2017). In addition, 0.6% of adolescents met the DSM-IV criteria for either dependence or abuse of prescription pain relievers within the previous 12 months; only 0.2% less than 18–25 year olds and the same prevalence as individuals ages 26 and older (Center for Behavioral Health Statistics and Quality 2017). Peak age of NMPOU onset is 16 years of age (Austic et al. 2015). Early age of NMPOU initiation has been associated with adverse consequences (Cerdá et al. 2013; McCabe et al. 2007b), including transition to heroin use in young adulthood (Cerdá et al. 2013). It is important to identify risk factors associated with NMPOU during adolescence in order to develop age appropriate intervention strategies to prevent and delay the onset of NMPOU.

Previous research has found the Theory of Reasoned Action (TRA) (Fishbein 1979) and Theory of Planned Behavior (TPB) (Ajzen 1991) to be useful in the explanation of substance use behaviors among adolescents and young adults (Gallucci et al. 2015; Maahs et al. 2016; Malmberg et al. 2012; Ponnet et al. 2014; Unger et al. 2001). The TRA posits that behavior is guided by perceived consequences of

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the behavior (e.g., perceived risk) and perceived normative expectations of others (e.g., perceived approval). These perceptions result in the formation of a behavioral intention and ultimately the behavior of interest (Fishbein 1979). The TPB expands upon the TRA to include perceived behavioral control of performing the behavior of interest; perceived behavioral control can either impact behavior directly or indirectly through intention (Ajzen 1991).

Although the TRA and TPB have been used to understand substance use behavior, there are other factors that also contribute to substance use, including descriptive norms and availability of substances of abuse. Descriptive norms is a type of norm included in Social Norms Theory (Perkins and Berkowitz 1986) that refers to individuals' perceptions of the prevalence of a specific behavior among others (e.g., peer use of prescription opioids). Studies have found that individuals tend to overestimate the use of substances by others and overestimation is related to personal use (Aas and Klepp 1992; Campo et al. 2003; Egan et al. 2016; Kilmer et al. 2015; Larimer et al. 2011; Martens et al. 2006; McCabe 2008; Vidourek et al. 2014).

Availability refers to the ease and convenience of obtaining substances for use or abuse (Babor et al. 2010a, p. 201). Prevention and intervention strategies that address the availability of substances are based on the hypothesis that limiting availability results in decreases of abuse and ultimately decreases of associated substance-related problems (Babor et al. 2010b; Maddahian et al. 1986; Paschall et al. 2009; Popova et al. 2009). Prescription opioids have been reported to be commonly available to adolescents via friends or family members (Center for Behavioral Health Statistics and Quality 2015; McCabe and Boyd 2005). Additionally, previous research has found that adolescents report easy and unrestricted access to prescription medications in their own homes (Friese et al. 2013; McCabe et al. 2013; Ross-Durow et al. 2013). These findings suggest that tracking and restricting access of prescription opioids may result in a decrease of NMPOU among adolescents.

Gender differences have been observed when examining NMPOU among both adolescents (Osborne et al. 2017) and adults (Back et al. 2010; Serdarevic et al. 2017). One study found that females, early initiators, and opiate users had a shorter length of time between onset of abuse and dependence which emphasized the importance of examining gender differences among adolescents who use NMPOs (Ridenour et al. 2005). Among adolescents, these may arise because behavior is influenced by external factors which differ by gender. For example, parental monitoring and guidance can differ by gender, with different expectations directed towards males and females (Hyde 2014; Witt 1997). Substance use is often influenced by social networks and factors such as peer pressure (Chan et al. 2017; Karakos 2014; Kristjansson et al. 2013; McDonough et al. 2016; Song et al. 2012), which may vary

by gender-specific norms. There are mixed findings as to whether females are more heavily influenced by parental support and guidance compared to males (Dunn et al. 2011) or if males are more susceptible to parental injunctive norms than females (Elek et al. 2006). Yet, these gender differences in the context of NMPOU have yet to be explored.

While the TRA and TPB have been used to identify risk factors associated with the misuse of prescription stimulants among college students (Gallucci et al. 2015; Ponnet et al. 2014), to our knowledge, they have not been used to examine the misuse of prescription opioids among adolescents. Additionally, previous research has not accounted for the impact of descriptive norms, the availability of prescription drugs in the home, and gender when examining the relationship between these theoretical constructs and NMPOU. The aim of this study was to examine nonmedical prescription opioid use (NMPOU) among adolescents using the Theory of Reasoned Action and Social Norms Theory while also examining the impact of availability. We also sought to explore how these potential risk factors differed by gender. In accordance with theory and previous research, we hypothesized that perceived risk of NMPOU, parent and peer disapproval of NMPOU, peer NMPOU, and parental restriction of access to prescription opioids would be related to adolescent NMPOU. We hypothesized that these findings would be consistent for both genders but parental norms would have a greater impact for females compared to males.

## Methods

In the fall of 2017, adolescents attending 6th through 12th grades in 10 south central Kentucky counties were invited to participate in an anonymous, school-based survey. The survey was a collaborative project among regional community agencies. It assessed demographics, health behaviors (including substance use), mental health, parenting practices, and school experiences. The median population size of the 10 participating counties was 17,738 (range, 10,099–113,792), and on average, the counties were 78% rural (range, 31.2–100%). All schools with 6th–12th grades that were served by the regional community agencies were invited to participate in the survey, and the majority participated ( $n = 44$  schools). Paper and pencil surveys were conducted within the classroom during the school day. Participation in the survey was voluntary, and students were given the option to opt out of the survey or single questions within the survey. A total of 11,761 adolescents completed the survey (~64% response rate). The Wake Forest School of Medicine Institutional Review Board approved the study protocol for secondary analysis of existing data.

## Measures

**NMPOU** NMPOU was assessed with the following question: “Think back over the past 12 months. How often did you use prescription pain killers (i.e., hydrocodone) to get high?.” Participants who endorsed “a few times a year,” “at least once a month,” “at least once a week,” or “several times a week” were considered past 12-month users. Students who stated “never” or “not within the past 12 months” were considered non-past 12-month users.

**Demographics** Gender (male or female), race (White, Black/African-American/American Indian/Native American, Asian/Pacific Islander, Multiracial, or Other), and grade (6th–12th) were self-reported by participants.

**Covariates** Perceived risk of NMPOU was assessed by asking “how much do you think people risk harming themselves physically or in other ways if they use prescription pain killers (i.e., hydrocodone) to get high?.” Response options were “no risk,” “slight risk,” “moderate risk,” or “great risk.” Perceived parent disapproval of nonmedical prescription drug use was queried with the item “how wrong would your parents feel it would be for you to use prescription drugs not prescribed to you.” Response options were “not wrong at all,” “a little bit wrong,” “wrong,” or “very wrong.” Perceived peer disapproval of NMPOU was queried with the item “how wrong would your friends feel it would be for you to use prescription pain killers (i.e., hydrocodone) to get high.” Response options were “not wrong at all,” “a little bit wrong,” “wrong,” or “very wrong.” Perceived peer NMPOU was assessed with the question “think about the people about your age who you consider to be your best friends. How many of them used prescription pain killers (i.e., hydrocodone) to get high?.” Response options were “none of them used,” “less than half of them used,” “about half of them used,” “more than half of them used,” and “all of them used.” Perceptions of parent(s) control of prescription opioids was captured with the question “do your parents take steps to ensure you do not have access to prescription medications?”

## Statistical Analyses

Analyses consisted of bivariate and multivariate logistic regression. Bivariate logistic regression models were conducted to examine the unadjusted associations between NMPOU and demographics, perceived risk, perceived peer NMPOU, perceived peer, and parent disapproval of NMPOU, and parental restriction of access to prescription medications in the home (Table 1). We examined the adjusted relationship between all variables listed above and NMPOU using a multivariate logistic regression model (Table 2). The impact of gender was assessed two ways: (1) gender-stratified multivariate logistic

regression models (Table 2) and (2) moderated multivariate logistic regression models (Table 3). For the five moderated models, in order to avoid potentially problematic high collinearity, the continuous variables were mean centered prior to creating the interaction terms. All models were adjusted for within-school clustering by treating school as a random effect using GENLIMIXED with a logit link function in SPSS version 24. *p* values, adjusted odds ratios, and 95% confidence intervals are presented.

## Results

### Sample Characteristics

As seen in Table 1, an equal number of males and females participated in the survey (49.3% and 50.6%, respectively). Many of the participants were White (75.5%) followed by Black/African-American (7.1%), Other (6.3%), Multiracial (6.2%), Asian/Pacific Islander (2.6%), and American Indian/Native American (2.4). The sample was slightly more diverse than the Census data for the participating counties which were on average 92% (range, 82.1–96.5%) white. As the grade levels increased from 6th through 12th, the percentage of participants per grade decreased slightly from 18.0% in 6th grade to 9.5% in 12th grade. There were 297 (2.7%) adolescents who reported NMPOU in the past 12 months. Of the 297 who reported NMPOU in the past 12 months, 45.5% ( $n = 135$ ) reported use a few times a year, 31.3% ( $n = 93$ ) at least once a month, 13.4% ( $n = 40$ ) at least once a week, and 9.8% ( $n = 29$ ) several times a week.

### Risk Factors of Nonmedical Prescription Opioid Use

In the unadjusted bivariate regression models (Table 1), neither gender nor race was statistically associated with NMPOU. Grade, perceived risk of NMPOU, perceived parent and peer disapproval of NMPOU, and perceived parent restriction of access to prescription opioids were significantly associated with NMPOU at  $p < 0.05$ .

Among the overall sample, after controlling for all variables, higher grade-level (AOR = 1.07; CI = 1.00–1.13) and perceived peer NMPOU (AOR = 1.74; CI = 1.57–1.95) were positively related to NMPOU, and perceived peer disapproval of NMPOU was negatively associated with NMPOU (AOR = 0.74; CI = 0.65–0.83) (shown in Table 2). These findings were consistent among males; higher grade-level (AOR = 1.09; CI = 1.00–1.19) and perceived peer NMPOU (AOR = 1.75; CI = 1.51–2.04) were positively associated with NMPOU, and perceived peer disapproval of NMPOU was negatively associated with NMPOU (AOR = 0.78; CI = 0.66–0.93). Among females, both perceived peer disapproval of NMPOU (AOR = 0.69; CI = 0.58–0.82) and perceived peer NMPOU (AOR =

**Table 1** Sample characteristics of the overall sample and by nonmedical prescription opioid use

	Overall Sample ( <i>n</i> = 11,761) <i>N</i> (%)	NMPOU		<i>p</i> value
		No ( <i>n</i> = 10,718) <i>N</i> (%)	Yes ( <i>n</i> = 297) <i>N</i> (%)	
Gender				0.916
Male	5497 (46.7)	5070 (47.3)	139 (46.8)	
Female	5644 (48.0)	5283 (49.3)	143 (48.1)	
Race				0.158
White	8346 (75.5)	7823 (75.9)	209 (73.3)	
Black/African-American	780 (7.1)	702 (6.8)	25 (8.4)	
Multiracial	681 (6.2)	263 (2.6)	26 (8.8)	
American Indian/Native American	260 (2.4)	242 (2.3)	4 (1.4)	
Asian/Pacific Islander	288 (2.6)	626 (6.1)	5 (1.8)	
Other	702 (6.3)	652 (6.9)	16 (5.6)	
Grade				< 0.001
6th	2114 (18.0)	1953 (18.2)	21 (7.1)	
7th	1982 (16.9)	1884 (17.6)	16 (5.4)	
8th	2089 (17.8)	1982 (18.5)	36 (12.1)	
9th	1476 (12.5)	1364 (12.7)	37 (12.5)	
10th	1214 (10.3)	1113 (10.4)	50 (16.8)	
11th	1267 (10.8)	1165 (10.9)	53 (17.8)	
12th	1117 (9.5)	985 (9.2)	77 (25.9)	
Perceived risk of NMPOU				< 0.001
No risk	1185 (10.9)	1081 (10.6)	31 (11.1)	
Slight risk	757 (7.0)	672 (6.6)	52 (18.6)	
Moderate risk	1945 (17.9)	1760 (17.3)	107 (38.4)	
Great risk	6973 (64.2)	6648 (65.4)	89 (31.9)	
Perceived parent disapproval of NMPOU				< 0.001
Not wrong at all	383 (3.7)	325 (3.4)	19 (7.2)	
A little bit wrong	137 (1.3)	106 (1.1)	28 (10.6)	
Wrong	599 (5.8)	537 (5.6)	43 (16.3)	
Very wrong	9145 (89.1)	8679 (90.0)	173 (65.8)	
Perceived peer disapproval of NMPOU				< 0.001
Not wrong at all	805 (7.7)	662 (6.7)	89 (33.1)	
A little bit wrong	573 (5.5)	494 (5.0)	58 (21.6)	
Wrong	1494 (14.2)	1392 (14.1)	43 (16.3)	
Very wrong	7618 (72.6)	7295 (74.1)	173 (65.8)	
Perceived peer NMPOU				< 0.001
None of them used	9834 (90.2)	9401 (92.2)	97 (34.0)	
Less than half of them used	611 (5.6)	499 (4.9)	89 (31.2)	
About half of them used	184 (1.7)	124 (1.2)	44 (15.4)	
More than half of them used	110 (1.0)	73 (0.7)	32 (11.2)	
All of them used	161 (1.5)	103 (1.0)	23 (8.1)	
Perceived parent(s) restrict access to prescription opioids	6002 (64.3)	5721 (65.2)	101 (42.1)	< 0.001

**Table 2** Adjusted odds ratios for past year nonmedical prescription opioid use among the overall sample, males, and females

	Overall	Males			Females		
	( <i>n</i> = 11,761)	( <i>n</i> = 5497)			( <i>n</i> = 5644)		
	AOR (95% CI)	NMPOU		AOR (95% CI)	NMPOU		AOR (95% CI)
		No <i>N</i> (%)	Yes <i>N</i> (%)		No <i>N</i> (%)	Yes <i>N</i> (%)	
Gender							
Male	–						
Female	1.07 (0.86, 1.34)						
Race							
White (referent)	–	3691 (75.3)	93 (68.9)	–	3899 (76.6)	109 (79.0)	–
Black/African-American	0.93 (0.60, 1.43)	329 (6.7)	14 (10.4)	0.95 (0.51, 1.78)	351 (6.9)	8 (5.8)	0.92 (0.50, 1.67)
Multiracial	1.02 (0.65, 1.59)	290 (5.9)	14 (10.4)	0.91 (0.46, 1.80)	315 (6.2)	11 (8.0)	1.11 (0.61, 2.00)
Other	0.96 (0.66, 1.40)	330 (6.7)	9 (6.7)	0.92 (0.54, 1.57)	298 (5.9)	7 (5.1)	1.03 (0.60, 1.76)
Grade	1.07 (1.00, 1.13)*	3.50 (1.9)	4.90 (1.9)	1.09 (1.00, 1.19)	3.50 (1.9)	4.94 (1.8)	1.05 (0.96, 1.14)
Risk of NMPOU	0.97 (0.87, 1.10)	3.33 (1.0)	2.87 (1.9)	0.95 (0.81, 1.12)	3.42 (1.0)	2.96 (0.9)	0.99 (0.84, 1.17)
Parent disapproval of NMPU	0.91 (0.78, 1.07)	3.79 (0.7)	3.40 (1.0)	1.02 (0.81, 1.28)	3.86 (0.5)	3.42 (0.9)	0.79 (0.63, 0.98)*
Peer disapproval of NMPU	0.74 (0.65, 0.83)***	3.47 (0.9)	2.32 (1.2)	0.78 (0.66, 0.93)**	3.65 (0.8)	2.39 (1.1)	0.69 (0.58, 0.82)***
Peer NMPOU	1.74 (1.57, 1.95)***	1.13 (0.6)	2.30 (1.3)	1.75 (1.51, 2.04)***	1.13 (0.5)	2.24 (1.2)	1.72 (1.47, 2.02)***
Parent(s) restrict access to PO	0.87 (0.69, 1.10)	2577 (63.4)	42 (38.9)	0.87 (0.62, 1.22)	3010 (67.0)	51 (42.5)	0.89 (0.64, 1.22)

\**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001

1.72; CI = 1.47–2.02) were significantly related to NMPOU in the same direction as they were for males. However, perceived parent disapproval of NMPU was negatively related to NMPOU (AOR = 0.78; CI = 0.66, 0.93) but grade-level was not associated with NMPOU (Table 2). As shown in Table 3, the statistically significant interaction term of gender × parental disapproval (AOR = 0.74; CI = 0.56, 0.97) suggests that gender moderates some of the relationship between parent disapproval of NMPU and NMPOU. Gender did not appear to moderate the relationship between other constructs and NMPOU (Table 3).

### Discussion

In our theory-driven study of 11,761 middle and high schoolers in south central Kentucky, 2.7% of adolescents reported NMPOU in the past 12 months. In accordance with the Theory of Reasoned Action, Social Norms Theory, and literature on physical availability, perceived risk, parent and peer disapproval, peer use, and parental monitoring of prescription drugs were significantly related to NMPOU in bivariate analyses. However, among all adolescents, only perceived peer subjective and descriptive norms remained statistically significant in the multivariate model. Further examination of these NMPOU risk factors by gender revealed that while peer norms were statistically significant for both genders, parental

disapproval was significant for females only and grade-level was significant for males only. Together, these findings suggest that, even after accounting for perceived risk and parental monitoring of prescription drugs at home, peer norms are the most powerful correlates of NMPOU among adolescents.

Among our sample, 2.7% reported NMPOU within the past 12 months which was similar to, but slightly less than, a national sample of adolescents ages 12 to 17 (3.5%) (Center for Behavioral Health Statistics and Quality 2017). Our indicator of prevalence solely assessed recreational use of prescription opioids (“to get high”) which may contribute to the slight difference between the prevalence of NMPOU in our sample compared to the national sample. The adolescents who reported NMPOU in our sample may be at higher risk of adverse consequences compared to adolescents who use prescription opioids for medical reasons only given their recreational motivations for NMPOU McCabe et al. 2007a).

Both adolescent males and females who perceived that their peers disapproved of NMPOU were significantly less likely to report NMPOU. This is consistent with the literature on the relationship between peer subjective norms and substance use (Malmberg et al. 2012; McCabe 2008; Perkins 2002; Ponnet et al. 2014). Additionally, we found that adolescents who perceived that their peers used NMPOU were statistically more likely to report past year NMPOU themselves. This finding is consistent with research on descriptive norms and other substance use (Neighbors et al. 2007), including

**Table 3** Gender-moderated regression analyses of past year nonmedical prescription opioid use among the overall sample ( $n = 11,761$ )

	Model 1 AOR (95% CI)	Model 2 AOR (95% CI)	Model 3 AOR (95% CI)	Model 4 AOR (95% CI)	Model 5 AOR (95% CI)
Gender					
Male	–	–	–	–	–
Female	1.07 (0.85, 1.34)	1.06 (0.85, 1.33)	1.04 (0.82, 1.32)	1.07 (0.86, 1.34)	1.11 (0.79, 1.55)
Race					
White (referent)	–	–	–	–	–
Black/African-American	0.93 (0.60, 1.43)	0.93 (0.61, 1.44)	0.93 (0.60, 1.44)	0.93 (0.60, 1.43)	0.93 (0.60, 1.43)
Multiracial	1.02 (0.65, 1.59)	1.02 (0.65, 1.59)	1.02 (0.65, 1.59)	1.02 (0.65, 1.59)	1.02 (0.65, 1.59)
Other	0.96 (0.66, 1.40)	0.70 (0.66, 1.42)	0.96 (0.66, 1.40)	0.96 (0.66, 1.40)	0.96 (0.66, 1.40)
Grade	1.07 (1.00, 1.13)*	1.07 (1.00, 1.13)*	1.07 (1.00, 1.13)*	1.07 (1.00, 1.13)*	1.07 (1.00, 1.13)*
Risk of NMPOU	1.00 (0.86, 1.17)	0.97 (0.87, 1.09)	0.97 (0.87, 1.10)	0.97 (0.87, 1.10)	0.97 (0.87, 1.09)
Parent disapproval of NMPOU	0.91 (0.78, 1.07)	1.05 (0.85, 1.30)	0.90 (0.77, 1.06)	0.91 (0.78, 1.07)	0.91 (0.78, 1.07)
Peer disapproval of NMPOU	0.74 (0.65, 0.83)***	0.73 (0.65, 0.83)***	0.80 (0.68, 0.93)***	0.74 (0.65, 0.83)***	0.74 (0.66, 0.83)***
Peer NMPOU	1.75 (1.57, 1.95)***	1.74 (1.56, 1.94)***	1.74 (1.56, 1.93)***	1.74 (1.57, 1.95)***	1.74 (1.57, 1.94)***
Parent(s) restrict access to PO	0.87 (0.69, 1.10)	0.88 (0.70, 1.11)	0.87 (0.69, 1.10)	0.87 (0.69, 1.10)	0.90 (0.65, 1.26)
Gender × risk	0.95 (0.77, 1.17)	–	–	–	–
Gender × parent disapproval	–	0.74 (0.56, 0.97)*	–	–	–
Gender × peer disapproval	–	–	0.86 (0.71, 1.04)	–	–
Gender × peer NMPOU	–	–	–	1.04 (0.85, 1.28)	–
Gender × restrict access	–	–	–	–	0.94 (0.60, 1.48)

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ 

general prescription drug use (McCabe 2008). Given the cross-sectional nature of this study, we are not able to ascertain if perceptions of peer approval and NMPOU led to personal NMPOU to conform to perceived social norms or if NMPOU preceded the perceptions. However, Lewis et al. (Lewis et al. 2015) conducted a longitudinal study of alcohol consumption among college students and found a reciprocal relationship between norms and alcohol consumption; norms predicted alcohol use which subsequently predicted both norms and alcohol use. Thus, a similar pattern may exist for NMPOU. Prevention efforts should focus on changing subjective and descriptive peer norms pertaining to NMPOU. There are several strategies and interventions that can be implemented to achieve this goal, including personalized normative feedback (Boyle et al. 2017; Dotson et al. 2015), social norm campaigns (Perkins et al. 2010), and peer-led interventions (MacArthur et al. 2016).

While parental disapproval did not impact NMPOU among males in the multivariate model, adolescent females who perceived that their parents disapproved of NMPOU were significantly less likely to report use. Our findings are similar to Dunn et al.'s (2011) who found that parental approval impacted adolescent females' marijuana use but not males' use. Our findings suggest that prevention strategies that include a parental norm component to address NMPOU may be more beneficial for female than male adolescents. That being said, parental norms were statistically significant prior to

controlling for other variables, such as peer descriptive and injunctive norms, which suggests that they still impact males' NMPOU even if they are not as strong as other variables. Additional research is needed to better understand effective strategies that parents can use to dissuade NMPOU among their male sons. For example, parent-child communication strategies (Luk et al. 2010) and parenting styles (Čablová et al. 2014) may be promising strategies to prevent NMPOU.

There are several limitations to our study. Our study was conducted in 10 counties located in south central Kentucky and may not be generalizable to other communities. However, our findings may apply to similar rural, southern contexts. According to the Theory of Planned Behavior and the Theory of Reasoned Action, intentions to perform a behavior occur between perceptions about the behavior and actually performing the behavior. While, we did not measure the construct of intention, previous research suggests that substance use behaviors may bypass intention and that measuring the intention of substance use is not necessary (Ajzen 1991). We only examined the use of prescription opioids for recreational motivations. Thus, our findings should not be extrapolated to NMPOU for other motivations (e.g., self-treatment). While perceived risk, peer disapproval, and peer use were specific to prescription opioids, the measures of parent disapproval and access to medications in the home were not specific to opioids. The lack of specificity may have partially contributed to the decreased strength of the relationship between these two

constructs and NMPOU in the multivariate analysis. The items that assessed opioid use or perceptions used, i.e., a limiting statement, followed by “hydrocodone” which could result in an underestimate if the participants took this literally. In addition, substance use was self-reported and is subject to social desirability bias. Given the similarity of our findings to national estimates, it is unlikely that these two limitations significantly impacted our findings. As mentioned previously, given the cross-sectional nature of the data, we are not able to ascertain if the perceptions preceded NMPOU which is important since behavioral feedback may influence or reinforce perceptions.

## Conclusion

After accounting for perceived risk and parental monitoring of prescription drugs at home, peer norms are the most powerful correlates of NMPOU among adolescents in our sample. Specifically, both male and female adolescent NMPOU were related to peer norms, whereas, parental norms were only significantly associated with NMPOU for females. Prevention efforts that focus on peer norms related to NMPOU may result in a reduction of adolescent NMPOU.

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## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Research Involving Human Participants** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** For this type of study, formal consent was not required.

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