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Desisting From Prescription Drug Abuse: An Application of Growth Models to Rx Opioid Users

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Abstract

Modern desistance research has examined many facets of desistance, in terms of theoretical predictors of desistance and recidivism, and in terms of differing types of offending. Though predicting desistance from illegal drug use is among these topics, no research to date has examined the predictors of desisting from prescription opioid abuse. This study uses longitudinal data from 318 prescription opioid users to analyze the effects of various predictors of desistance on declining nonmedical prescription opioid use, with an emphasis on gender differences among participants. Results indicate that theoretical and demographic characteristics correspond with differing rates of decline and further vary by gender.

Keywords

Prescription drug abuse; opioids; desistance

The nonmedical use (abuse) of prescription drugs has been a long-standing and growing problem in the United States. Nonmedical prescription drug use can be defined as use without a prescription from a doctor or use solely for the feeling or experience caused by the drug, and includes the use of opiate-type pain relievers, tranquilizers, stimulants, and sedatives (Substance Abuse and Mental Health Services Administration [SAMHSA], 2006a). In recent years, there has been a sizable increase in the prevalence of nonmedical prescription drug users, particularly among adolescents and young adults (Gledhill-Hoyt, Lee, Strote, & Wechsler, 2000; Johnston, O'Malley, Bachman, & Schulenberg, 2006; Mohler-Kuo, Lee, & Wechsler, 2003; SAMHSA, 2006b). The National Survey of Drug Use and Health found that the numbers of new nonmedical users of prescription opioids (primarily products containing codeine, hydrocodone, and oxycodone) increased from 600,000 in 1990 to more than 2.4 million in 2004, making it the drug category with the largest number of new users that year (Inciardi & Cicero, 2009; SAMHSA & Office of Applied Studies, 2005). The increase has been so pronounced that recent national survey

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data regarding substance use have indicated that the prevalence of nonmedical prescription drug use is now greater than the prevalence rates for all other illicit drugs aside from marijuana (Johnston et al., 2006; McCabe, Teter, & Boyd, 2006; SAMHSA, 2006a). In addition, the number of new opioid users exceeded new initiates for marijuana (2.1 million) and cocaine (1.0 million) in 2004 (SAMHSA, 2006a).

Prior studies examining nonmedical prescription drug use have been focused primarily on addressing the characteristics of the users themselves and the correlates related to their use. Research has found that those at the greatest risk for use tend to be younger (Johnston et al., 2006; SAMHSA, 2006a). Similarly, gender differences in use tend to be mixed, with some studies finding higher prevalence rates in males (Kroutil et al., 2006; McCabe, 2005; McCabe et al., 2006), whereas others have found higher rates among females (Simoni-Wastila, Ritter, & Strickler, 2004; Simoni-Wastila & Strickler, 2004; Sung, Richter, Vaughan, Johnson, & Thom, 2005). Research also indicates that Whites are at an increased risk for use compared with non-Whites (Ford & Rivera, 2008; Kroutil et al., 2006; McCabe, 2005; McCabe et al., 2006; Simoni-Wastila & Strickler, 2004; Sung et al., 2005). Other correlates related to increased nonmedical prescription drug use include those with less than a high school education or college degree (Harrell & Broman, 2009; Huang et al., 2006; Merline, O'Malley, Schulenberg, Bachman, & Johnston, 2004), unemployed and nonmarried people (Merline et al., 2004), illicit drug and alcohol users (Kurtz, Inciardi, Surratt, & Cottler, 2005; Simoni-Wastila et al., 2004), those with more substance-using peers (Higgins, Mahoney, & Ricketts, 2009; Quintero, 2009), and those with more severe criminal offending and arrest histories (Ball, Rosen, Flueck, & Nurco, 1982; Goldstein, 1985; Inciardi, 2008; Kurtz et al., 2005; Kurtz, Inciardi, & Pujals, 2009).

Drug Use and the Desistance Process

Although a vast number of recent empirical studies has focused on the process of desistance from criminal offending, no study to date has examined this process among a contemporary sample of nonmedical prescription drug users. Prior research has primarily examined the mediating effect that drug use has between conventional social roles and criminal desistance (see Schroeder, Giordano, & Cernkovich, 2007), but no study to date has examined those factors that lead to the cessation from nonmedical prescription drug use. From a theoretical standpoint, it is therefore unknown whether theories of desistance can be used to explain this new type of drug user in today's social and economic context. Most notably, Sampson and Laub's age-graded theory of informal social control has emphasized the importance of social bonds through positive relationships as offering the potential to redirect lives in a more prosocial direction. Studies examining these relationships have generally found peer relationships to be influential (Maume, Ousey, & Beaver, 2005; Warr, 1998). While this study is not meant as a direct test of Sampson and Laub's (1993) age-graded theory of informal social control (see also Laub & Sampson, 2003), this theoretical framework serves as an important starting point in identifying those specific factors that are influential in the cessation of nonmedical prescription opioid use.

A large body of criminological research has examined the factors related to the cessation of substance use and crime. An array of empirical evidence supports the notion that criminal offending and drug use have common causes (Brook & Cohen, 1992; Osgood, Johnston, O'Malley, & Bachman, 1988; Schroeder et al., 2007; White, Pandina, & LaGrange, 1987; Zhang, Welte, & Wieczorek, 2002). Laub and Sampson (2001), in a comprehensive review of the desistance process, concluded that those factors influencing desistance for drug use and crime are contextually similar. Despite these similarities relating to the cessation of substance use and crime, researchers have discovered significant differences between the developmental trajectories of drug users and criminal offenders. Drugs and, possibly more

contextually important, the drug culture have unique features that can potentially complicate desistance efforts. Beyond the social-control explanation for the relationship between drugs and life-course patterns of offending described by Laub and Sampson (2003), research has stressed the importance in examining peer associations among drug users as impediments to the desistance process over the life course. Prior research examining the factors relating to marijuana desistance has found the association with drug-using peers to be a significant predictor of an individual's likelihood to stop using marijuana (Esbensen & Elliott, 1994; Kandel & Raveis, 1989; Lanza-Kaduce, Akers, Krohn, & Radosevich, 1984; Maume et al., 2005). The influence of drug-using peers has also proved to be a significant factor in the etiology of marijuana use as well as other illicit substances (Akers & Cochran, 1985; Elliott, Huizinga, & Menard, 1989; Hawkins, Catalano, & Miller, 1992; Jessor, Chase, & Donovan, 1980; Marcos, Bahr, & Johnson, 1986; Ousey & Maume, 1997).

Other studies have stressed the importance of the influence of prior criminality on the desistance process. Although existing literature suggests that an individual's prior offending is a strong predictor of future offending (e.g., Nagin & Paternoster, 1991), few existing studies have controlled for these factors (e.g., arrest history) when evaluating explanations of desistance, particularly among drug-involved samples. That being said, the theoretical perspectives that frame the majority of studies examining the desistance process (i.e., age-graded social-control and self-control theories) are general explanatory models that can apply to criminal offending and substance-using behaviors. The analysis that we describe focuses on an as of yet unexplored area of desistance and drug use: nonmedical prescription opioid use.

The current study contributes to research on substance abuse by examining those factors that impede and accelerate the desistance process from nonmedical prescription opioid use. Many studies define *desisters* as individuals who have not reoffended over a certain period of time, which can range from 1 year to several years (see, for example, Bushway, Piquero, Broidy, Cauffman, & Mazerolle, 2001; Maruna, 2001; Warr, 1998). This static approach to operationalizing desistance as an event as opposed to a process has been inconsistent regarding recent arguments in the life-course literature (see Bushway et al., 2001; Giordano, Cernkovich, & Rudolph, 2002; Laub & Sampson, 2003). Other studies have argued that desistance should not be understood as a permanent or static condition but rather understood and conceptualized as a process or as "a work in progress" (Bushway et al., 2001; Maruna, 2001). The usage patterns of drug use makes examining a static form (e.g., user vs. nonuser) of desistance difficult. As is the case with most dependent or recreational illicit drug users, true desistance or cessation is a dynamic process that often involves a sequence of unsuccessful attempts to quit before long-term abstinence is achieved (Zhou et al., 2009). Thus, operationalizing desistance as a state of nonoffending rather than considering it as a gradual changing process in terms of the reduction of severity of offending behavior may not be appropriate for illicit drug users (Chu & Sung, 2009). Understanding that a prolonged state of abstinence is unlikely given the high probability of relapse among a sample of nonmedical prescription opioid users, this study operationalizes desistance using a more realistic harm-reduction approach of declining use.

Using four waves of structured interview data derived from a sample of ethnically diverse polydrug users recruited using respondent-driven sampling (see Heckathorn 1997, 2002) in Miami-Dade County, Florida, this study assesses and compares the influence of multiple social, criminal history, and demographic variables on the likelihood of exhibiting a model of desistance, persistence, or an unstable/episodic pattern of prescription opioid use. This study is particularly important as it utilizes a contemporary sample of ethnically diverse men and women, whereas prior studies of desistance have relied heavily on samples of delinquent males who were coming of age during a time of economic growth and prosperity

in the 1950s and 1960s (i.e., Glueck & Glueck, 1950).[1] It is therefore unknown whether the traditional explanations for desistance can be extended to explain behavior in today's social and economic context regarding a contemporary type of drug user. While this is by no means an explicit test of the traditional theories of desistance, it is meant as an exploratory study examining some of the factors potentially related to desistance/declining use among a diverse contemporary sample of nonmedical prescription opioid users in the club culture.

Method

Data Collection and Sample

The data used in this study come from the South Beach Project, which has a sample of 600 ethnically diverse polydrug users recruited in Miami-Dade County, Florida. Initial participants ("seeds") were recruited through outreach in nightclub districts, as well as advertisements in alternative print media. These 81 seeds were then used to recruit referrals using respondent-driven sampling (Heckathorn, 1997, 2002). Each participant was given "coupons" for referrals up to a maximum of five coupons/referrals. If a new participant presented a coupon associated with a prior participant, the prior participant would receive US$50. Participants were asked to give the coupons only to people in their social networks with whom they had used drugs in the past 90 days. The first baseline interviews began in May 2006 and continued through June 2008 until 600 participants had been interviewed. Follow-up interviews were conducted at 6 months, 12 months, and 18 months postbaseline. These interviews were attempted with all participants regardless of whether participants had missed a previous follow-up. The retention rates for the follow-up interviews were 81%, 77%, and 77%, respectively. Interviews lasted approximately 2 to 3 hr and participants were paid US$50 for each interview in which they participated.

The median age among the participants was 24 years old, though the sample targeted all ages from 18 to 49. Participants were ethnically diverse, including 21% non-Hispanic White, 25% non-Hispanic Black, 54% Hispanic, and 3% Other. The sample contained slightly more males than females, with 59% male and 40% female. In addition, three individuals identified as trans-gendered rather than male or female.

Each baseline interview was conducted using computer-assisted, interviewer-administered, standard instrumentation. The primary instrument was the Global Appraisal of Individual Needs (GAIN; Dennis, Titus, White, Unsicker, & Hodgkins, 2002). Only a few modifications were made to the baseline (GAIN-I) and follow-up (GAIN-M90) instruments for the study. Changes relevant to the present study included (a) increasing the number of drug categories so as to clearly delineate a wide variety of prescription and illicit drugs and (b) greater detail regarding age and sequence of onset, recency, frequency, and heavy periods of use for each drug. For substance use, baseline and follow-up instruments include measures of past 90-day behavioral counts.

The present study uses select data from all four timepoints to estimate desistance patterns for nonmedical prescription opioid use. As such, some cases were not used for analyses in the present study. First, only participants who reported using opioids at baseline were retained. This resulted in a reduced data set of 345 participants. In addition, because this study addresses change over time, only participants with at least two timepoints of data (baseline and at least one follow-up) are included in these analyses (92% of cases). This further reduced the sample to 318 participants. In terms of opioid use, the participants who did not participate in a follow-up interview were not significantly different from those who did in a *t*

[1]For alternative studies that have examined the desistance process among contemporary samples, see Giordano, 2010; Giordano, Cernkovich, and Rudolph, 2002; and Maruna, 2001.

test comparing these groups ($p = .49$). The sample continues to be slightly more male (56%) and ethnically diverse (22% White, 30% Black, 46% Hispanic, and 3% Other). The age has a median of 25 and a mean of 27.

Variables

The main variables of interest are measures of opioid use at each timepoint. The survey asked participants about a variety of opioids, including codine, propoxyphene, meperidine, fentanyl, hydrocodone, hydromorphone, methadone, morphine, OxyContin, other oxycodone, pentazo-cine, tramadol, and "all other Rx opioids." Two questions relating to each of these opioids are used for the present study: "During the past 90 days, on how many *days* have you used [drug name]" and "What was the strength in milligrams of the [drug type] that you usually took?" The latter question included a drug-specific dosage chart to assist participants in selecting the appropriate response.

To transform these variables into a single, continuous variable, several steps were taken. First, the dosage responses were transformed, separately, into *z* scores and adjusted using the following equation:

$$\text{Dose}=\left[\frac{z\,\text{score}+4}{6}\right]+0.333.$$

This results in a variable for each drug that has a mean of 1 and ranges from 0.6 to 1.4, which measures the dose for each drug relative to the dose used by other users of the same drug. The next step used was to multiply this dosage variable with the number of days the participant used the specific drug, resulting in a dose-adjusted frequency. Because desistance could be confounded by users switching the specific drug used from one type of opioid to another, these variables were then combined by summing the variables together. Though this is *not* a measure of days of opioid use, it is largely based on the number of days and may be thought of as a number of days measure adjusted for dosage and multiple types of opioids. Due to a high positive skew, the resulting variable was capped at 90. This value was chosen because most cases (>90%) scored below 90 and, given that the number is an adjust number of days measure, it was a natural selection for a maximum. Thus, the final variables (one for each timepoint) range from 0 to 90 and provide single measures capturing frequency, variety of opioid types, and dosage. The descriptive statistics for this and other measures are included in Table 1.

Predictor variables in the model include baseline measures of peer use, perceptions of harm, perceptions of punishment, and criminal history. Peer use was measured using the question, "How many of your friends would you estimate use sedatives or painkillers to relax or get high (not as prescribed)?" Responses included *none* (0), *a few* (1), *some* (2), *most* (3), and *all* (4). Perceptions of harm was measured using the question, "How much do you thing people risk harming themselves (physically or in other ways) if they take sedatives or painkillers twice a week to relax or get high (not as prescribed)?" Responses included *no risk* (0), *slight risk* (1), *moderate risk* (2), and *great risk* (3). Perceptions of punishment was measured using the question, "How likely is it that you would get in trouble with police if you were stopped while driving and had five sedative or painkiller pills and no prescription?" Responses included *very unlikely* (0), *unlikely* (1), *not sure* (2), *likely* (3), and *very likely* (4).

Criminal history measures include measures of arrests, convictions, and violent history. The measure for arrests counts the number of self-reported arrests in the participant's lifetime in which the participant was arrested and charged with a crime. Arrests in which the case was

dropped prior to trial are still counted as long as the participant was charged at some point. The measure for convictions is a count of self-reported convictions or adjudications. For both arrests and convictions, the number is not contingent on the severity or type of offense. Violent history is a dichotomous variable indicating whether the participant had ever been charged with robbery, aggravated assault, forcible rape, murder/homicide/manslaughter, or arson.

Several demographic characteristics are also included. They include dichotomous indicators of being female, Black, Hispanic, and having completed a high school degree or General Educational Development (GED). A dichotomous indicator of a race/ethnicity that is not White, Black, or Hispanic ("Other") was originally included but had to be removed due to convergence problems relating to having so few cases with that attribute.

Analytic Strategy

To estimate change over time, this study uses MPlus to estimate growth models based on these data. This approach estimates an intercept predicting baseline opioid use and a slope estimating a linear change over time. Timepoints used for this linear change are the number of months since baseline (i.e., 0, 6, 12, and 18). A nonlinear, quadratic change was estimated but was a poor fit and resulted in a failure to converge. The models presented are estimated using maximum likelihood (ML) estimations. Models were also run using ML with robust standard errors (not presented) to address the nonnormally distributed opioid variables but did not significantly improve model fit and therefore were abandoned in favor of standard ML estimations.

Baseline predictors are included in the model as time-invariant covariates and are used to predict the intercept and slope. Perceptions of harm and peer use were also measured during follow-up interviews and theoretically could be considered time-varying covariates. However, due to little change within persons, these variables are included postbaseline only as a measure of change since baseline. This allows opioid use to be estimated while controlling for changes in these perceptions but without affecting the inclusion of the baseline measures as time-invariant covariates. A dichotomous measure indicating whether the participant had been arrested since the previous interview is also included as a time-varying covariate at each timepoint. A graph of the model is presented in Figure 1. Given that prior research has demonstrated gender differences in those factors contributing to the desistance process for males and females, these models were also estimated separately for males and females as an exploratory step for examining gender differences (see Giordano et al., 2002; Uggen & Kruttschnitt, 1998).

Results

The fit statistics for the overall model were mixed. The chi-square statistic indicated good fit ($\chi^2/df = 2.017$), as did the standardized root mean square residual (SRMR = .032). The comparative fit index (CFI), conversely, indicated poor fit (CFI = .824). Given that two of these three measures indicated good fit, no modifications were made from the hypothesized model. Substantively, the model predicts an average starting point of 21.072 for opioid use and an average monthly decline of 0.967. This results in an estimated decline in nonmedical opioid use from 21.1 to 3.7 over the course of the study. In addition, the interaction between the intercept and slope (−.020) indicates that the higher the predicted intercept is for an individual, the steeper their slope, thus indicating partial convergence over time between high and low opioid users. For example, an individual 1 unit higher at the intercept would be expected to be 0.64 units higher by the end of the study. The full results for the model estimated with the entire sample are presented in Table 2.

Beginning with the theoretically relevant variables, the measure of peer use has a significant impact on the intercept (5.76). This indicates that an individual 1 unit higher than the mean on this 5-point scale is predicted to be nearly 6 points higher on the Opioid Use scale. Though this variable's effect on the slope is not statistically significant, its cumulative effect by the 18th month is substantive. An individual 1 point higher than the mean for peer use would be expected to decline from a 5.76 unit difference in opioid use at baseline, to a 2.50 unit difference 18 months later.

The coefficients for perceived harm indicate a continuing impact on opioid use. At baseline, an individual who reported perceiving harm of prescription drug use without a prescription at 1 point higher than the mean for this 4-point scale is likely to be using opioids less often than the average user (−3.30). Moreover, this effect appears to be a cumulative effect throughout the study. Though nonsignificant, the impact of perceived harm on the slope is also negative. This indicates that the aforementioned hypothetical individual would not only start with lower opioid use (−3.30), he or she would end with lower opioid use as well (−3.70).

Unlike the measures of perceived peer use and perceived risk of harm, the perception of punishment for being found with prescription drugs does not appear to have a significant impact on opioid use. Those who perceived punishment to be 1 unit more likely on the scale than average do not use significantly less opioids than those at the mean. In fact, the nonsignificant effect indicates they are estimated to use more opioids (1.09 at baseline), though the impact on the slope (−0.04) reverses most of this difference (0.29 at 18 months). Neither the number of reported prior arrests nor the number of reported prior convictions appears to have a significant influence on the amount of opioid use. Similarly, a self-reported conviction for a violent offense did not significantly impact the intercept or the slope.

Select background characteristics were significant predictors of the degree of opioid use. Individuals who were Black or Hispanic are predicted to use significantly less opioids than Whites (−10.77 and −15.85, respectively). Interestingly, the strong positive effects on the slope indicate these differences disappear over time. For Blacks, this means a near-complete convergence with Whites (−0.40 by the 18th month), whereas for Hispanics, it means the difference is roughly halved (−15.85 at baseline to −7.59 at 18 months).

Older individuals tended to engage in more opioid use than the young. For year, older an individual reported being, he or she is estimated to be 0.40 units higher on the Opioid Use scale. Moreover, the effect of age on the slope is nonsignificant, which indicates that this effect does not lessen over time and older individuals continue to use more opioids than the young.

The remaining demographic variables, having a high school degree and gender, did not have a significant impact on the intercept. However, being female did have a significant impact on the slope. This indicates that females start out lower than the males for opioid use but end with more opioid use than the males. This reversing role will be further explored with the separate gender models.

The effects of the time-varying covariates, including changes in perceived peer use, changes in perceived risk of harm, and having been recently arrested, are also presented with the results for the full model. Because these are included primarily as control variables, these relationships will not be fully explored. However, it is worth noting that effects of changes in peer use are significant at 6 and 12 months, and in the expected direction. Thus, declines in perceived peer use correspond to decline in the participant's peer use as well.

The gender-specific models are presented in Table 3. Overall, the model predicts similar slopes for males and females (−1.17 and −0.84, respectively), but different starting points on the intercept (24.24 for males and 16.98 for females). Thus, males start with greater opioid use than females and consistently use more after controlling for other factors. However, as is evident in a visual representation of the model (see Figure 2), the male and female slope do converge after taking into account the exogenous variables. For males, the interaction between the intercept and the slope continues to be significant, indicating that males with more opioid use have steeper declines than males with lower levels of opioid use.

As with estimates for the entire sample, males and females tend to score roughly 6 points higher (6.3 and 6.1, respectively) on the Opioid Use scale for every 1 point higher on the Peer Use scale. Though the effect on the slope remains nonsignificant for both groups, and there is no significant difference between groups, the effect of peer use on the slope is roughly 3 times as much for females as it is for males. Thus, the effect of peer use seems to diminish over time for females (6.12 at baseline, 0.65 at 18 months), whereas remains present for males (6.32 at baseline, 4.67 at 18 months).

With regard to perceptions of harm, the effect on the intercept does not appear to differ from the previous model. Though the effect is now nonsignificant, the substantive impact remains similar. Thus, the decrease in significance is likely the result of a loss of power from halved sample sizes in this group-specific model. The direction of the effect of peer use on the slope varies by gender, indicating that the effect of perceived harm on opioid use decreases over time for males, whereas increases over time for females. However, as with the full sample, the effect of perceived harm on the slope is not significant.

For demographic characteristics, the effect of being Hispanic does not appear to vary significantly by gender in comparison with the overall model. For males and females, Hispanics are predicted to use less opioids than Whites. Conversely, the effect for being Black does show some differences by gender, albeit not significantly. For males, being Black results in a higher intercept and the effect only partially diminishes over time (−15.36 at baseline, −7.60 at 18 months). For females, being Black decreases the intercept by a smaller amount and the effect is reversed thereafter (−4.36 at baseline, 9.15 at 18 months). For age, older males tend to use more opioids than younger males at baseline (0.562 per year), but the effect is nearly halved within 18 months. For females, there is no significant difference by age.

Other variables in the model continue to be nonsignificant in the gender-specific models. These include number of arrests, number of convictions, violent conviction, and high school degree. Among the time-varying covariates (not shown) for males, changes in peer use and having a new arrest are significant at 6 months and changes in perceived harm is significant at 18 months. For females, only having a new arrest at 6 months is significant.

Discussion

Prior literature has suggested that opioid use and nonmedical prescription drug use in general have become rivals with nonprescription illicit drug use in terms of prevalence (e.g., SAMHSA, 2006b). There has been, however, little to no research examining whether users of prescription drugs experience the same desistance process or whether they are subject to the same influences of desistance in comparison with users of illicit drugs or users in previous generations. Similarly, prior studies of desistance have relied primarily on male samples that came of age in a much different social and economic context than the sample utilized in this study (i.e., Glueck & Glueck, 1950). This study sought to provide an

exploratory examination of a diverse group of nonmedical prescription opioid users and their desistance process.

The results indicate similarities and dissimilarities to prior studies on nonmedical prescription drug use and among desistance studies of criminal offending and drug use. Males and females, for example, were typically using more opioids if they reported that their friends were also using, which is consistent with prior research on the effect of peer use (Higgins et al., 2009; Quintero, 2009). Prior studies examining desistance from substance use has found the association with drug-using peers to be a significant predictor of an individual's likelihood to stop using the illicit substances (Esbensen & Elliott, 1994; Hawkins et al., 1992; Kandel & Raveis, 1989; Lanza-Kaduce et al., 1984; Maume et al., 2005; Ousey & Maume, 1997). Consistent with these studies that primarily examined alcohol and marijuana, an association with antisocial or drug-using peers was also found to impede the desistance process for nonmedical prescription opioid users. Thus, those individuals who had prescription opioid–using peers were less likely to desist as quickly from their own use compared with those with nonprescription opioid–using peers. This supports the life-course perspective, which stresses the importance of social bonds, positive and negative, in redirecting drug-using trajectories in a prosocial or antisocial direction.

The overall findings for race—that Blacks and Hispanics are using less prescription opioids than Whites—are consistent with research in the area of nonmedical prescription drug use (Ford & Rivera, 2008; Kroutil et al., 2006; McCabe, 2005; McCabe et al., 2006; Simoni-Wastila & Strickler, 2004; Sung et al., 2005). Also similar to prior research (Ball et al., 1982; Goldstein, 1985; Inciardi, 2008; Kurtz et al., 2009), this study found that males with more extensive criminal histories (arrests) typically desist at a slower pace. This is supportive of the criminal stability hypothesis, emphasizing the role that an individual's prior offending has on future offending (e.g., Nagin & Paternoster, 1991). On the contrary, however, these findings indicate that prior convictions have the opposite effect and that neither relationship is found among female users. Whereas traditionally education has played a role in drug use (Harrell & Broman, 2009; Huang et al., 2006; Merline et al., 2004), the present data suggest no such relationship. In addition, despite traditional drug involvement theoretically being related to the perception of harm and the perception of punishment, these relationships were also nonsignificant among these users in terms of predicting desistance.

These findings are not without limitations. First, the sample was limited to multidrug-involved club patrons in South Beach, Miami. Though there is no evidence to suggest these prescription opioid users are different from other prescription opioid users, there is similarly no evidence to suggest they are the same. A sample that reaches other populations of nonmedical prescription opioid users would invoke more confidence in its generalizability. Second, the data are limited entirely to self-report data. While the high reported levels of prescription drug abuse would appear to indicate that the respondents are not attempting to hide their use, its accuracy and full honesty cannot be guaranteed. Third, though the retention rate is reasonably high (92% participated in at least one follow-up), there is always a danger in attrition of any kind that nonresponses are related to the variables of interest. In this case, it is possible that nonresponse is related to substance use or its consequences, though no significant differences at baseline were observed.

Overall, these findings suggest a need for additional research in the area of nonmedical prescription drug use desistance. With similarities and dissimilarities to prior desistance research uncovered in this exploratory study, additional research is necessary to fully understand these relationships. For example, the positive relationship between arrests and use and the negative relationship between convictions and use suggests the involvement of

sentencing may influence desistance after the fact; additional research is needed to fully understand this relationship. Moreover, the findings suggest racial differences, with White users typically using more than Black or Hispanic users. However, determining whether the effects of the theoretical predictors vary by race was beyond this study's scope. Future research should more fully address the potential differences by race.

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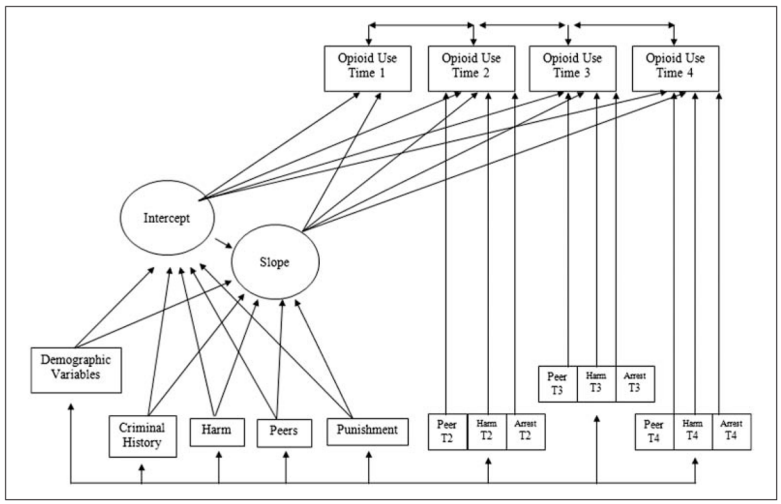

Figure 1.
Growth model

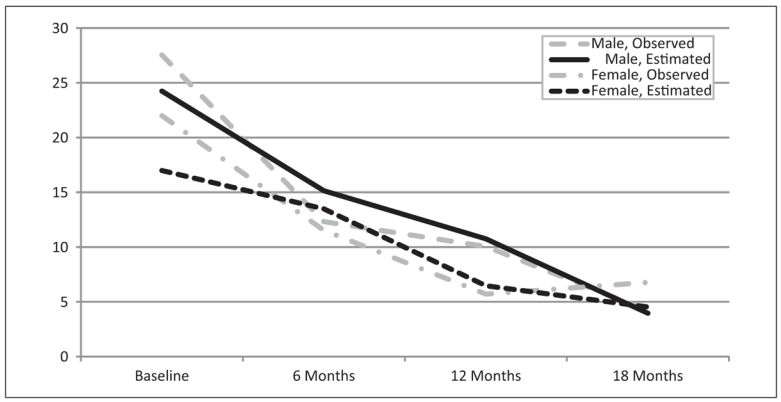

Figure 2.
Declining opioid use by gender

Table 1

Descriptive Statistics

	M	*SD*	Minimum	Maximum
Opioid use–Time 1	25.067	29.461	0.65	90.00
Opioid use–Time 2	11.001	22.297	0.00	90.00
Opioid use–Time 3	7.999	19.055	0.00	90.00
Opioid use–Time 4	5.306	16.742	0.00	90.00
Peer use	1.915	0.924	0.00	4.00
Perceived harm	1.550	0.967	0.00	3.00
Punishment	2.745	1.318	0.00	4.00
Arrests	4.255	7.854	0.00	80.00
Convictions	2.791	5.983	0.00	58.00
Violent	0.160	0.368	0.00	1.00
High school education	0.789	0.408	0.00	1.00
Female	0.437	0.497	0.00	1.00
Age	27.327	8.297	18.00	51.00
Black	0.305	0.461	0.00	1.00
Hispanic	0.462	0.499	0.00	1.00
Peer use–Time 2	−0.117	1.069	−4.00	4.00
Peer use–Time 3	−0.574	1.264	−4.00	3.00
Peer use–Time 4	−0.500	1.265	−4.00	3.00
Harm–Time 2	0.137	0.942	−3.00	3.00
Harm–Time 3	0.221	1.130	−3.00	3.00
Harm–Time 4	0.313	1.138	−3.00	3.00
Arrests–Time 2	0.221	0.412	0.00	1.00
Arrests–Time 3	0.147	0.355	0.00	1.00
Arrests–Time 4	0.130	0.337	0.00	1.00

Table 2

Growth Models

	b	*SE*
Intercept		
Peer use	5.758	1.534**
Perceived harm	−3.303	1.463*
Punishment	1.086	1.017
Arrests	−0.380	0.270
Convictions	0.354	0.392
Violent	7.447	3.966
High school degree	−3.395	3.331
Female	−4.028	2.756
Black	−10.767	3.463**
Hispanic	−15.850	3.154**
Age	0.405	0.172*
Slope		
Peer use	−0.181	0.096
Perceived harm	−0.022	0.084
Punishment	−0.044	0.049
Arrests	0.015	0.014
Convictions	−0.018	0.020
Violent	−0.223	0.205
High school degree	0.187	0.163
Female	0.278	0.134*
Black	0.576	0.189**
Hispanic	0.459	0.203*
Age	−0.007	0.009
Intercept	−0.020	0.008*
Opioids		
Intercept	15.907	6.992*
Slope	−0.491	0.365
Opioids (6 months)		
Peer use	2.448	1.178*
Perceived harm	−1.144	1.335
Arrested	−1.547	2.460
Opioids (12 months)		
Peer use	1.803	0.837*
Perceived harm	−0.883	0.972
Arrested	4.431	2.498
Opioids (18 months)		

	b	*SE*
Peer Use	−1.145	0.938
Perceived harm	−0.695	1.063
Arrested	2.662	2.614
Means		
Intercept	21.072	—
Slope	−0.967	—

* $p < .05$.

** $p < .01$.

Table 3

Growth Model by Gender

	Males		Females	
	b	***SE***	***b***	***SE***
Intercept				
Peer use	6.322	2.227**	6.125	2.137**
Perceived harm	−3.595	2.120	−2.608	1.972
Punishment	0.640	1.457	1.882	1.398
Arrests	−0.274	0.300	−0.922	1.236
Convictions	0.066	0.446	1.849	1.143
Violent	8.284	4.956	3.503	7.641
High school degree	−4.373	4.669	1.425	4.762
Black	−15.359	4.768**	−4.364	5.202
Hispanic	−16.534	4.437**	−13.813	4.738**
Age	0.562	0.253*	0.213	0.231
Slope				
Peer use	−0.092	0.097	−0.0304	0.185
Perceived harm	−0.036	0.082	0.061	0.148
Punishment	−0.059	0.045	−0.086	0.097
Arrests	0.021	0.010*	0.005	0.083
Convictions	−0.036	0.016*	−0.034	0.085
Violent	−0.081	0.177	−0.053	0.497
High school degree	0.072	0.153	0.379	0.310
Black	0.431	0.184*	0.751	0.340*
Hispanic	0.279	0.184	0.714	0.411
Age	−0.014	0.009	−0.001	0.015
Intercept	−0.031	0.007**	−0.007	0.019
Opioids				
Intercept	15.268	10.120	6.438	9.864
Slope	0.113	0.345	−0.867	0.640
Means				
Intercept	24.242	—	16.985	—
Slope	−1.117	—	−0.814	—

Note: Estimates for time-varying covariates, which are included as control variables in these model, are not shown here to conserve space.

* $p < .05$.

** $p < .01$.