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Gender Similarities and Differences in the Treatment, Relapse, and Recovery Cycle

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Abstract

This study explores the influence of gender on changes in recovery status among participants in a longitudinal study. The study sample ($N = 1,202$; 60% female) is recruited on referral to treatment, and annual interviews are conducted from Years 2 to 6 following intake. At each annual observation, participants are classified into one of four statuses (recovery, treatment, incarcerated, and using), and the transitional probabilities and correlates of transitioning from one status to another are estimated. About 80% of the participants changed status at least once over the follow-up period. Women are one third less likely to transition from recovery to using; the predictors of transitioning to different statuses vary by gender. The implications of gender as a moderator of the recovery process are discussed.

Keywords

gender differences; longitudinal follow-up; relapse; transition; recovery

The concept of addiction as a chronic disorder, requiring long-term management much like other chronic disorders, has been widely disseminated and generally accepted within the substance abuse treatment field (McLellan 2002; McLellan et al. 2000; McLellan et al. 2005). Yet this way of conceptualizing addiction is still lacking in detailed empirical description (Anglin, Hser, and Grella 1997; Anglin et al. 2001). In particular, there is limited understanding of how frequently individuals change from one status to another during the recovery cycle (e.g., from abstinence to using or vice versa or from using into treatment) or about the correlates that accompany these changes in status. Prior research has shown that a majority of individuals relapse at some point following a treatment episode, and many of them subsequently reenter treatment (Grella, Hser, and Hsieh 2003). To study addiction as a chronic disorder, it is useful to take a “life course perspective,” in which drug use, treatment, relapse, and recovery are not viewed as discrete events but rather as stages in a cyclical process where prior experiences of drug use and treatment influence later experiences (Hser, Longshore, and Anglin 2007; Scott, Foss, and Dennis 2005; Williams 2003).

Gender Differences in Drug Use and Treatment Participation

This article focuses on how gender moderates the longitudinal course of recovery following treatment participation. We focus on gender because considerable research has shown that

there are important ways in which the course of drug use and treatment participation differs for men and women. First, there are gender differences in the processes of initiating substance use and becoming dependent (Anglin, Hser, and McGlothlin 1987; Hser, Anglin, and McGlothlin 1987). Women tend to initiate drug and alcohol use later than men but progress faster to dependence (Greenfield et al. 2007). Moreover, men and women are subject to different social influences on their initiation of substance use; women more often report that initiation occurs within the context of sexual or interpersonal relationships, whereas men are more likely to report experimentation or peer influence as the context for drug use initiation (Frajzyngier et al. 2007; Hser, Anglin, and Booth 1987).

Second, gender differences are evident in the processes related to treatment initiation, including the social influences that may support or inhibit treatment entry and the referral pathways into treatment (Anglin, Hser, and Booth 1987; Weisner and Schmidt 1992). Women are more likely than men to enter treatment via the mental health and child welfare systems, whereas men are more likely to enter treatment through the criminal justice system (Schmidt and Weisner 1995). Research from a national treatment outcome study showed that drug treatment use among men was associated with stronger family opposition to their drug use and more support for treatment, whereas for women it was associated with more mental health problems and self-referral into treatment (Grella and Joshi 1999). Past research has also shown that women tend to enter treatment after fewer years of use but that they present to treatment with a more severe clinical profile and more problems related to mental health, family and interpersonal relationships, employment, and physical health (Grella, Scott et al. 2003; McKay et al. 2003; Stewart et al. 2003; Wechsberg, Craddock, and Hubbard 1998).

Third, treatment processes, retention, completion, and outcomes appear to be influenced by gender (Green 2006; Grella, Scott, and Foss 2005). Among patients treated in an HMO setting, Green, Polen, Dickinson, Lynch, and Bennett (2002) found that although time in treatment and rates of treatment completion did not differ by gender, different participant characteristics were related to retention and completion for males and females. Similarly, in an extensive review of the literature, Greenfield et al. (2007) found that gender is not a significant predictor of treatment retention, completion, or outcome but that there is evidence for gender-specific predictors of outcomes. Studies have shown few gender differences in rates of post-treatment relapse to alcohol use, although the evidence is mixed in regard to relapse to drug use. There are gender differences, however, in the situations that are associated with relapse to substance use (Walitzer and Dearing 2006). For males, these include living alone, positive emotional affect, and social pressures, whereas for females, relapse has been associated with living apart from one's children, being depressed, having a stressful marriage, and using within the context of "romantic" relationships (Rubin, Stout, and Longabaugh 1996; Saunders et al. 1993). Last, some research has shown that women tend to engage more than men in self-help participation following treatment (Humphreys, Mavis, and Stofflemayr 1991) and in successive treatment episodes (Hser et al. 2004), both of which may influence the course of recovery following treatment.

This growing body of work has clearly demonstrated the importance of gender as a moderator of the course of substance use initiation, development of addiction, treatment participation, and outcomes following treatment. We build on the foundation of this previous research to examine how gender influences the longitudinal course of recovery following treatment, including subsequent relapse, treatment use, and cessation of use. In particular, the prior research demonstrates various ways in which social context influences substance use and treatment participation differentially for men and women. Therefore, we assume that the longitudinal course of recovery for men and women will be influenced differentially by social context, including family and work relationships; interactions with

social institutions, such as criminal justice, social welfare, and health services; and treatment and self-help participation.

Current Study

The current study builds on a longitudinal body of research that has been conducted with a relatively large sample of participants who were initially referred into community-based substance abuse treatment through a centralized intake unit as part of the Chicago Target Cities study (Scott, Muck, and Foss 2000). Beginning in the second year following study intake, Scott et al. (2003, 2005) have conducted annual follow-ups with this cohort, extending through 6 years postintake. Within the 36 months following study intake (comparing changes in status at intake, Years 2 and 3), nearly all participants (83%) changed in status (e.g., relapsed to substance use, entered treatment, became incarcerated, or returned to recovery in the community) at least one time, and many transitioned multiple times from one type of recovery status to another (Scott et al. 2005). Moreover, the specific predictors of transitioning varied by type and direction of the pathway (i.e., the type of starting and ending status for each annual period).

In the first follow-up study conducted with this sample, men and women did not differ in the prevalence of substance use reported at the 24-month follow-up, but there was more persistent use of alcohol and marijuana among men and use of cocaine among women. Moreover, women were more likely to return to treatment, whereas men were more likely to become incarcerated. Psychological distress was associated with a greater likelihood of continued substance use for both men and women. Yet for women, living with a substance user following treatment predicted a greater likelihood of their own substance use at 24 months, but this relationship was not significant among men (Grella, Scott et al. 2003). In the subsequent analyses, there were no differences between men and women in the proportion who reported any alcohol or drug use at 36 months, but there were persistent gender differences in several areas of psychosocial functioning, including greater psychological distress among women and greater criminal justice involvement among men. Women continued to have lower rates of employment and to report more interpersonal problems than men, but they had greater increases in self-help participation (Grella et al. 2005).

The present article extends these previous studies by examining gender similarities and differences in the number, types, and predictors of transitions among the various recovery statuses from Years 2 through 6 following study intake. Based on the literature and prior follow-up studies conducted with this sample, we hypothesized that both men and women would have multiple changes in recovery status throughout the extended follow-up period. Moreover, we hypothesized that there would be gender differences in the frequency of transitioning across the various pathways (i.e., the starting and ending statuses) and in the predictors of transitioning across these pathways. In particular, because of the stronger association between mental health problems and substance use among women, we hypothesized that mental health problems would be more strongly associated with transitions from recovery to relapse for women. Conversely, because of the stronger association between substance use and criminal behavior among men, we hypothesized that criminal justice involvement would be more strongly associated with transitions out of recovery (or into treatment) for men. Furthermore, because of prior research showing that women tend to engage in successive treatment episodes and to participate in self-help more than men, we hypothesized that treatment and self-help participation would be more strongly associated with transitions out of using to recovery, or with the maintenance of recovery, for women than for men. Last, because prior research has suggested the greater influence of interpersonal relationships on women's drug use and treatment participation, we

hypothesized that interpersonal relationships would be more strongly associated with transitions for women, generally, compared with men.

Method

Study Design

A sample of 1,326 participants was recruited from sequential admissions to 12 substance abuse treatment facilities operated by 10 agencies on Chicago's west side and from the central intake unit serving these programs from 1996 to 1998. More than 90% of those receiving a referral entered treatment within 6 months; about 90% of these entered the program to which they had been referred. A quota sampling approach was used with a target sample of 200 sequential admissions from each treatment modality. Because some of the treatment modalities included only women (e.g., women-only residential programs), women were oversampled. Hence, as a function of the study design, type of treatment modality varied by gender, and a majority of the resultant study sample (approximately 60%) is female. A greater proportion of men than women received outpatient treatment (33% vs. 10%, respectively), intensive outpatient treatment (24% vs. 12%), and methadone treatment (23% vs. 18%). About 19% of the men were treated in halfway house programs, and 36% and 24% of the women were treated in short- and long-term residential programs, respectively.

Annual follow-up interviews were conducted starting 2 years postintake and extended through 6 years postintake. Follow-up interviews were completed with 94% of the participants at 2 years, 94% at 3 years, 96% at 4 years, 97% at 5 years, and 96% at 6 years (excluding deceased participants).¹ The analyses for this study (see Analytic Methods section) used data collected between the 2-year and 6-year follow-up interviews. Excluded from the analyses were individuals who were deceased at 6 years ($n = 94$, 7.1%) and individuals with no transition data during the 4-year follow-up period ($n = 30$, 2.4%; 11 were not interviewed at any time and 19 did not have any consecutive interviews), resulting in a sample size of 1,202.

The first study objective was to observe how frequently participants transitioned from one type of status to another across annual assessments conducted throughout the 4-year follow-up period. Participants were classified into a status based on their self-reported behavior in the 30 days preceding the annual follow-up interview. Four statuses were examined: using, treatment, incarcerated, and recovery. Transitions from one type of status to another across annual assessments are referred to as "pathways." The annual transition data were then collapsed, overall and separately by gender, to estimate transition probabilities over time.

The second objective was to examine whether there were gender differences in the factors that distinguished between individuals that transitioned from one status to another (i.e., using to recovery) and those that were in the same status from one annual assessment to the next (i.e., remained in the community using). A common set of factors was examined for each type of transition pathway that included gender and the interaction of gender with other factors. The goal was to identify factors that were common to different pathways and were unique to specific pathways.

¹The rate of follow-up in Year 2 was slightly lower than in subsequent years because of the loss of participants in the extended interval between it and a prior follow-up that had been conducted at 6 months (data from the 6-month follow-up are not included in the current study). Subsequent annual follow-ups beginning in Year 2 successfully located some individuals who had not been interviewed in the prior years. See Scott et al. (2003) for more detailed information on the study methods.

The focus of this study was on transitions that originated among participants in the community who were either using or in recovery. Four types of transition pathways were examined: (a) using to recovery, (b) recovery to using, (c) using to treatment, and (d) recovery to treatment. Because movement into or out of incarceration may be strongly influenced by factors external to the individual (e.g., the type of crime an individual is charged with committing, which is subject to negotiation and circumstances; sentencing policies and practices, which may change over time; and local conditions in the correctional system, such as overcrowding), we decided to exclude pathways that included incarceration (either as the starting or ending status) from the multivariate analyses of transition predictors.²

Instrument and Measures

The primary assessment instrument was an augmented version of the Addiction Severity Index (ASI, 5th ed.; McLellan et al. 1992), which included more detailed questions/scales in each section (Scott et al. 1995). The internal consistency of the ASI composite scores was typically 0.7 or better, and test-retest reliabilities were generally between 0.7 and 0.9, which are comparable to or better than values reported in other published studies (see Scott et al. 2003 for more details).

Recovery status—Participants were classified into one of the four recovery statuses based on data collected at each annual follow-up assessment on their behavior in the preceding 30 days. A participant was classified as incarcerated if during the 30 days prior to the interview, the individual had spent 15 or more days in jail or prison or was otherwise incarcerated. A participant was classified as in treatment if the individual was receiving inpatient or out-patient substance abuse treatment at the time of the interview and was not classified as incarcerated. A participant who was not incarcerated or in treatment, and who was living in the community, was classified as using if during the 30 days prior to the interview the individual reported any illegal substance use, intoxication, alcohol use on 15 or more days, or any days of alcohol- or drug-related problems. Finally, if there was no use of an illegal drug, intoxication, or days with drug- or alcohol-related problems in the 30 days prior to the interview, or less than 15 days of alcohol use, a participant was classified as being in recovery. In a subsample of 77 people, the 2-day test-retest reliability of this classification scheme was high (Kappa = .69).

Predictor variables—A combination of variables related to recovery, relapse, and treatment participation was identified in the literature and guided the analyses (see, e.g., Bischof et al. 2001; McKay and Weiss 2001; Scott et al. 2003, 2005). Emphasis was placed on including variables that had been associated with gender differences in the literature to test the study hypotheses. Background variables from the study intake assessment included gender, age, number of lifetime arrests, and number of prior substance abuse treatments. Variables on current status measured at the annual follow-up interviews included General Mental Distress Index (GMDI) score, ASI Legal Composite score, whether the respondent had been mandated to treatment by the legal system or the Department of Child and Family Services, number of respondent's friends who are clean and sober (categorized as 0 = *none*, 1 = *a few*, 2 = *some*, 3 = *most*, 4 = *all*), cumulative weeks in treatment during the 12-month follow-up period,³ and number of 12-step sessions attended during the previous 6 months. In addition, for each variable, the interaction term with gender was examined as a potential

²In addition to this consideration, because 10% or less of all transitions began or ended when the participant was incarcerated (see Table 2), there is limited statistical power to determine the predictors of the incarceration transition pathways.

³The relatively small number of participants who were in treatment during a given follow-up period (10%) precluded categorizing treatment received by modality; therefore, cumulative time in treatment was collapsed across type of modality.

predictor variable. The GMDI (Dennis 1999; Dennis et al. 1995) is based on factor and item response analyses of the Hopkin's Symptom Checklist 90 (Dennis, Chan, and Funk 2006; Derogatis et al. 1974) and is a symptom count of internal sources of distress (somatic, depressive, and anxiety-related disorders) with a high internal consistency ($\alpha = .9$) in this sample and the prior literature (see Scott et al. 2003).

Participant Characteristics

Background characteristics of the participants (males: $n = 476$ and females: $n = 726$) are presented in Table 1.⁴ With the exception of race/ethnicity (nearly 90% of the sample is African American), there were gender differences on all of the demographic and background characteristics. Males were older on average, more likely to be married, more likely to have completed high school, less likely to be living with children and without spouse/partners and more likely to be living alone, less likely to report symptoms of major depression and general anxiety disorder, and more likely to have ever been arrested, convicted, or incarcerated and, if incarcerated, to have spent more time incarcerated. With regard to substance use, a greater proportion of males than females reported weekly use of alcohol, whereas greater proportions of females reported weekly use of cocaine and heroin, although there was no difference in marijuana use. Males reported a significantly longer duration of regular substance use. There was no difference, however, in the proportions of males and females that had prior substance abuse treatment at study intake.

Analytic Methods

Repeated measures multinomial logistic regression was conducted using as the outcome measure the participant's status for the 30 days preceding the annual follow-up interview. Change or stability in status was observed across each of the annual transitions (i.e., from 2 to 3 years, 3 to 4 years, 4 to 5 years, and 5 to 6 years). Separate analyses were conducted for each transition's starting status (i.e., using or recovery). The model was fit using a full-information maximum likelihood, mixed-effects multinomial logistic regression procedure (MIXNO; Hedeker 1998, 1999). A random intercept term was used to account for individual differences in average response probabilities over time. The maximum likelihood has been shown to be the best estimation method, both under conditions of model misspecification and nonnormality (Olsson et al. 2000) and for handling missing data (Enders and Bandalos 2001). The full-information maximum likelihood uses all outcome data available for an individual by assuming that any missing outcome data are missing at random and can be ignored without bias. Given the high follow-up rates in this study (i.e., less than 4% of the sample or fewer than 50 observations were missing in any follow-up wave), the effect of missing outcome data is small, and the assumption that missing data were random rather than systematic was deemed tenable. However, if any one of the predictor variables was missing for an outcome, all data for that outcome would have been deleted from the analysis. This can result in a significant loss of data even when the overall amount of missing data is small. In this study, whenever the follow-up interviews were conducted, there were very little missing data among the predictor variables (i.e., typically less than 1%); therefore, it was decided to replace these missing data with imputed values using a hot-deck imputation procedure (Little and Rubin 1987). This was done by grouping participants based on their gender, age, and the level of care to which they were referred at intake. Missing values were then replaced with values selected at random, with replacement, from the corresponding group. In this way, both the mean and variance remain unbiased.

⁴Background characteristics of the study sample have been previously described in-depth in Grella, Scott et al. (2003) and Grella, Scott, and Foss (2005).

This analytic model is related to a first-order Markov Model with predictor variables; however, instead of modeling all the transitions simultaneously using the starting status as a predictor variable, we decided to analyze specific transitions conditioned on the starting status. This approach eliminated the need for a large number of interaction terms (starting status by each predictor variable) required when the optimal set of predictors depends on the starting point (see, e.g., Scott et al. 2005). In addition, the present model controls for within-subject variability rather than treating repeated observations as independent (cf., Bonney 1986).

Results

Annual Transition Patterns in Recovery Status

The first goal of the study was to examine the frequency and types of transitions across the annual assessments during the 4-year follow-up period. An examination of the pathways that participants traversed during the first few years following treatment (Scott et al. 2005) found that the percentage of participants in the different statuses changed over time, with those in the community using decreasing from 80% at intake to 39.6% at the 3-year follow-up and those in recovery increasing from 8.3% at intake to 41.2% at the 3-year follow-up. During the subsequent time periods, the percentage of participants in the different statuses changed slightly in the same direction. The percentage of participants in the community using decreased between the 3-year and 6-year follow-ups (40.9% to 37.4% for males and 43% to 37.6% for females); likewise, the percentage of participants in recovery increased (33.7% to 36.1% for males and 40.7% to 43.2% for females).

The participant's type of status at the start of each annual assessment period was then compared with their status at the start of the prior assessment period. The transition probabilities for each pathway (i.e., the probability of ending status conditioned on the starting status) are reported in Table 2. The rows reflect the starting point in the transition period, and the columns reflect the end point. The data are collapsed across the four transition periods (Years 2 to 3, Years 3 to 4, Years 4 to 5, and Years 5 to 6) examined in this study. The transition probabilities are presented separately for males and females and across all participants; also shown is the percentage of observations for each type of status. Along the block diagonal (in boldface) are the probabilities of nontransitioning (i.e., remaining at the same type of status from one assessment point to the next during a 1-year period).

Two significant patterns emerge from the data and are noted in Table 2. For the two largest groups (using—the starting status of 38.9% of the pathways and recovery—the starting status of 40.5% of the pathways), more than 60% were in the same status during two assessment points. Thus, among participants observed in the community using, 60.3% of males and 60.5% of females were still in the community using 1 year later. Among participants classified as in recovery, 60.2% of males and 66.2% of females were still in recovery 1 year later. Pathways with a starting status of incarcerated or treatment were more transitory, with well more than half of the participants moving to a different status 1 year later. Among incarcerated participants, a greater proportion of males than females remained incarcerated 1 year later (48.7% vs. 34.9%, respectively). About one third of both males and females transitioned from treatment to recovery. Similarly, about equal proportions of males and females moved from treatment to using (about 27%) or were in treatment at both the starting and ending points in the transition period (about 35%).

Collapsed across the four annual transition periods, 78.8% of the participants (81.8% of males, 77.6% of females) transitioned from one status to another one or more times, with close to one third transitioning twice (31.7%/30.4% [male / female], 19.2% / 18.8% three

times, and 7.8% / 6.2% all four times). The two distributions are not significantly different (WILCOXON-MANN-WHITNEY z score = 1.409, $p = .16$).

Predicting Transitioning Versus Stability

The second goal of this study was to identify factors related to transitioning along specific pathways. The two key questions were as follows: (a) Are the factors that predict transitioning the same for all pathways, or are there factors unique to each pathway? and (b) Are the relationships between factors and pathways the same for males and females? To answer these questions, the observed pathways during the 4 years of observation were grouped into separate data analysis sets based on the starting points in the transition period (in the community, either using or in recovery). Potential predictor variables were then examined separately for each data set by means of a mixed-effects multinomial logistic regression (MIXNO; Hedeker 1998, 1999) to identify the factors that predicted the transition end points (using, recovery, or treatment). The reference group for each analysis was the stable pathway (i.e., staying at the same status). Autocorrelations (over time) within individuals were controlled for by including a random intercept term. The same set of predictors was examined in each analysis; however, only the significant predictors are presented in the tables. The odds ratios for each predictor are reported in Tables 3 and 4. An odds ratio greater than 1 indicates a predictor variable where participants with higher scores were more likely to transition along the pathways than remain in the same status. Odds ratios of less than 1 indicate predictor variables where participants with lower scores were more likely to transition than to remain at the same status. For continuous predictor variables, the odds ratios were based on the change in odds when the predictor variable increased 1 standard deviation (based on the variance across observations). For dichotomous predictor variables (e.g., gender), the odds ratio was based on comparing one level of the variable (male) to the other (female). For the rating of clean and sober friends (an ordinal variable with four categories), the odds ratio is based on the difference between adjacent response categories.

The Using to Recovery and Recovery to Using Pathways

Factors related to the using to recovery and recovery to using pathways are reported in Table 3. Six factors were related to the using to recovery pathway. Relative to those who continued using, those who transitioned to recovery (a) had a greater proportion of friends who were clean and sober, (b) experienced fewer symptoms of mental distress, and (c) had been arrested more often in their lifetime. Three additional factors also predicted the transition to recovery, but the magnitude of the relationship differed depending on the gender of the participant. For males, the more substance abuse treatment they received during the period, the more likely they were to transition to recovery rather than to remain using. Among females, the amount of treatment received did not distinguish between those who transitioned and those who did not. Days of substance use in the 30 days prior to the start of the period also predicted transitions; participants who reported more days of use were less likely to transition into recovery. The relationship was significant for both males and females; however, the effect was stronger for males such that more days of use had a greater effect on reducing the likelihood of moving from using to recovery among men. Finally, the more self-help sessions attended during the period, the more likely a participant was to transition into recovery rather than to remain using. Again, this was significant for both men and women; however, the effect was stronger for women, indicating that for the same number of sessions attended, the likelihood of transiting from using to recovery was greater for women than it was for men.

Also listed in Table 3 are the six factors that predicted the recovery to using pathway. Relative to those who remained in recovery, those who relapsed to using (a) had a smaller

proportion of friends who were clean and sober, (b) had more legal problems as measured by the ASI Legal Composite score, (c) were more likely to be male, (d) had attended more weeks of substance abuse treatment, and (e) had attended fewer self-help sessions during the period. In addition, the number of prior substance abuse treatment episodes was also related to remaining in recovery versus transitioning to using, but the effect differed by gender. Among males, those with more prior treatment were less likely to transition from recovery to using, whereas among females, those with more prior treatment were more likely to make this transition.

Of the nine variables listed in Table 3, two (clean and sober friends and self-help group attendance) predicted transitioning in a consistent direction, as seen in the odds ratios. That is, they increased the likelihood of moving from using to recovery and reduced the likelihood of moving from recovery to using. One variable, weeks of treatment, predicted transitioning in an inconsistent manner. However, this is likely due to individuals who started the period in recovery, relapsed, and had a subsequent treatment episode but continued to use, whereas those that did not relapse had no weeks of treatment during the period. Hence, treatment participation for this comparison may be more an indicator of relapse than a measure of the effects of treatment on recovery. Finally, the five remaining variables were uniquely related to transitioning in one direction but not the reverse. Also, all of the variable interactions with gender were unique to a specific direction of transition.

The Using to Treatment and Recovery to Treatment Pathways

The four factors that predict the using to treatment pathway are shown in Table 4. Relative to those who continued using, those who entered into treatment (a) attended more self-help group sessions, (b) had more legal problems as measured by the ASI Legal Composite score, (c) attended more weeks of treatment during the period, and (d) were more likely to have been mandated to treatment by the legal system or the Department of Child and Family Services. The effects of two of these variables on transitioning were also moderated by gender. Given the same number of weeks of substance abuse treatment during the period, males were more likely than females to be in treatment at the end of the period. Gender also moderated the effect of being mandated to treatment; being mandated to treatment increased the odds of moving from using to treatment for males, but it had little or no effect on this transition pathway for females.

Also listed in Table 4 are the three factors related to the recovery to treatment pathway. Relative to those that remained in recovery, those that entered into treatment (a) were younger, (b) had more legal problems, and (c) attended more weeks of treatment during the period. The effect of two of these factors on transitioning was moderated by gender. Among females, a greater number of legal problems reduced the likelihood that they would transition from recovery to treatment; however, among males, there was little relationship between the amount of legal problems and this transition pathway. Females were more likely than males to be in treatment at the end of the period for any given amount of treatment received during the period.

Of the five factors listed in Table 4 related to transitioning into treatment, three (age, self-help attendance, and treatment mandates) were uniquely related to transitioning along a specific pathway. For both starting statuses, ending the period in treatment was more likely when more weeks of treatment were received during the period; the strength of the relationship differed by gender and depended on the starting status. The effect of legal problems on transitioning into treatment was inconsistent in that it depended on the participant's starting status. Participants with more legal problems were more likely to transition into treatment when starting off in the community using, whereas they were less likely to transition into treatment when they started off in recovery.

Other Potential Factors

As hypothesized, there were several other variables that were examined for their potential association with transitioning along the above pathways, for either males or females. Furthermore, to check for spurious findings and/or model misspecification, we verified that more than a dozen other variables frequently cited in the literature did not contribute (i.e., were not significant) to the existing models. In addition to the variables reported earlier, we tested variables including race/ethnicity, number of children, living with children, receipt of public assistance, age of first drug use or intoxication, years of regular substance use and dependence, current substance use, illegal activities (for profit, drug dealing), involvement with the criminal justice system (e.g., probation, parole, awaiting trial or sentencing), employment activity, and family/social environment (e.g., living with a substance user, interpersonal conflict or abuse). None of these variables was significant with the existing variables in the model; nor did any of them replace the reported variables when tested with step-wise regression.

Discussion

The study findings provide an empirical description of the dynamic process of change that occurs following referral and entry into substance abuse treatment for a period extending up to 6 years. Approximately 80% of the study participants transitioned at least once during the 4-year follow-up period, moving from one status in the recovery cycle to another. The rates of transitioning at least once were slightly higher among males than females (82% vs. 78%, respectively). Thus, the study findings confirmed our hypothesis that males and females would show similar rates of transitioning but also suggested slightly greater stability in status among the females. A majority of participants (approximately 60%) who were in the community at the start of a transition period—whether using or in recovery—were in the same status at the end of that period, although not necessarily continuously.

Transitions Across Various Pathways

With regard to the probability of moving from one type of status to another, there appeared to be more similarities than differences between men and women. There were two notable exceptions to this pattern. First, a greater proportion of women who were in recovery at the start of a transition period remained in this status compared with men (66% vs. 60%, respectively). This finding was reinforced by the multivariate analyses that showed women were one third less likely than men to transition from recovery to using, collapsed across all transition periods. Second, a greater proportion of men than women were incarcerated at both the beginning and end of a transition period (49% vs. 35%, respectively). Most likely, this finding reflects the generally longer prison terms that are served by men. In addition, a greater proportion of men moved from being in the community, either using or in recovery, to incarceration, but these transitions constituted a minority of all of the community transitions (about 10%). Similarly, a greater proportion of women moved from using to treatment, but these accounted for only a minority of the transitions out of using (11% for females and 8% for males). Otherwise, there appeared to be remarkable similarity between men and women in transitional probabilities across the various pathways.

Stronger Effects of Self-Help Participation on Recovery for Women

In support of our hypothesis regarding the specific factors associated with transitioning, the multivariate models showed that participation in self-help and treatment had differential associations with several types of transitions for men and women. As hypothesized, self-help participation was more strongly associated with moving from using to recovery for women. This finding is consistent with the findings from a longitudinal study of individuals who sought help for alcohol problems, showing that women were more likely than men to

participate in self-help groups and to have greater reductions in drinking concurrent with their self-help participation during an 8-year follow-up period (Timko, Finney, and Moos 2005; Timko et al. 2002). More recently, these findings have endured throughout a 16-year follow-up period (Moos, Moos, and Timko 2006). The findings also concur with those of the Hser et al. (2004) 3-year follow-up study of participants from community-based treatment, in which participation in treatment and self-help groups were both related to more reductions in drug use and criminal behavior among women, with less consistent associations among men. This study also showed that women's drug use and criminal behavior following treatment were more likely to be influenced by their spouse's continued drug use, compared with men in the study.

Contrary Effects of Substance Use and Treatment on Transitions

For men, a greater frequency of substance use at the start of a transition period had a stronger effect on reducing their chances of moving from using to recovery. We did not find support for our hypothesis about the expected greater association of treatment participation with recovery for women; instead, participation in treatment during the course of a transition period was more strongly associated with moving from using to recovery for men. In contrast, more prior treatment episodes increased the likelihood of moving from recovery to using for women but reduced the likelihood for men. Hence, frequency of substance use following treatment may be a stronger marker for continued use among men, whereas frequency of prior treatment may be a stronger marker for risk of relapse among women. In addition, treatment participation during the transition period was more strongly associated with moving from in recovery to treatment for women, whereas it was more strongly associated with moving from using to treatment for men. These contrasting pathways into treatment for men and women from either using or recovery suggest that different forces may impel men and women to reenter and to sustain treatment participation.

Stronger Effect of External Mandate on Treatment for Men

As hypothesized, the study findings illustrate the greater role of criminal justice involvement in influencing transitions for men compared with women. This is particularly evident in the 12-fold greater likelihood of moving from using to treatment for men who were mandated to treatment compared with women. Hence, although women have increasingly entered prison for drug-related crimes in the past 20 years (Mauer, Potler, and Wolf 1999) and there has been an increase in treatment provided to women in correctional settings (Grella and Greenwell 2004), the criminal justice system continues to exert a stronger influence on treatment participation for men.

Lack of Gender Differences in Association of Psychological Distress and Relationships on Recovery

Although we found that higher psychological distress at the start of a transition period reduced the likelihood of moving from using to recovery, contrary to our expectations, we did not find a gender difference in this association. As expected, there was an overall positive effect of having more friends who were not using on transitioning into recovery (or out of using). Yet there was no gender difference in the strength of this association, nor in any of the other variables that pertained to interpersonal relationships that were entered into the models, contrary to our hypothesis regarding the expected greater effects of relationships on women's transitions.

Study Limitations

The study findings need to be interpreted within the context of the study design. The concept of "transition" was operationalized by comparing the behavior that participants reported

with regard to drug and alcohol use and their status in the community for the 30-day period that preceded the annual follow-up interview. It is possible that multiple changes in status could have occurred during the 12-month follow-up period, even though the participant reported being in the same status at the beginning and end points in the transition period. Hence, the construction of “transition” is arbitrarily bounded by these time frames. Yet given the high number of transitions observed using this time frame (more than 4,600), it appeared to be a reasonable period for examination, although the number of transitions across various pathways would be greater if examined using a shorter time frame (e.g., 1, 3, or 6 months). Furthermore, the analyses did not control for the temporal ordering of transitions during the 4-year follow-up period but collapsed all transitions of similar types that occurred at any time in this period. Nor did we explore the impact of specific transitional events (e.g., marriage or divorce, change in educational or employment status) on changes in recovery status, as has recently been demonstrated using retrospective data collected from a nontreatment sample in the National Epidemiologic Survey on Alcohol and Related Conditions (Dawson et al. 2006).

As with all studies using self-report data, there is the possibility of bias; however, previous studies with substance-abusing samples have shown an acceptable level of concordance between self-report data and biological specimens used to confirm current drug usage (Lennox et al. 2006). The study sampling design, as described previously, did not purport to draw a random sample of participants in the local treatment system in Chicago but rather purposefully sampled from specific treatment modalities. Hence, the generalizability of study findings may be limited to this particular study sample. Last, the observational nature of the study limits the ability to draw causal inferences based on the observed findings.

Conclusion

In sum, the study findings contribute to the growing literature that examines the process of recovery from substance use disorders within the context of a chronic disease model (Pincus, Tanielian, and Lloyd 2003) and further our understanding of the role of gender in influencing the recovery process. Although the broad contours of the recovery cycle are similar for men and women, as seen in the overall proportions of each that transitioned across the various pathways, there are several significant gender differences in the factors associated with these transitions. This is especially apparent in the role of interventions that mandate individuals to treatment, the association of prior treatment participation with the likelihood of relapse, and the association of self-help participation with sustained recovery. The study findings suggest the need to enhance the effects of self-help participation following treatment among men and to address the greater likelihood of relapse among women who have more prior treatment exposure. Future research can further improve our understanding of the influence of gender on the complex and dynamic processes of recovery that occur during the life course.

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Table 1

Participant Characteristics at Intake

Characteristic	Male (n = 476)	Female (n = 726)	Total (N = 1,202)	χ^2	p
Age (M)	35.3	33.4	34.1	13.80	.0002
Race/ethnicity				0.087	.8318
African American (%)	88.2	89.1	88.8		
White (%)	4.0	4.4	4.2		
Hispanic (%)	7.4	6.1	6.6		
Other (%)	0.4	0.4	0.4		
Marital status				13.29	.0013
Never married (%)	63.0	67.0	65.4		
Married (%)	14.1	7.6	10.2		
Divorced/separated/widowed (%)	22.9	25.4	24.4		
Education				9.02	.0291
Less than high school (%)	46.9	53.4	50.8		
GED (%)	5.9	3.9	4.7		
High school (%)	32.8	26.7	29.1		
Beyond high school (%)	14.5	16.0	15.4		
Living arrangement				101.15	< .0001
Alone (%)	13.9	9.3	11.1		
With children alone (%)	0.4	16.7	10.3		
With sexual partner, alone (%)	7.4	10.2	9.1		
With sexual partner and children (%)	19.2	15.8	17.1		
With family or friends (%)	40.6	38.3	39.2		
Controlled environment or unstable (%)	7.3	5.9	13.3		
Psychological status					
Major depression (%)	29.0	41.1	36.3	18.08	< .0001
General anxiety disorder (%)	29.6	41.1	36.5	16.19	< .0001
Criminal justice system involvement (lifetime)					
Ever arrested (%)	92.0	67.0	77.0	99.95	< .0001
Ever convicted (%)	68.7	37.2	49.7	114.17	< .0001

Characteristic	Male (n = 476)	Female (n = 726)	Total (N = 1,202)	χ^2 ^a	p
Ever incarcerated (%)	84.0	53.6	65.6	118.21	< .0001
Months of incarceration (<i>M</i>) ^b	35.6	19.6	29.9	31.95	< .0001
Weekly substance use ^c					
Alcohol (%)	47.3	40.4	43.1	5.60	.0180
Cocaine (%)	35.3	61.3	51.0	77.78	< .0001
Heroin (%)	29.6	39.0	35.5	11.03	.0009
Marijuana (%)	15.3	14.6	14.9	0.12	.7261
Years of regular substance use (<i>M</i>) ^d	16.0	13.3	14.3	29.74	< .0001
Prior substance abuse treatment				2.71	.4389
None (%)	48.6	44.1	45.8		
Once (%)	24.8	28.4	27.0		
Twice (%)	13.7	13.8	13.8		
Three or more times (%)	12.9	13.8	13.4		

^a Pearson chi-square for percentages and Kruskal-Wallis Test for means.

^b Among those that had been incarcerated.

^c Five or more days in the past 30 days or 26 or more days in the past 6 months.

^d For drug use or alcohol to intoxication that was used for the most years.

Table 2

Gender Differences in Stability and Transition in the Recovery Cycle

Starting Point	Gender ^a	Ending Point		
		Using	Incarcerated	Treatment Recovery
Using	Male (38.8)	60.3	10.4	7.6
	Female (39.1)	60.5	5.0	10.8
	Total (38.9)	60.5	7.1	9.5
Incarcerated	Male (16.4)	25.0	48.7	5.1
	Female (6.1)	30.2	34.9	16.9
	Total (10.1)	26.9	43.6	9.4
Treatment	Male (8.3)	27.3	5.3	35.3
	Female (11.8)	27.0	3.9	35.9
	Total (10.5)	27.1	4.3	35.7
Recovery	Male (36.6)	24.4	9.7	5.8
	Female (43.0)	23.6	2.6	7.6
	Total (40.5)	23.8	5.1	6.9
				64.4

Note: All figures are percentages.

^aPercentage of pathways with the starting point.

Table 3

Odds Ratios for the Using to Recovery and Recovery to Using Pathways

Predictor	<i>M</i> ^a	<i>SD</i> ^a	Recovery to Using	
Friends, clean, and sober	—	—	1.22***	0.82**
General Mental Distress Scale	4.14	5.01	0.80**	—
Arrests, lifetime	6.64	12.60	1.18*	—
ASI legal composite score	0.09	0.18	—	1.49**
Female	—	—	—	0.66*
Weeks of treatment	3.24	9.27	1.42*	1.34*
Male × weeks of treatment			1.98*	—
Female × weeks of treatment			1.01*	—
Days of substance use	11.64	12.00	0.56***	—
Male × days of substance use			0.43**	—
Female × days of substance use			0.73**	—
Self-help sessions attended	15.29	47.35	1.70***	0.58***
Male × self-help sessions attended			1.50*	—
Female × self-help sessions attended			1.92*	—
Number of prior treatments	1.57	2.13	—	—
Male × number of prior treatments		—	0.83	—
Female × number of prior treatments		—	1.23*	—

Note: ASI = Addiction Severity Index.

*
 $p < .05$.**
 $p < .01$.***
 $p < .001$.

Table 4

Odds Ratios for the Using to Treatment and Recovery to Treatment Pathways

Predictor	<i>M</i> ^a	<i>SD</i> ^a	Using to Treatment	Recovery to Treatment
Age	34.63	7.95	—	0.73 [*]
Self-help sessions attended	15.29	47.35	1.49 ^{***}	—
ASI legal composite score	0.09	0.18	1.40 ^{**}	0.39 [*]
Male × ASI legal composite score			—	0.99 [*]
Female × ASI legal composite score			—	0.15 [*]
Weeks of treatment	3.24	9.27	4.58 [*]	3.38 ^{***}
Male × weeks of treatment			6.35 [*]	2.85 [*]
Female × weeks of treatment			3.30 [*]	4.01 [*]
Mandated to treatment	—	—	3.52 [*]	—
Male × mandated to treatment			12.07 [*]	—
Female × mandated to treatment			1.03 [*]	—

Note: ASI = Addiction Severity Index.

^aThe mean and standard deviation of continuous variables computed across observations. The odds ratios are based on a one *SD* increase in the predictor. For categorical variables, the odds ratio represents the difference between adjacent categories.

^{*}
p < .05.

^{**}
p < .01.

^{***}
p < .001.