The Influence of Legal Coercion on Dropout From Substance Abuse Treatment: Results from a National Survey

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Abstract

Legal coercion is frequently used to leverage substance abuse treatment upon persons who would otherwise not seek it voluntarily. Various methodological and conceptual problems of the existing research have prevented a clear understanding of its effectiveness. The influence of legal coercion on retention in substance abuse treatment was examined using a national survey of programs in the public sector of care and three different treatment modalities including short-term residential ($N = 756$), long-term residential ($N = 757$), and outpatient treatment ($N = 1,181$). Legal coercion was found to reduce the risk of dropout across all three treatment modalities. The greatest effect was among persons in short-term residential treatment. The smallest effect was observed in outpatient treatment. This study shows that legal coercion significantly reduces the risk of dropout in substance abuse treatment. However, the differential effects across treatment conditions must be carefully considered when using coercion to involve individuals in treatment.

Key words: Treatment dropout, legal coercion, mandated treatment, survival analysis

1 Background

Legal coercion is a common method for leveraging substance abuse treatment among people who would otherwise not participate voluntarily. It involves legally compelling an individual to participate in treatment as an alternative to another type of sanction, such as incarceration (Hough, 2002; Miller and Flaherty, 2000). The practice of coercion reflects a desire on the part of the criminal justice system to provide treatment to substance users, with the idea that this approach can reduce recidivism among criminal offenders (Anglin et al., 1989).

The ethics of using coercive tactics to mandate treatment have been debated for years (Fagan, 1999). On one hand, coercion conflicts with the patient-centered philosophy advocated by the Institute of Medicine (2006) and professional organizations advocating the importance of self- determination (National Association of Social Workers, 2007). In American public policy, for example, decision-making autonomy in health care is valued above the potential benefit of treatment (Caplan, 2006). On the other hand, coercion is seen as a legitimate solution to problems of community safety and a response to society's disillusionment with incarceration as a means of curbing the problems of this population (Klag et al., 2005). In other words, it can help provide treatment to individuals who would otherwise not access these resources (Anglin et al., 1989).

The field of substance abuse treatment has also struggled with taking a client-centered approach given the negative impact of substances on judgment, decision-making, and impulse control. The issue is further complicated by the concerns about denial as a barrier to entering treatment voluntarily. For example, some authors advocate using client-centered approaches to deal with denial (Polcin, 2006), whereas others have asserted that coercive methods can help clients overcome denial (Miller and Flaherty, 2000).

The emergence of drug courts reflects a shift in criminal justice policy to the disease model of addiction (Nolan, 2002). There has been a rise in the use of coercion as an increasing number of criminal acts are related to substance use (Fagan, 1999). While drug courts originated and have seen widespread use in the United States, they have also been expanding to a number of other countries, including Australia, Canada, the United Kingdom, and Brazil (Harrison and Scarpitti, 2006), as societies around the world attept to deal with problems of addiction and concomitant criminal behavior (Hough, 2002). Approximately half of all persons in community-based substance abuse treatment programs in the U. S. are legally coerced (Farabee et al., 1998). Legal coercion is increasingly common among persons with co-occurring substance use and psychiatric conditions (Institute of Medicine, 2006), and among criminal

recidivists who are polysubstance users (Cooper, 2003).

It is important to recognize that legal coercion is only one form of pressure clients in substance abuse treatment can face. Coercion can originate from social contacts as well as internally motivating factors, such as guilt or individual choice (Wild et al., 2006). Individuals may feel significant pressure from family and social networks. In this sense, "voluntary" clients can also be considered coerced (Marlowe et al., 1996). When coercion or pressure to enter treatment is measured on a continuum, court-mandated clients are found to feel more legal pressure than others who receive substance use treatment (Young, 2002).

The ethics of legal coercion and its widespread use necessitate a clear understanding of its outcomes. Retention in treatment for an appropriate duration is considered essential for post-treatment success (Broome et al., 1999; Simpson et al., 1997). Retention in methadone maintenance, non-methadone outpatient treatment, and long-term residential treatment has been found to be associated with a reduction in drug use (Zhang et al., 2003). Moreover, persons who leave treatment early or are terminated from treatment have demonstrated an increased risk of relapse, in addition to future legal and employment problems (Mateyoke-Scrivner et al., 2004). As the rate of dropout across treatment programs is estimated to be between 25 and 75% (Jacobson, 2004), legal coercion provides a potentially important mechanism for admitting and retaining people in treatment for an amount of time that would have clinical benefits.

The extant literature shows important links between treatment retention and various treatment outcomes (National Institute of Drug Abuse, 1999). Treatment retention is also especially important as it relates to legal coercion, as clients who leave treatment prematurely can experience increased legal involvement, including prison sentences. Therefore, it is important to consider whether retention can be improved through the use of legal coercion. Despite the potential of legal coercion to keep people in treatment, a recent review of the literature by Klag and colleagues (Klag et al., 2005) shows mixed evidence on the positive influence of legal coercion on retention in substance abuse treatment. They argued that the current knowledge is based on small, non-empirical, single-site studies that have serious conceptual and methodological problems (Klag et al., 2005). It is important to consider this question using large samples that are generalizable to publicly funded programs and include controls for potentially confounding variables.

The purpose of the current study is to examine the impact of legal coercion on treatment dropout. To overcome limitations of prior research, this study uses data derived from the National Treatment Improvement Evaluation Study (NTIES) (US Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Sub-

stance Abuse Treatment, 2004), which are publicly available through the Inter-university Consortium for Political and Social Research (Study No. 2884). The NTIES was a prospective study of the impact of drug and alcohol treatment on thousands of clients in hundreds of treatment units that received public support from the Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment. It is one of only a small number of studies that examined a comprehensive set of variables among a large sample of persons from substance abuse treatment programs across the US.

In addition to contributing to the existing research on legal coercion, this study also expands the substance abuse treatment knowledge based on the NTIES. More specifically, the final report of the NTIES (Gerstein et al., 1997) indicated that lengths of stay differ by gender, ethnicity and age, with complex relationships occurring with treatment modality. For example, males exhibited the longest treatment stay in short-term and long-term residential programs, whereas women had the longest stay in outpatient programs. Hispanic clients had the longest stay in correctional programs, whereas Black clients exhibited the shortest stay across all programs. Persons under 18 had the longest stay in all programs except methadone programs. The report indicated that other unexamined treatment characteristics (e.g., legal coercion) might have affected length of stay.

The final report of the NTIES also indicated that substance abuse treatment outcomes among legally coerced persons were not as good as those entering treatment for other reasons (Gerstein et al., 1997). This finding is at odds with prior research which shows that legally coerced clients enter treatment with more problems than voluntary clients (Marshall and Hser, 2002), but tend to have better post-treatment outcomes (Anglin et al., 1989; Brecht et al., 1993; Burke and Gregoire, 2007; Easton et al., 2007; Fagan, 1999; Kelly et al., 2005; Polcin, 2001). This discrepancy of findings underscores the importance of understanding the extent to which legal coercion actually keeps people in treatment, given that time in treatment is associated with more positive outcomes (National Institute of Drug Abuse, 1999).

The specific research questions guiding the current study are as follows: First, do clients who are coerced exhibit better retention than voluntary clients? Second, does legal coercion have the same influence on retention on persons in outpatient treatment, short-term residential treatment, and long-term residential treatment?

2 Methods

2.1 Sample

The NTIES was conducted by the National Opinion Research Center (NORC) in collaboration with the Research Triangle Institute. The NTIES was based on a universe of 698 service delivery units (SDUs) which are defined as one treatment modality provided at a single site (Gerstein et al., 1997). Hereafter, SDUs are referred to as "treatment programs." The NTIES treatment modalities included methadone, outpatient non-methadone, short-term residential, long-term residential, and corrections.

The NTIES was based on a two-stage sampling procedure. First, treatment programs were sampled, and then clients within the programs were sampled. Eighty-two treatment programs were purposively selected from the universe and 78 agreed to participate, representing a 95% response rate for treatment programs. Clients were then purposively sampled, focusing on obtaining a requisite number of client subgroups for the analyses the NTIES administrators planned to complete (see Gerstein et al. 1997).

Clients recruited for the study were invited to participate in a series of three interviews – an intake interview, discharge interview, and follow-up interview. Subjects had a right to refuse participation in the interview, in addition to refusing to answer any individual question even if they agreed to participate in the study. Intake questionnaires were administered between July, 1993 and November, 1994 to 6,593 persons (85% response rate).

Discharge questionnaires were administered between July, 1993 and April, 1995. Persons were eligible for the discharge questionnaire upon termination of treatment, irrespective of whether they completed treatment. Only persons who completed an intake questionnaire were eligible to complete the discharge questionnaire. A total of 5,274 subjects completed the discharge questionnaire, representing an 80% response rate at discharge. It should be noted that this study did not examine data from the follow-up interview.

The current study included subjects who completed intake and discharge questionnaires and participated in one of three treatment modalities: short-term residential ($N = 986$), long-term residential ($N = 881$), and outpatient ($N = 1,439$). Using the definition provided by the NTIES survey administrators, short-term residential treatment are programs with a typical treatment duration of less than two months. Long-term residential are programs with a treatment duration of two months and longer. Outpatient treatment included programs that provided non-methadone treatment services, sometimes in conjunction with primary mental health care. Methadone treatment, which was

comprised of 514 subjects, was was not included in this study because only a small percentage were legally coerced ($n = 40;\ 7.8\%$). Correctional programs were also excluded, as the process by which individuals drop out of these programs is inherently different than non-correctional settings.

After listwise deletion of missing values, the effective sample size for each modality was as follows: short-term residential ($N = 756$), long-term residential ($N = 757$), and outpatient ($N = 1,181$).

2.2 Measurement

2.2.1 Legal coercion

Legal coercion was the primary independent variable, reflecting whether treatment was required. Specifically, subjects were asked, "Is your coming to [this program] at this time required or recommended by an attorney or anyone in the criminal justice system such as the courts, a jail or prison, or a probation or parole officer?" Subjects who endorsed this question were considered legally coerced. For purposes of brevity, in this study all non-legally coerced persons are referred to as being "voluntary." However, it is recognized that these subjects may have been pressured or coerced to treatment in other ways. This issue is given additional consideration later in this article.

2.2.2 Treatment dropout

Treatment dropout was the primary outcome variable in this study. It was specified as a 'time to event' measure, taking into account whether subjects dropped out of treatment and, if so, when. Dropout reflected the subjects' failure to complete the prescribed treatment protocol from the viewpoint of the treatment provider. The timing of dropout was determined by the subjects' length of treatment, which was recorded in weeks by the treatment provider. For example, if a subject failed to complete treatment and had a length of treatment of four weeks, then dropout occurred at Week 4. Subjects who completed treatment were censored on their last week of treatment. This censoring strategy is consistent with prior research examining treatment dropout using survival analysis (Woodside et al., 2004).

It should be noted that the NTIES reported treatment duration of subjects through a total of 50 weeks in order to increase anonymity of study participants. These subjects were censored on Week 50. In non-technical terms, censoring reflects that the event under examination – that is, treatment dropout – did not occur. Censored observations are included in the calculation of risk of dropout up to the point they leave treatment. After they are censored, they

are no longer used in the calculation of risk.

2.2.3 Control variables

This study included a set of client and service characteristics that were intended to serve as control variables. A review of the literature preceding this study revealed a wide range of variables have been examined in prior research on dropout from substance abuse treatment. Very little consistency in terms of variables measured and measurement strategies was observed, which may have contributed to discrepant findings. In this study, variables that were found to be prognostic indicators of treatment (namely measures of clinical severity) were included. Additionally, the major classes of variables examined in prior research were also included to facilitate a comparison with prior results. The final set of variables included demographic measures, psychosocial factors, measures of clinical severity, and service-related variables. The measurement strategy for each variable is discussed below.

Demographic measures included age (in years), ethnicity (Non-Hispanic Black, Hispanic, and Non-Hispanic Non-Black), education (in years), gender (male/female), insurance (yes/no), and marital status (yes/no). Psychosocial factors included homelessness and treatment importance. Homelessness indicated whether the subject stayed in a homeless shelter or other type of shelter during the 30 days prior to treatment intake (1=yes, 0=no). The third measure was the extent to which they regarded their current treatment episode as being important. A standardized measure of treatment motivation was not available in the NTIES survey. Thus, a proxy measure of the importance of substance abuse treatment was used. This was measured on a three-point ordinal scale (1=very important, 2= somewhat important, 3 = not at all important).

Clinical severity measures included two substance use variables (i.e., primary substances and substance use severity) and measures of psychiatric problems. Primary substance refers to the main substance for which the subject received treatment, including cocaine, alcohol, marijuana, heroin, and other substances (e.g., other narcotics, uppers, and downers). This information was extracted from the clients' treatment records by the NTIES field staff. Heroin and other substances were collapsed into a single category because of low cell counts.

Substance use severity was an index computed by summing the past 30-days of self-reported use of alcohol and seven different types of drugs included in the survey (marijuana, crack, cocaine, heroin, other narcotics, uppers, downers). The response categories for each substance was measured on a six-point scale (0 = zero days; 1 = one day; 2 = two to five days; 3 = six to ten days, 4 = 11 to 20 days; 5 = more than 20 days). Thus, the theoretical range for substance use severity was zero to 40.

Four measures of psychiatric problems were included. Each psychiatric problem was considered present or absent based on a series of self-report survey items. The psychiatric problems and the survey items on which they were based are as follows: depressed mood (loss of interest or very sad/depressed); suicidality (thoughts about suicide or suicide attempt); anxiety (sudden feelings of fright/nervousness when not center of attention or in danger); hallucinations (heard or saw things that no one else could). Two additional criteria had to be met in this study for the psychiatric problems to be considered present. First, with the exception of hallucinations, the psychiatric problems must have occurred within the past year. Second, the problems were not attributable to the use of drugs or alcohol. It should be noted that the past-year criterion was not available for hallucinations in the NTIES survey, which is considered a limitation of the measure for the current study.

Two measures of service characteristics were included. The first was the total number of service needs that were self-reported at intake. The needs included medical, mental health, family, vocational, social relations, financial, and housing. Each need was dichotomously scored; thus, the final service needs measure ranged from zero to seven. The second measure was the percentage of services matched. This involved calculating the proportion of services received during the treatment episode that corresponded with services needed. This scoring method followed measurement strategies of prior research (Zhang et al., 2003; Hser et al., 1999; Joe et al., 1991; Morrow-Howell et al., 1998).

2.2.4 Analytic strategy

Descriptive statistics were used to summarize the characteristics of the subjects across the three modalities. Chi-square tests (χ^2) and t-tests were used to test whether mandated subjects differed on measures of clinical severity (i.e., substance use severity and psychiatric problems) and service needs compared to non-mandated subjects. Given the large sample size, effect sizes were computed from these tests to characterize the magnitude of the differences. This involved computing phi correlations (ϕ) and point-biserial correlations (r_{pb}) for the chi-square and t-tests, respectively. Cohen's (Cohen, 1988) general guidelines for interpretation effect sizes were used: .20 was considered small; .50, medium; .80, large.

The multivariate strategy used in this study was Cox proportional hazards (PH) regression. This is the most common type of survival analysis, which is the primary strategy for analyzing time to event data. A separate Cox PH model was fit to the data for each treatment modality. As subjects were nested in treatment programs, a Huber-White (robust) sandwich estimator was used to account for non-independence of observations.

The proportional hazards assumption of each model was examined using two different methods. The first method involved correlating Schoenfeld residuals with a transformation of time (i.e., Kaplan-Meier estimate) and inspecting the relationship graphically. The second method involved inspecting a log-log plot of the hazard function. No significant departures from the proportional hazards assumption were observed.

3 Results

3.1 Sample characteristics

Table 1 summarizes the sample characteristics by treatment modality. In general, the clients in these data were unmarried males, approximately 30 years of age with slightly less than a high-school education. Most subjects had a history of substance abuse treatment, and either alcohol or cocaine was the primary drug for their current treatment episode. Subjects had a high overall number of service needs (means between 4.5 and 5.5 services needed), and approximately one-third of the service needs were matched. Outpatient treatment had the highest rate of coercion (40%) in comparison to short-term residential (31%) and long-term residential treatment (26%).

3.2 Differences in clinical severity and service needs

Prior research has suggested that clients who are legally coerced to substance abuse treatment have more problems and greater clinical severity than voluntary clients (Marshall and Hser, 2002). Only one comparison yielded a statistically significant difference with an effect size of at least .20. Specifically, contrary to prior findings, substance use severity scores (log-transformed) were lower among legally coerced subjects ($\bar{X} = 1.20$) compared to voluntary subjects ($\bar{X} = 1.57$) in short-term residential treatment. Although this difference was statistically significant, the effect size was small ($t[408] = 5.31), p < .0001, r_{pb} = .20$). This pattern of association was also true among subjects in long-term residential treatment. That is, substance use severity scores were lower among legally coerced subjects ($\bar{X} = .95$) than voluntary subjects ($\bar{X} = 1.41$). The magnitude of the effect was small: $t[6.04] = 340, p < .0001, r_{pb} = .21$. No differences in substance use severity scores were observed among subjects in outpatient treatment. No differences that reached an effect size of at least .20 were observed across the groups in the other measures of clinical severity or service needs.

3.3 Summary of dropout

Table 2 summarizes the rate of dropout across treatment programs. Treatment dropout occurred at the highest rate among persons in outpatient treatment (64.8%). The differences across modalities were significantly different ($\chi^2[2] = 260.7,\ p < .0001$).

3.4 Cox PH Regression Models

Table 3 provides a summary of the hazard ratios (HR) and 95% confidence intervals for each treatment modality. The hazard ratios for legal coercion are also depicted graphically in Figure 1a. The overall model for short-term residential treatment exhibited a good fit with the data (Likelihood Ratio $\chi^2[22] = 83,\ p < .0001$, pseudo-$R^2 = .10$). As revealed in Figure 1a., legal coercion was associated with the greatest reduction in the risk of dropout for clients in short-term residential treatment, compared to long-term residential and outpatient treatment. The narrow confidence interval suggests a high degree of precision in this estimate.

The model for long-term residential treatment exhibited a good fit with the data (Likelihood Ratio $\chi^2[22] = 189,\ p < .0001$, pseudo-$R^2 = .22$). Although legal coercion was associated with a reduced risk of dropout in long-term residential treatment, the effect size was not nearly as large or precise as short-term residential. However, the overall model explained approximately twice as much variance as the short-term residential treatment model.

The model for outpatient treatment also exhibited a good fit (Likelihood Ratio $\chi^2[22] = 125,\ p < .0001$, pseudo-$R^2 = .10$). Again, legal coercion was associated with a reduced risk of dropout, but the effect size was smaller than the residential programs. The 95% confidence interval was also wide, with the upper-bound being close to 1.0, which represents a non-significant effect. The explained variance was approximately equal to the short-term residential model.

Figures 1b-1d are survival curves, showing the estimated survival – that is, probability of remaining in treatment through each week – over the duration of the study period. Because some subjects in each treatment modality remained in treatment for 50 weeks or more, the time frame of each survival curve extends over a period of 50 weeks. As previously stated, the NTIES survival administrators reported treatment duration up to 50 weeks to increase anonymity of the subjects. It should be noted that the survey did indicate the circumstances that lead to some subjects in the various modalities to be in treatment longer than otherwise expected.

Long-term residential (Figure 1c) and outpatient treatment (Figure 1d) exhibited a very similar pattern of dropout, with legally coerced and voluntary clients dropping out at a high rate until Week 25. The differences between the two groups represents the estimated effect of legal coercion. Legally coerced persons in short-term residential treatment (Figure 1b) had a rate of survival that was consistently higher than the other modalities.

It should be noted that service matching was associated with a reduced risk of dropout across all three modalities. However, interpretation of these effects are challenged by directions of causality, which is discussed in further detail in the following section. Substance use severity was associated with an increased risk of dropout in long-term residential and outpatient treatment.

4 Discussion

This study contributes to the existing literature on the effects of legal coercion on treatment retention. It utilized one of the most comprehensive data sources on publicly funded substance abuse treatment services. The results of this study generalize to substance abuse treatment programs in the publicly funded community programs. This study does not generalize to clients in private tier programs.

The results indicate that legal coercion is associated with a reduced risk of treatment dropout across all three treatment modalities – short-term residential, long-term residential, and outpatient treatment. While legal coercion is used as a mechanism to refer clients to all these treatment modalities, prior research has been unclear as to whether differential effects on retention exist among these modalities. This is an important consideration, as the expansion of drug courts and legal mandates to treatment require a more complete understanding of the contexts in which coercion may be most helpful to the many clients these policies are intended to assist.

In the present study, there were clear differences in effect size, with the largest and most precise effect observed for short-term residential treatment. The differences may be attributed to treatment duration. That is, subjects may have more difficulty completing a long-term residential or outpatient program than a short-term program. The wide confidence intervals for the estimated effects for long-term residential and outpatient treatment suggest that legal coercion is likely to be more effective for some persons than others.

In this study, legal coercion and services matched were the only variables that significantly reduced the risk of dropout across all three modalities. Although legal coercion is a potentially strong leverage point for helping retain persons

in treatment, the influence of service matching on treatment dropout must be carefully considered since the direction of causality cannot be established. More specifically, persons may find treatment beneficial if the program is responsive to their individual service needs, thus giving them a reason to persist in treatment. However, treatment programs may be better able to respond to service needs the longer persons stay in treatment. The issue of causality could potentially be better understood using structural equation modeling, which provides the means to specify non-recursive (i.e., feedback) relationships among these variables. Longitudinal approaches could show how these variables covary over time.

Prior research has found legally coerced clients to have better post-treatment outcomes (Anglin et al., 1989; Brecht et al., 1993; Burke and Gregoire, 2007; Easton et al., 2007; Fagan, 1999; Kelly et al., 2005; Polcin, 2001). The current study showed that legally coerced clients were more likely to stay in treatment longer, although the NTIES final report found coerced clients to have worse outcomes. This is a somewhat paradoxical finding, given the evidence linking retention to better post-treatment outcomes (National Institute of Drug Abuse, 1999). Outlined below are two potential explanations for this finding.

First, this study showed that clients who were legally coerced showed very few differences on measures of clinical severity, whereas prior authors have indicated that legally coerced clients may have more problems and be more resistant and ill-prepared for substance abuse treatment than voluntary clients (Hunt and Stevens, 2004; Marshall and Hser, 2002). Given the legal mandate of the legally coerced subjects in this study, it is possible that they were responding in a socially desirable manner. Additional evidence to triangulate the subjects' self-report of substance use is necessary to clarify these results. Future research should attempt to use multiple measures and various data sources, such as self-report, clinician ratings, and biological markers (McHugo et al., 2006).

Second, legal coercion removes decision-making capabilities from clients. This loss may place clients at risk of receiving substandard care or services of poorer quality services, whereas persons who attend treatment voluntarily are positioned to make more choices about their services and advocate on their own behalf. Thus, legally coerced clients received more treatment, but may not have made gains due to their overall quality of care. To date there have been no published studies examining systematic differences in care among legally coerced and voluntary clients that could shed light on this issue.

4.1 Study limitations

It is important to consider these results within the limitations of the study. Studies that employ secondary data face a variety of challenges, especially related to measurement. Most importantly, the present approach to the measurement of coercion is the narrow conceptualization. Specifically, it is regarded as a function of legal involvement rather than one type of a broader set of diverse social pressures (Marlowe et al., 1996; Wild, 2006).

The study findings also need to be considered in the context of how treatment dropout was measured. That is, it was based on failure to complete treatment, using the report of the service provider. Treatment completion is a logical measure for court-involved clients, as failure to complete treatment typically results in greater legal consequences and court involvement. However, this measure does not take into account the actual treatment benefits. This is an important consideration given the link between time in treatment and post-treatment outcomes (National Institute of Drug Abuse, 1999). For example, it is possible that a client in a long-term residential treatment program stayed in treatment for six months but failed to meet the graduation requirements of the treatment program. It is plausible that this client may have achieved greater clinical benefits than somebody who successfully completed a short-term residential treatment program lasting approximately two months.

When examining the influence of legal coercion on dropout, it is important to consider that treatment completion was based solely on provider endorsements. A limitation is that treatment programs and providers can vary significantly in their criteria. It is also a problem that confronts drug courts and treatment programs, given the absence of established and empirically supported clinical guidelines. There is also significant variability in practices across treatment programs, which was particularly evident with respect to treatment durations. That is, some subjects in short-term programs received treatment for more than 50 weeks, even though eight weeks of treatment for this modality is considered average. This limitation is aptly summarized by McHugo et al. (2006), "One problem with conducting studies in routine care is that usual care varies widely from setting to setting" (p. 8). Thus, in order to improve inferences drawn from routine care settings, it is necessary to standardize care.

The age of the data should also be considered (1992-1997), as the substance abuse systems of care have undergone a variety of changes. For example, there has been considerable erosion of public treatment dollars, which may have undermined the quality of care to this population, potentially accounting for dropout. Also, the rate of coercion is likely to be higher if this study were replicated with present-day data, given the increased use of coercion (Institute

of Medicine, 2006).

4.2 Future research

Future research systematically comparing treatment outcomes of legally coerced and voluntary persons is still needed. This study focused on a key short-term outcome – treatment retention. Further study is still necessary to clarify the extent to which legal coercion contributes to post-treatment success. A major challenge confronting the use of legal coercion is that subjects may achieve important clinical benefits but fail to complete treatment. Thus, a person may have actually achieved important gains in treatment but may still have to carry out a sentence in the judicial system. Future research can help drug courts establish treatment mandates that focus on specific treatment outcomes. Additional research is needed to document the variability in the legal decision making surrounding the use of mandated treatment. This can help target efforts to reduce the variability and ensure greater protections against individuals who may be legally coerced.

4.3 Conclusions

In this study, legal coercion significantly reduces the risk of treatment dropout in substance abuse treatment. Differential effects were observed across treatment modalities, with the greatest effect occurring for short-term residential treatment, followed by long-term residential treatment. Outpatient treatment exhibited a relatively small effect with a wide confidence interval, suggesting that it works better for some people than others. These differences must be carefully considered when using coercion to get involve people in treatment.

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Table 1. Descriptive Summary of Client Characteristics by Treatment Modality

Variable		Short-term residential (N = 756)	Long-term residential (N = 757)	Outpatient (N = 1,181)
Legally coerced		30.9	25.8	40.6
Male		70.6	44.2	69.9
Age $_{17-51}$	$\bar{X}$ *(SD)*	*31.1 (7.5)*	*29.9 (7.9)*	*32.4 (9.0)*
Education $_{6-16}$	$\bar{X}$ *(SD)*	*11.7 (2.0)*	*11.1 (1.9)*	*11.3 (2.0)*
Insurance		22.3	56.9	57.7
Married		26.0	14.8	20.2
Race				
Non-Hispanic Black		42.0	62.7	59.6
Hispanic		17.0	11.2	14.6
Non-Hispanic Non-Black		41.0	26.1	25.7
Past 30 days homeless		21.4	29.5	18.5
Treatment importance $_{1-3}$	$\bar{X}$ *(SD)*	*1.29 (.7)*	*1.25 (.6)*	*1.59 (.8)*

Primary substance				
Cocaine		33.6	59.8	41.1
Marijuana		39.9	13.4	11.2
Alcohol		21.3	17.9	38.9
Heroin / other substances		5.3	9.0	8.9
Substance use severity $_{0-40}$	$\bar{X}(SD)$	*4.8 (3.9)*	*4.3 (4.1)*	*2.6 (3.1)*
Prior substance abuse treatment		57.6	59.0	59.9
Depressed mood		57.4	63.9	58.8
Suicidality		10.0	14.9	11.4
Anxiety		29.2	30.9	30.0
Hallucinations		5.5	11.6	12.3
Service needs $_{0-7}$	$\bar{X}(SD)$	*4.5 (2.2)*	*5.5 (2.0)*	*4.6 (2.3)*
Services matched $_{0-1}$	$\bar{X}(SD)$	*.36 (.26)*	*.40 (.27)*	*.31 (31)*

Note: Numbers are percentages unless otherwise indicated.

Note: Range of values for continuous measures are as subscripts.

Table 2. Summary of treatment dropout by treatment modality

	Long-term residential	Short-term residential	Outpatient
Outcome	N (%)	N (%)	N (%)
Dropout	332 (43.9)	210 (27.7)	765 (64.8)
Censored[†]	424 (56.1)	547 (72.3)	416 (35.2)
Total	756 (100)	757 (100)	1181 (100)

[†]Note: Censored refers to subjects who did not drop out.

Table 3 - Summary of Final Cox Proportional Hazards Regression Model

Variable	Short-term residential HR (95% CI)	Long-term residential HR (95% CI)	Outpatient HR (95% CI)
Legally coerced	**.34 (.28-.41)**	**.64 (.46-.91)**	**.81 (.66-.99)**
Male	1.05 (.85-1.31)	1.15 (.73-1.82)	1.12 (.92-1.35)
Age $_{17-51}$	**.97 (.94-.99)**	.99 (.97-1.01)	.99 (.98-1.00)
Education $_{6-16}$	**.94 (.90-.97)**	.98 (.94-1.01)	.99 (.99-1.05)
Insurance	1.14 (.91-1.43)	1.04 (.76-1.42)	1.05 (.85-1.29)
Married	**.67 (.49-.90)**	1.18 (.92-1.52)	1.01 (.86-1.18)
Race			
(Non-Hispanic Black)			
Hispanic	1.03 (.80-1.32)	1.08 (.78-1.49)	.87 (.69-1.12)
Non-Hispanic Non-Black	.90 (.54-1.50)	.93 (.72-1.19)	.78 (.57-1.07)
Past 30 days homeless	1.0 (.81-1.24)	.98 (.79-1.22)	1.16 (.89-1.52)

Primary substance			
(Cocaine)			
Marijuana	1.02 (.73-1.43)	1.21 (.84-1.73)	1.07 (.74-1.55)
Alcohol	**1.55 (1.16-2.06)**	.82 (.61-1.12)	.90 (.70-1.14)
Heroin / other substances	1.26 (.94-1.70)	.73 (.42-1.28)	.80 (.57-1.11)
Substance use severity $^{\dagger}_{0-3}$	.98 (.83-1.16)	**1.39 (1.11-1.74)**	**1.17 (1.05-1.31)**
Prior substance abuse treatment	.94 (.72-1.22)	.93 (.74-1.18)	1.00 (.82-1.23)
Depressed mood	.93 (.82-1.07)	1.23 (.99-1.51)	1.15 (.99-1.34)
Suicidality			
Anxiety	**1.32 (1.08-1.61)**	1.12 (.87-1.44)	1.06 (.87-1.29)
Hallucinations	**.48 (.34-.70)**	1.13 (.92-1.40)	.92 (.76-1.12)
Service needs $_{0-7}$	**.95 (.93-.96)**	.96 (.89-1.03)	.99 (.94-1.04)
Services matched $_{0-1}$	**.31 (.15-.61)**	**.15 (.09-.23)**	**.31 (.19-.50)**

Note: Range of values for continuous measures are as subscripts. All other measures are dichotomous. Statistically significant hazard ratios are presented in bold.

†Log-transformed values.

Figure 1. Adjusted Treatment Survival Curves by Treatment Modality

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