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An Evaluation of a Family Preservation Juvenile Justice Program with a
Cox Regression Model

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Abstract

This paper presents an evaluation of the effectiveness of using an intensive home-based family preservation model employed by the Richland County, Ohio Juvenile Court's Partners Program for felony offending juveniles. The study used quasi-experimental design methodology that included a group of juveniles exposed to the Partners Program and another group of juveniles not exposed to the program. The Cox regression analysis revealed that the length of time to recidivism was longer for the juveniles exposed to the Partners Program and these juveniles also had reduced risks of felony re-arrests.

An Evaluation of a Family Preservation Juvenile Justice Program with a
Cox Regression Model

Juvenile delinquency in America has developed into one of the nation's most troubling social problems. From 1980 through 1995, more than 40% of delinquency careers involved at least one serious offense. From 1987 to 1994, the violent crime arrest rate for juveniles aged 10 to 12 increased 63%. In the past decade, there was a large increase in juvenile arrests for violence, weapons, and drugs. Since 1980, 25% of all juveniles murdered involved a juvenile killer. In 1997, nearly 20% of all arrests made by law enforcement agencies involved a juvenile, 27% of all violent crime involved a juvenile, and 35% of all property crime arrests involved juveniles. It is estimated that 42% of the serious violent crimes committed by juveniles were never reported (Snyder & Sickmund, 1999).

From 1987 to 1994, 21% of the juveniles arrested at age 16 had previous arrests by 12. Eleven percent of the juveniles arrested for selling hard drugs began doing so prior to age 12, and 25% of the males with delinquency records had been referred before age 14. On the positive side, 54% of males entering the juvenile justice system never return on a new offense. Of the 46% that do re-offend, their age entering the system and recidivism appear to be two important considerations in juvenile crime prevention (Snyder & Sickmund, 1999).

With respect to recidivism, almost 19% of the people adjudicated delinquent in their juvenile career had four or more delinquency referrals. Ten percent of the males who were involved in the juvenile justice system for a delinquent offense went on to commit at least one violent crime before age 18. Almost six percent involved in the system had at least four referrals with at least one referral for a violent crime (Snyder & Sickmund, 1999).

The cost of juvenile crime is another serious concern. It is estimated that each juvenile who leaves high school for a life of crime costs society \$1.7 to \$2.3 million over the juvenile's life span. Drug abuse costs alone are estimated at between \$200,000 and \$400,000; lost wages to poor employment options and other non-market-related losses are estimated at \$470,000 to \$750,000 (Snyder & Sickmund, 1999).

Despite an increasing need for resources in the areas of juvenile justice, community-based mental health, and substance abuse, monies appropriated for such services are more likely to come from the reallocation of existing dollars formerly spent on institutionally-based services. Further, resources spent in all these areas have not shown effectiveness and may actually cause harm (Sondheimer, Schoenwald, & Rowland, 1994).

There are alternatives to traditional juvenile justice programming, however, that are producing positive results. Intensive home-based program strategy utilizing multisystemic treatment is showing significant improvement in reducing recidivism and improving the lives of juveniles who commit serious crime. In a study released in 1992, Henggeler, Melton, and Smith found that a multisystemic treatment strategy (MST) used in South Carolina reduced the rates of criminal activity initially and at the 2.4-year follow-up point (Henggeler, Melton, & Smith, 1992; Henggeler, Melton, Smith, Schoenwald, & Hanley, 1993). The Partners Program, among others, utilized the multi-systemic theory and (MST) principals published by Henggeler and his associates (Henggeler, et al., 1994).

The Partners Program is a home-based family preservation program that began in January 1995 as a pilot program for the Richland County Juvenile Court in Mansfield, Ohio. Although this program uses the MST principles and the MST model as published by Henggeler and his associates, it can not be equated to the MST intervention model because it lacks the formal

training and supervision required to adequately implement the actual MST program (Henggeler, 1994). Nonetheless, since the Partners (intensive home-based family preservation) Program was perceived as being very successful (Allen, 1996), it was expanded in its own right, continues to operate out of the Richland County Juvenile Court in Mansfield, Ohio and merited research evaluation.

The Partners Program

The Partners Program offers the opportunity for juveniles adjudicated delinquent for a felony offense and committed to the Department of Youth Services (DYS) to remain with their families in their homes. It is important to note, however, that the Partners Program in Richland County, Ohio substantially differs from MST programs such as Scott Henggeler's South Carolina Project in that rigorous training and oversight of MST by Henggeler's staff has never been implemented.

The Partners Program provides a community-based intervention program at a cost that is substantially lower than the cost incurred when juveniles are sent to the Department of Youth Services' detention facility (Allen, 1996). For communities the size of Richland County, Ohio with limited budgetary resources, the Partners Program may serve as an excellent cost-effective prototype for effective delinquency intervention.

Program Eligibility

A juvenile residing with his/her family in Richland County, Ohio having committed a felony and subsequently admitted to or been found guilty of the offense, is adjudicated delinquent. If the offense is great enough to warrant confinement into one of the Department of Juveniles Services' correctional facilities, the Richland County Juvenile Court judge makes a determination in cooperation with the court staff to either send the juvenile to the Department of

Youth Services detention facility or offer the juvenile and his/her family the opportunity of going into the Partners Program.

Program Components

Upon entry into the Partners Program, the juvenile is released from the Richland County juvenile jail to the custody of his/her parent(s) or guardian(s). During the release, the family and delinquent juvenile meet informally with the Partners Program supervisor, the juvenile court director, and the direct service provider that will be personally overseeing treatment and intervention.

Immediately, the direct service provider arranges a meeting with the immediate family and the delinquent juvenile. Rules, expectations, and general structure of the Partners Program are explained. This is individually tailored to the juvenile and family in question. Both the juveniles and the family are involved in the creation of this plan.

The basic principles and tenets of MST as published by Henggeler, Schoenwald, Borduin, Rowland, and Cunningham (1998) are intrinsic to the formation and implementation of the Partners Program. Direct contacts with the family and the delinquent juvenile are done at the family's home and in the family's neighborhood. Assessment is ongoing, interactive, and designed for continued growth and skill development.

Once the initial phase of contact, rapport, and basic implementation of the intensive home-based program are established, community, extended family, peer support, and other systems as explained by Bronfenbrenner's (1979) concentric circles are brought in and a comprehensive list of needs over eight major life areas are evaluated. The areas of life most commonly reviewed are: (a) spiritual, (b) health, (c) family, (d) social, (e) school, (f) employment, (g) financial, (h) hobbies and recreation, and (i) legal (court expectations). The strengths of the family and the

delinquent juvenile are established and all the identified problems in the major life areas are recognized and plans are implemented to remedy these problems. Individuals brought in from the community including extended and immediate family are called upon to oversee progress with the targeted problem areas. The direct service provider then oversees, coordinates, and remains in contact with all the individuals working to improve the situation. This allows the direct service provider an opportunity to work with all the people connected with the delinquent juvenile as a means to further assess and evaluate how best to help. Further, those individuals in the delinquent juvenile's life that are deleterious to the overall successes of the Partners Program and the juvenile can also be addressed.

This process continues to occur over several months depending upon the needs of the delinquent juvenile and his/her family. Once sufficient success has occurred and the staff feels comfortable with the level of skill attained by the delinquent juvenile and his/her family, the juvenile then graduates from the Partners Program. The juvenile is then overseen through the probation department (Aftercare) and tangentially by the Partner's staff and his/her original direct service provider.

Research Methodology

This study utilized a quasi-experimental program evaluation design with non-random non-equivalent control groups (Cook & Campbell, 1979; Royse, 1995). This design utilized two non-equivalent groups that consisted of the juveniles exposed to the Partners Program (experimental group) and juveniles not exposed to the program (control group).

Rossi and Freeman (1993) address some of the challenges of an impact assessment/program evaluation study. One challenge is in assessing gross outcomes versus a net outcome. Gross outcomes, which encompass net outcomes, consist of all changes observed as an

outcome measure. With regard to Partners Program evaluation, the gross outcome is whether or not the intervention produced a reduction in felony recidivism between the control and experimental groups. Net outcomes are "those results that can be reasonably attributed to the intervention free and clear of the effects of any other causes that may be at work" (Rossi & Freeman, 1993, p-221). When reviewing the results of this study, one should keep in mind the difficulty encountered in separating the net effect from the gross effect when a quasi-experimental program evaluation design with non-random non-equivalent control groups is used.

Sample Selection

The experimental and control groups consisted of 130 juveniles who were adjudicated delinquent for a first to fourth degree felony. Ohio Revised Code (ORC) numbers were used to ensure consistency of felony degree between the offenses of juveniles in the experimental and control groups. As stated earlier, the juvenile court judge would have referred juveniles from the control group for the Partners Program had it been available at the time the control group juveniles were adjudicated. Juveniles, who were evaluated to be too dangerous for the Partners Program, would have been screened out at this phase by the juvenile court judge and not considered as part of the control group population.

The control group also consisted of juveniles who were adjudicated delinquent for a first to fourth degree felony. They were subsequently committed by the Richland County Juvenile Court to the State of Ohio's Department of Youth Services (DYS) correctional facility. To determine what facility best suited the delinquent juveniles, they began by serving a 30-day evaluation period at the Circleville detention site. They were then sent to a detention facility that was best suited to their needs. Upon serving their sentence at the recommended Department of Youth Services' corrections facility, they were released back to the custody of the Richland County

Juvenile Court and subsequently returned to their family. At this time, they were entered into the study. The juveniles from Richland County, Ohio who participated in the traditional juvenile court program from January 1, 1993, through December 31, 1994 comprised the control group, which consisted of 45 felony offending juveniles.

In the case of the juveniles in the experimental group, the director of the juvenile court identified a juvenile that ordinarily would be sent to the Department of Youth Services. A referral was made to the Partners Program staff. The supervisor of the Partners Program examined the fit between each juvenile's identified problems and the resources within the court, the family, and the community that would enable the Partners Program to intervene successfully. If the supervisor believed there were sufficient resources and all parties agreed to the terms and rules of the Partners Program (Partners), the juvenile was accepted into the program. The director conferred with the judge, the judge ordered the referral, and a Partners Program staff member was then assigned to the case. There has never been a juvenile or family accepted into Partners who refused to join the program. Prior to Partners, all juveniles accepted to the program and included in this study would have been incarcerated at the Department of Youth Services (DYS). Juveniles in the experimental group were eligible for entry into the study at the point they were released to the Partners Program. All juveniles who participated in the Partners Program of Richland County, Ohio, from May 31, 1996, through July 31, 1998, comprised an experimental group of 85 juveniles who committed felony offenses.

Three factors added to the strength of the selection process and this program evaluation research. First, the four delinquency professionals (the juvenile court director, the Partners Program supervisor and the two original direct service providing staff) who conducted subject selection were at the Richland County Juvenile Court for the entire length of time of the study.

These professionals also had first-hand knowledge of all the subjects and are still there. Second, Judge Ronald Spon, who was not involved in subject selection but consistently presided over the Richland County Juvenile Court during the entire length of the study, still presides to this day. His involvement, noted later, added more consistency to the adjudication and incarceration process. Third, in prior research on home-based family preservation programs not all of the juveniles included were actually removed from the home. All juveniles in this study regardless of whether they were in the control and experimental groups would have been removed from their homes through their incarceration periods.

Cox Regression and the Dependent Variable

Since the number of days until recidivism occurred for each juvenile was recorded for the data set used in this study, a Cox regression model was used to evaluate the differences between the recidivism rates of the experimental and control groups. An analysis of a Cox regression model is a form of survival analysis that allows the researcher to use various factors to model the length of time it has taken for an event to occur (i.e., re-arrest) even when some of the participants have not experienced the event (i.e., the censored cases).

This analytical approach was selected for two reasons. First, information, specifically the length of time until a felony re-arrest, would not be wasted. Such information would not be utilized if logistic regression had been used to analyze a dichotomized variable in which a juvenile would be simply be classified as being re-arrested or not re-arrested. Second, all cases are selected, not just the ones who where re-arrested (i.e., non-censored cases). It is possible for a researcher to use only non-censored cases or assign the censored cases the maximum time observed in the study. Such data could be analyzed with a multiple linear regression model. If only the censored cases were analyzed for this study or the censored cases were assigned the

maximum time observed, however, the true survival period would be underestimated (Adams, 1996).

To understand what serves as the dependent variable in a Cox regression model, three concepts need to be understood: (a) survival probability, (b) survivor function, and (c) hazard rate. The survival probability is the probability that a juvenile will not be re-arrested until a given point in time. The survivor function depicts the relationship between estimated survival probabilities over time. When graphed, the survival function for this study shows the proportion of juveniles not re-arrested by a specified point in time. According to Blossfeld and Mayer (1989) the hazard rate is the instantaneous rate of change in the survivor function. The hazard rate for this study indicates the instantaneous rate at which juveniles are re-arrested.

In a Cox regression model the dependent variable is the hazard rate. In order to allow the SPSS® computer software to generate the hazard function, the length of time between the day the participants were released from prison (for members of the control group) or the day the participants began the Partners Program (for members of the experimental group) and the day they committed another felony must be entered as a variable in the data set. It is important to note that the entry point for each control group participant was the day the participant was released from DYS detention; while the entry point for each experimental participant was day the participant entered the Partners Program. Participants who were not re-arrested for felony within 850 days were assigned a value of 850.

The number of censored cases was 73, which was 56% of the 130 juveniles. A total of 17 of the 45 juveniles (37.8%) in the control were not re-arrested (censored cases); while 56 of the 85 juveniles (65.9%) in the experimental groups were not re-arrested (censored cases). The

median number of days until re-arrested for the 28 non-censored cases in the control group was 241; while the number of days for the 29 non-censored cases in the experimental group was 400.

Independent Variables

The following characteristics were identified as the study's independent variables:

1. Ages of the participants at the time of commitment (X_1) -- Age was defined as an interval measure for any youth entering the study before the age of 18. The zero age point is the point of study entry. Age was portioned into years and months. The year is shown as 13, 14, 15, etc. The months were added to the year as a decimal divisible by 12. So, the data for a person who is 15 years and six months old is quantified as 15.5 (15 and 6/12).
2. Ages of the participants at the time they entered the study (X_2) -- The data for this variable were recorded as described in the previous variable.
3. Gender (X_3) -- Gender was defined as a discrete/binomial measure dummy coded as one for male and zero for female.
4. Race (X_4) -- Race was defined and coded as a discrete/binomial measure with one for white and zero for black, with white as stipulated in the guidelines established by the Department of Youth Services in the State of Ohio.
5. Frequency of prior probation and/or misdemeanors (X_5) -- Probation/misdemeanor violations were defined under the Ohio Revised Code and monitored by the Richland County, Ohio court record. Misdemeanor and probation violations were quantified as the frequency of occurrence.

6. Frequency of prior felony convictions (X_6) -- Prior felony violations were defined under the Ohio Revised Code and monitored by the Richland County, Ohio court record. Prior felonies were quantified as the frequency of felonies.
7. Loss due to parental inaccessibility (X_7) -- Loss due to a parental inaccessibility (the parent is for all intents and purposes unavailable or inaccessible to the child, that is, in prison, lives out of the state, etc.), was coded as dummy coded, one for presence of the event, zero for absence of the event.
8. Group membership (X_8) -- This variable identified whether a juvenile was exposed to the Partnership Program (experimental group) or not exposed to the Partnership Program (control group). The control and experimental groups were assigned values of zero and one, respectively.

The mean and standard deviation values for seven of the independent variables are listed in Table 1 (X_8 , the group variable was excluded). The differences between the mean values of the control and experimental groups were not statistically significant for the following four variables: (a) the ages of the participants at the time of commitment [X_1], (b) gender [X_3], (c) frequency of prior probation and/or misdemeanors [X_5], and (d) frequency of prior felony convictions [X_6]. Statistically significant differences existed between the following: (a) the mean ages of the participants at the time they entered the study [X_2] for the control group [16.73] and the experimental group [15.92], (b) the proportion of white juveniles [X_4] in the control group [.49] and the experimental group [.67], and (c) the proportion of juveniles who experienced the loss due to parental inaccessibility [X_7] in the control group [.42] and the experimental group [.68].

Insert Table 1 about here

Cox Regression Analysis Results

The results of the Cox regression analysis are listed in Figure 1 and Table 1. The survival function estimates are depicted in Figure 1 for each group (i.e., the experimental group and the control group). Figure 1 displays the estimated differences between the experimental group and the control group, holding the other variables constant.

Insert Figure 1 about here

Figure 1 also contains three horizontal reference lines to indicate the 90%, 80% and 70% survival points. A review of these survival points revealed the following:

1. At approximately 200 days 90% of the juveniles in the experimental group had not been re-arrested. For the control group, this 90% level had been reached in approximately 110 days.
2. At approximately 450 days 80% of the juveniles in the experimental group had not been re-arrested. For the control group, this 80% level had been reached in approximately 195 days.
3. At approximately 790 days 70% of the juveniles in the experimental group had not been re-arrested. For the control group, this 70% level had been reached in approximately 330 days.

Thus, as depicted in the two survival curve estimates, the members of the experimental group (juveniles in the Partners Program) reflected prolonged time to re-arrest when compared with members of the control group (juveniles in the Partners Program).

Table 2 contains further results of the Cox regression analysis. Listed in Table 2 is each variable's: (a) coefficient, (b) standard error, (c) Wald test value, (d) degrees of freedom, (e) probability level of the Wald test. The coefficient for the variable representing the group membership (X_8), which was $-.843$, was statistically significant at the established alpha level of $.05$ (Wald test = 6.718 , $p = .01$). This value of $-.843$ indicates that being a member of the experimental group reduces the log of the hazard (the hazard of committing another crime) by $.843$, controlling for the other variables in the model. This value can be better understood by interpreting its antilog value [$\exp(\beta_i)$], which is $.43$. This value is referred to as a risk ratio or effect. The $.43$ value indicates that the risk of experimental group members being re-arrested was 43% of the risk of control group members, holding constant the other variables.

 Insert Table 2 about here

It is important to note that one other predicted variable, which was a behavioral variable, was statistically significant. The frequency of prior probation and/or misdemeanors (X_5) had a coefficient value of $.062$ (Wald value = 4.492 , $p = .034$). The antilog of this coefficient 1.064 indicates that an increase of one prior conviction increases the log of the hazard (the hazard of committing another crime) by 6.4%, holding constant the other variables.

Summary and Implications

Results indicated that compared to the juveniles not exposed to the Partners Program (control group), the juveniles exposed to the Partners Program (experimental group) had: (a) reflected prolonged time to re-arrest and (b) , lower risks of being re-arrested. Of the other predictor variables entered into the Cox regression model, only prior misdemeanors/probation violations was significant. Thus behavioral and not temporal measures were related to juvenile delinquency.

This study has practical implications for juvenile court administrators who are interested in reducing felony re-arrest rates or substantially prolonging the days to which a youth does get re-arrested. The intervention and supervision strategies utilized in the Partners Program appear to create a greater involvement in the delinquent youth's (and their family's) life. Although such interventions might cause a higher incidence of misdemeanor and probation violation occurrence, it appears to improve the life skills of the youth and those surrounding them, resulting in a reduction in felony re-arrest and subsequent removal from the community. While remaining in the community, these youths have the opportunity to learn and grow from more suitable role models (including Partners Program direct service providers) than if in (DYS) detention.

Another effective strategy of the Partners Program intervention, because prior study research shows that each probation or misdemeanor offense increased the likelihood of a felony occurrence by greater than six percent, juvenile court administrators may want to pay greater attention early on to those youths who are repeat misdemeanor and probation violation offenders. Offering greater structure and supervision modeled after the Partners Program intervention strategy may reduce the occurrence of felony offenses in the future.

It should be noted that the home-based family preservation model, generally, has been criticized because of study design. Detractors argue children included in the study may or may

not have been placed out of the home thereby creating a sample population that was not truly at risk of placement. All youth included in the Partners Program study would have been incarcerated (experimental group) or were incarcerated (control group), thereby adding important information to the research literature. This research supports prior research on the efficacy of family preservation strategies.

It is important to keep in mind that this study used a non-randomized quasi-experimental design, which prohibits one from assuming causation making it difficult to generalize to other populations. The above findings suggest the Partners Program family preservation model should place even more emphasis on intervention with delinquent juveniles at the earliest sign of frequent misdemeanor/probation violation occurrence, thus increasing the likelihood of successful intervention and decreasing the likelihood of delinquent behavior in the future. This possibility and the fact that the Richland County, Ohio's Partner Program model allows youth to avoid incarceration into Department of Youth Services detention thus allowing them to remain in the care of their families and community, family preservation programs modeled after the Richland County, Ohio Partners Program warrant further study.

Future research on the Partners Program should also utilize prior research suggesting that age, loss and unpredictability in a child's life contribute to delinquency. Low turnover rates among Richland County Juvenile Court staff and the quality and expertise of the staff may play an important role in the success of the program. Consistent, ongoing connection with a skilled direct service provider appears to play a favorable role in helping youth avoid delinquent behavior by creating a meaningful relationship with and positive role modeling by the direct service provider, as well as further establishing predictability, consistency and structure in the youth's life. Variables like the role and impact of the direct service provider in examination of family preservation strategies modeled after the Richland County's Partners Program warrant further research.

Educators can assist future research in this area by making sure school records are complete and accurate. Information pertaining to school misconduct, special school outreach and

tracking a youth's academic career from school to school can provide important linkages that will help researchers and school officials track, advocate, intervene more effectively and provide suggestions and strategies that may increase the likelihood of graduation, less misconduct in school and in the community and create a better chance for success as an adult.

Finally, although the exact cost savings of the Partners Program intervention is beyond the scope of this study, it is still important to note the economic ramifications of such findings. Since the Partners Program is community based and able to operate at a lower cost than the Department of Youth Services detention facilities, (Allen, 1996), the program is able to save Ohio tax dollars. When a juvenile is able to enter the adult community with skills that allow that juvenile to avoid a criminal career, cost savings is substantial (Snyder & Sickmund, 1999). Further cost analysis research of the Richland County Juvenile Court's Partners Program merits further study.

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Table 1
Descriptive Statistics for the Independent Variables

Variables	Control Group		Experimental Group		Total	
	Mean	SD	Mean	SD	Mean	SD
X ₁ (Commitment Age)	16.10	1.03	15.73	1.36	15.85	1.26
X ₂ (Age at Entry) ^a	16.72	1.05	15.92	1.34	16.20	1.30
X ₃ (Gender)	.91	.29	.87	.34	.88	.32
X ₄ (Race) ^a	.49	.51	.67	.47	.61	.49
X ₅ (Prior Prob./Misd.)	6.07	4.85	4.94	5.05	5.33	4.99
X ₆ (Prior Felony Con.)	2.22	1.48	1.84	1.31	1.97	1.38
X ₇ (Loss of Access) ^a	.42	.50	.68	.47	.59	.49

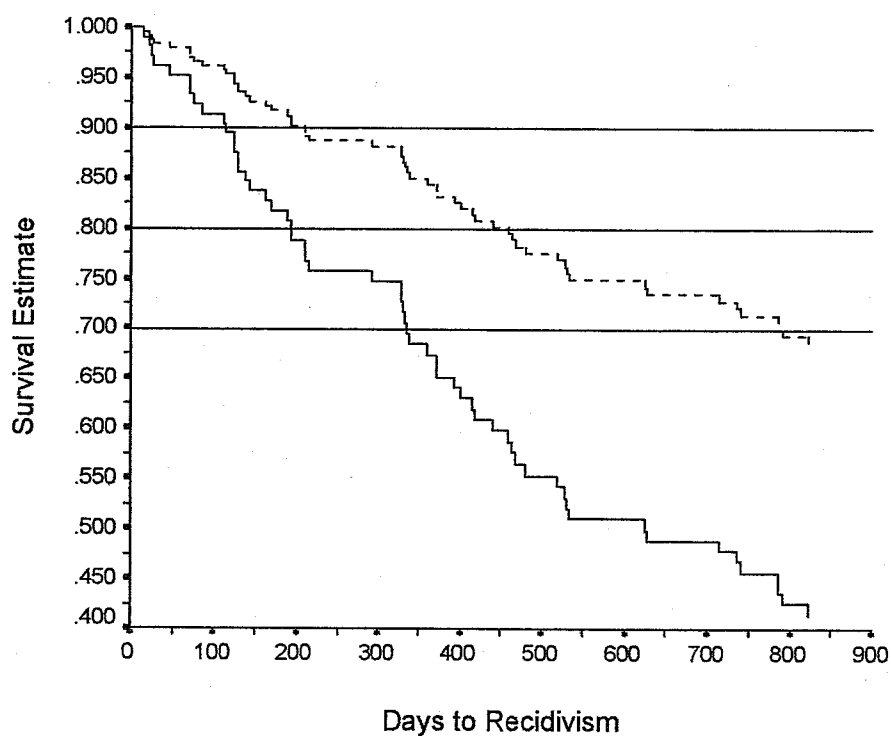
^a Differences between the means of the control and experimental groups were significant at the .05 level.

Table 2
Cox Regression Analysis Results ^a

Variables	Coefficients	SE	Wald	DF	P
X ₁ (Commitment Age)	.087	.283	.094	1	.759
X ₂ (Age at Entry)	-.267	.288	.861	1	.354
X ₃ (Gender)	1.209	.731	2.732	1	.098
X ₄ (Race)	-.522	.294	3.147	1	.076
X ₅ (Prior Prob./Misd.)	.062	.029	4.492	1	.034
X ₆ (Prior Felony Con.)	.136	.089	2.347	1	.125
X ₇ (Loss of Access)	-.348	.283	1.506	1	.220
X ₈ (Groups)	-.843	.325	6.718	1	.010

^a $\Delta(-2\text{Log Likelihood}) = 35.002$, $\chi^2 = 35.002$, $p < .001$

Figure 1
Survival Functions for the Experimental and Control Groups^{a, b}



^a The dashed line represent the survival function of the experimental group; while the solid line represents the survival function of the control group.

^b Reference lines are placed at the .90, .80, and .70 levels.