

Department of Community Corrections & Rehabilitation

Office of Policy, Planning, and Evaluation

Evaluation of Thinking for a Change (T4C), a Cognitive-Based Intervention

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Introduction

There is extensive research evidence suggesting that cognitive-behavioral programming significantly reduces the risk for recidivism of offenders,¹ with representative programs resulting in recidivism reductions of 20-30% compared to control groups.² In a meta-analysis of studies evaluating the effectiveness of a variety of structured, group-based cognitive intervention programs,³ three factors common to the most effective treatment programs were identified, including (1) selection criteria based upon risk for re-offense, (2) treatment fidelity, and (3) content that included anger control and interpersonal problem solving components.

'Thinking for a Change' (T4C)⁴ is one such group-based cognitive behavioral intervention program for criminal justice clients. Developed by the National Institute of Corrections (NIC) in 1997,⁵ it is based upon cognitive restructuring theory, social skills development, and the development of problem-solving skills. The curriculum is comprised of 25 lessons with a minimum recommended dosage of once per week and a maximum of three times per week.

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¹Pearson, F. S., Lipton, D. S., Cleland, C. M., & Yee, D. S. (2002). The effects of behavioral/cognitive-behavioral programs on recidivism. *Crime and Delinquency*, 48(3), 476-496.

²Wilson, D.B., Bouffard, L.A., & MacKenzie, D. L. (2005). A quantitative review of structured, group-oriented, cognitive-behavioral programs for offenders. *Journal of Criminal Justice and Behavior*, 32(2), 172-204.

³Landenberger, N. A., and Lipsey, M. W. (2005). The positive effects of cognitive behavioral programs for offenders: A meta-analysis of factors associated with effective treatment. *Journal of Experimental Criminology*, 1, 451-476.

⁴<https://nicic.gov/thinking-for-a-change>

⁵Bush, J., Glick, B., & Taymans, J. (1997). Thinking for a Change: Integrated Cognitive Behavior Change Program. Washington, D.C.: Department of Justice, National Institute of Corrections.



Initial quasi-experimental evaluations of the effectiveness of T4C in reducing recidivism have produced mixed results. Some studies have found significant reductions in recidivism rates following T4C treatment,⁶ ⁷ while a more recent analysis of a large sample of offenders released from Minnesota prisons found that completion of T4C was a factor in recidivism reduction for females but not for males.⁸

At Hennepin County's Department of Community Corrections and Rehabilitation (DOCCR), T4C intervention was implemented during 2012 for males within both community supervision and the Adult Correctional Facility (ACF) settings. This study evaluates the effect of completion of T4C on recidivism. Though an experimental design requires randomized assignment of clients to either treatment or control groups, there are frequently practical and ethical barriers to such a design with applied research. With no randomized control group available in this study, propensity score matching (PSM)⁹ is utilized to form comparison control groups. The propensity score is a composite score based upon key pretreatment characteristics that differentiate those clients selected for treatment from those who are eligible for treatment but not selected. Though still an observational study, matching comparison groups on this score reduces bias and lends strength to causal inferences.

There are two distinct treatment settings for T4C interventions at DOCCR. While there is overlap between the populations of clients within community supervision and those incarcerated at the ACF, there are significant differences. All those booked to the ACF have been sentenced to short term incarceration of less than one year as a consequence of their criminal behavior or violation of conditions of probation. This subpopulation is comprised of more serious offenders. The control pool for those receiving T4C treatment at ACF must be gathered from among this subpopulation as well. Considering these differences, the evaluation of T4C in the two settings is analyzed separately.

Propensity score matching (PSM) reduces bias and lends strength to causal inferences in observational research.

T4C interventions within community probation and ACF settings are evaluated separately.

⁶Lowenkamp, C. T., Hubbard, D. J., Markarios, M.D., and Latessa, E. J. (2009). A quasi-experimental evaluation of Thinking for a Change: A real-world application. *Criminal Justice and Behavior*, 36(2), 137-146.

⁷Golden, L. S., Gatchel, R. J., & Cahill, M. A. (2006). Evaluating the effectiveness of the National Institute of Corrections' "Thinking for a Change" program among probationers. *Journal of Offender Rehabilitation*, 42, 55-73.

⁸Duwe, G.. (2013). The Development, Validity, and Reliability of the Minnesota Screening Tool Assessing Recidivism Risk (MnSTARR). *Criminal Justice Policy Review*, 25(5), 579-613

⁹Rosenbaum, P.R., & Rubin, D.B. (1984). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70(1), 41-55.

Methodology

The study methodology is a two sample matched design using PSM analysis. Those who were referred to or participated in T4C but did not graduate are eliminated from both treatment and control groups. Only those with a one year recidivism time frame plus one year for case outcomes to resolve are included in sample groups. The recidivism period is adjusted for those with confinement time at the ACF during the recidivism period. Clients with participation in any further cognitive group treatment during the recidivism period are excluded from both treatment and comparison groups. Due to record matching constraints for collection of recidivism data, those with non-Minnesota intake offenses are also excluded from the sample groups.

Data sources include the following systems:

- Court Services Tracking System (CSTS) for demographic, probation, and primary probation offense data.
- Offender Management System (OMS) for ACF booking data.
- Statewide Supervision System (S3) for Level of Service and Case Management Inventory (LSCMI) data.
- Minnesota Court Information System (MNCIS) for criminal history and recidivism data using the Automated Recidivism Application.

Potential matching variables include a wide range of variables.

Demographic variables include age, race, ethnicity (Hispanic), marital status, number of children, number of dependents, and veteran status.

Probation variables include court conditions, court condition status, and primary offense level, rank, and type. Definitions of types and ranks of offenses can be found in the Appendix. Booking variables include booking age, type of stay, length of stay, days since primary offense, and primary booking offense level, rank, and type. Assessment variables include LSCMI total score and risk classification. Criminal history variables include number of prior convictions, number of felony convictions, number of prior public safety relevant convictions (person score), criminal history offense level score, criminal history offense rank score and total criminal history score (combined offense level and person score).

For treatment and comparison groups in the ACF setting, the start of the recidivism time period is defined as the date of release from the ACF. For those who received T4C treatment in a community probation setting, the start of the recidivism time period is defined as the date of graduation.

For the comparison probation group, the start of the recidivism time

Clients with referrals to or participation in T4C who did not graduate are excluded from both treatment and control groups.

Demographic, current offense, criminal history, and assessment data is used for propensity score matching (PSM).

period is defined as one year from the start of probation services at DOCCR. This is the average period of time from start of probation to graduation for the treatment group. Therefore, it is the best estimate of when graduation would have taken place for clients if they had been referred to and completed T4C in a community probation setting.

Recidivism is defined as the occurrence of a misdemeanor or above offense within the recidivism period resulting in a subsequent conviction. Recidivism variables include three and six month recidivism, one, two and three year recidivism, days to recidivism, number of recidivism offenses, number of felony recidivism offenses, number of public safety relevant recidivism offenses, recidivism offense level score, recidivism offense rank score and total recidivism score. The primary program evaluation outcome or dependent variable is one year recidivism, with all other recidivism variables as secondary outcome variables.

The primary outcome or dependent variable is one year recidivism.

Statistical procedures include comparison group means, frequencies and percentages, Pearson R correlation, Independent Sample t-test, Chi-Square, Logistic Regression, AUC analysis, PSM analysis and covariate balance analysis. Analysis utilizes SPSS and R statistical software¹⁰, including R packages of Matchit¹¹, Cobalt¹², and pROC¹³. For evaluation of model goodness of fit of the propensity score in predicting the treatment group, AUC values of .600 to .699 are considered borderline, .700 to .799 are good, and .800 or above are excellent.¹⁴

Sample Description

The treatment samples consist of 323 male probation clients and 397 male ACF inmates who graduated from T4C between March 1st, 2012 and September 30th, 2016. The DOCCR criteria for eligible referral to T4C and attendance requirements are listed in the Appendix. An additional criteria for those referred for treatment at the ACF is a length of stay of at least one month to allow for completion of the T4C program.

¹⁰ R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <http://www.R-project.org/>.

¹¹ Ho, D, Imai, K., King, G., & Stuart, E. (2018). MatchIt: Nonparametric Preprocessing for Parametric Causal Inference. *Journal of Statistical Software*, 42(8). <http://www.jstatsoft.org/>.

¹² Greifer, N. (2018). *Covariate Balance Tables and Plots: A Guide to the cobalt Package*. R package version 3.6.1.

¹³ Robin, X., Turck, N., Hainard, A., Tiberti, N. Lisacck, F., Sanchez, J., & Muller, M. (2011). *pROC: an open-source package for R and S+ to analyze and compare ROC curves*. BMC Bioinformatics, 12, 77.

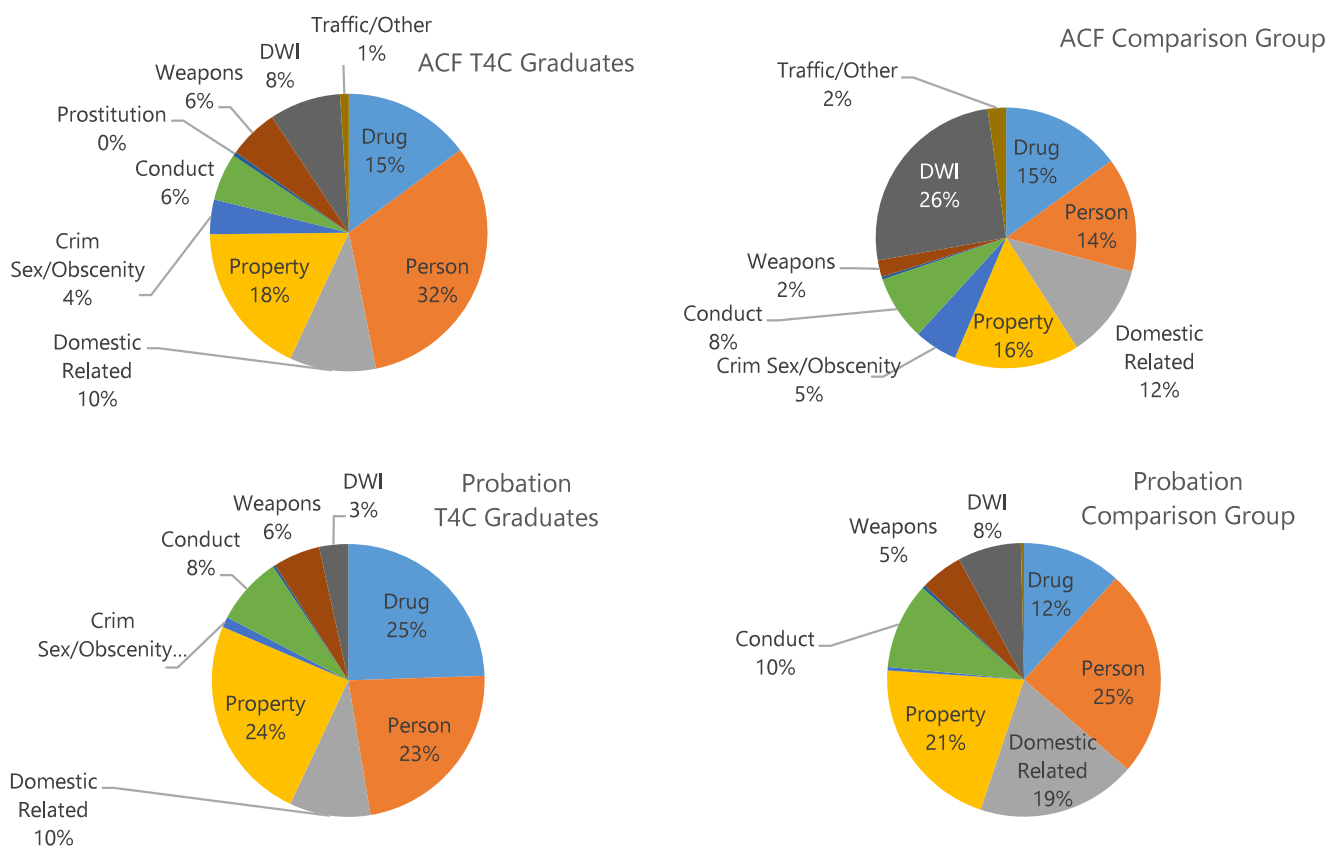
¹⁴ Hosmer, D.W, Lemeshow, S, & Sturdivant, R.S. (2000). Assessing the fit of the model. *Applied Logistic Regression, Third Edition*, 153-225.

The potential control group for the ACF setting (ACF comparison group) is comprised of 3844 male clients receiving traditional probation services at DOCCR and serving at least thirty (30) days incarcerated at the ACF during the treatment sample time period. Those who participated in other group cognitive classes during the treatment or follow up recidivism time period are excluded from the comparison group.

The potential control group for the community supervision setting (probation comparison group) is comprised of 1712 male clients receiving traditional probation services at DOCCR with an active court condition of group cognitive classes during the treatment sample time period. Those who participated in other group cognitive intervention during the treatment or follow up recidivism time period as well as any clients selected for matching to the ACF treatment group are excluded from the probation comparison group.

Comparisons of types of probation/booking offenses for treatment and comparison samples are displayed in Figure 1.

Figure 1. Probation/Booking Offenses for Treatment and Comparison Groups



Propensity Score Matching Analysis

The initial step in propensity score matching is identification of variables to include in models for matching treatment and control groups in both treatment settings. Backward conditional ($\alpha=.05$) logistics regression is considered most effective in such model development.¹⁵ Using this procedure with all collected variables, excluding recidivism variables, the resulting models for prediction of the selection for treatment in each treatment setting are presented in Table 1.

Table 1. Logistic Regression Models for Prediction of T4C Treatment					
ACF Treatment Setting Model			Probation Treatment Setting Model		
Variables	B	Corr. With One Year Recidivism	Variables	B	Corr. With One Year Recidivism
Primary Charge Level Score	.327**	-.081**	Criminal History Score	.106**	.091**
Criminal History Charge Level Score	.009**	.352**	Current Age	.277**	-.132**
Criminal History Felony Score	-.091**	.162**	Primary Drug Offense	-	-.042
Primary Person Offense	.548**	-.007	Primary DWI Offense	.130**	-.027
Black Racial Designation	.572*	.134**	Black Racial Designation	.030*	.106**
ACF Length of Stay	.013**	-.069**	LSCMI Risk Classification	.134**	.115**
Booking Age	-.026**	-.053**			
(Constant)	-8.135**	-----	(Constant)	-3.011**	-----
Variance Explained	28.0%	-----	Variance Explained	17.4%	-----
Model Chi Square	589.637**	-----	Model Chi Square	1230.070**	-----
*Significant at the .05 level (2-tailed)			**Significant at the .01 level (2-tailed)		

Since the LSCMI risk classification is a signification factor in prediction of selection for treatment in a probation setting, those with no LSCMI assessment prior to treatment or projected treatment date are eliminated from probation treatment (N=40) and comparison (N=370) groups.

The correlation of predictive factors in both models with one year recidivism is also presented in Table 1. Most factors are significantly related to one year recidivism, addressing bias in comparison of treatment to comparison groups.

¹⁵ Harrell, F.E., Lee, K.L., & Mark, D.B. (1996). Multivariable prognostic models: Issues in developing models, evaluating assumptions and adequacy, and measuring and reducing errors. *Statistics in Medicine*, 15, 361-387.

AUC analysis of the propensity score generated from these models gives an indication of the model goodness of fit. The AUC for the ACF treatment selection model is .850, indicating an excellent model fit (> .800). The AUC for the probation treatment selection model is .670, indicating a borderline model fit (>.600 & <.700). Table 2 presents this analysis for both models.

Table 2. AUC for Prediction of Treatment Selection by Treatment Model				
Treatment Model	AUC	Std. Error	AUC Confidence Interval	
			Lower	Upper
ACF	.850	.009	.833	.868
Probation	.670	.016	.638	.702

*Significant at the .001 level (2-tailed)

With the development of predictive models, the propensity score can be used to match comparison groups with treatment groups for both treatment settings. Nearest neighbor selection with one to one matching without replacement is used for PSM matching (matching caliper set at .05).

ACF Treatment Setting

With a well matched comparison group, the matching process equally distributes or balances covariates over the treatment and matched group. Table 3 provides summary statistical comparisons of the balance of the treatment group with the unmatched and matched comparison groups. For continuous and interval variables, the average for each group is displayed. For binary variables, the percentage within each group is displayed. For unmatched and matched comparison groups, a significant difference in average score (t-test) or percentage (chi square) from the treatment group is identified. The Variance Ratio (V Ratio) is a measure of covariate distribution balance, with ratios close to one (1) indicative of group distribution balance.

Table 3. Summary of ACF Treatment, Comparison and Matched Groups									
Matching Variables	Treatment (N = 397)		Comparison (N = 3844)			Matched (N = 397)			% Balance Improvement (Mean Diff)
	Avg. or %	SD	Avg. or %	SD	V. Ratio	Avg. or %	SD	V. Ratio	
Propensity Score	.243	.164	.078**	.106	.647	.242	.162	.987	99.2%
Primary Offense Level Score	14.58	1.47	12.41**	3.32	2.26	14.63	1.30	.886	97.7%
Criminal History Offense Level Score (5 yr)	36.44	22.75	32.61**	26.57	1.17	39.65	32.30	1.42	16.1%
Criminal History Felony Score (5yr)	2.83	1.85	1.96**	2.07	1.12	3.11	2.31	1.25	67.6%
ACF Length of Stay	163.6	54.86	92.01**	59.06	1.08	163.2	74.03	1.35	99.4%
Booking Age	30.41	10.47	35.05**	11.35	1.08	30.72	10.09	.96	93.3%
Primary Person Offense	32%	-	13%**	-	-	29%	-	-	83.6%
Black Racial Designation	69%	-	50%**	-	-	69%	-	-	95.8%

*Significant at the .05 level (2-tailed) **Significant at the .01 level (2-tailed)

Figures 2 and 3 gives visual depictions of gains in balance with PSM. Figure 2 displays density and histogram comparisons of the propensity score and all variables in the predictive model. Figure 3 displays standardized balance comparisons of unmatched and matched groups.

Figure 2. Density and Histogram Plots of ACF Sample Groups

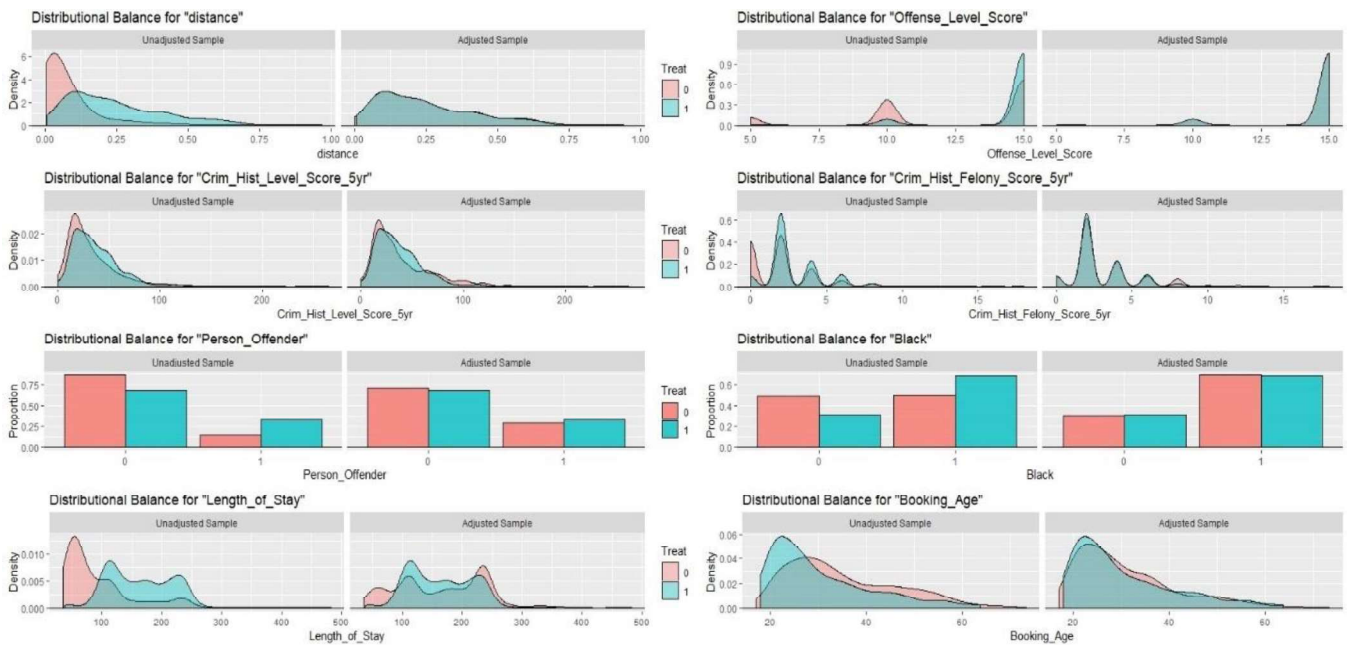
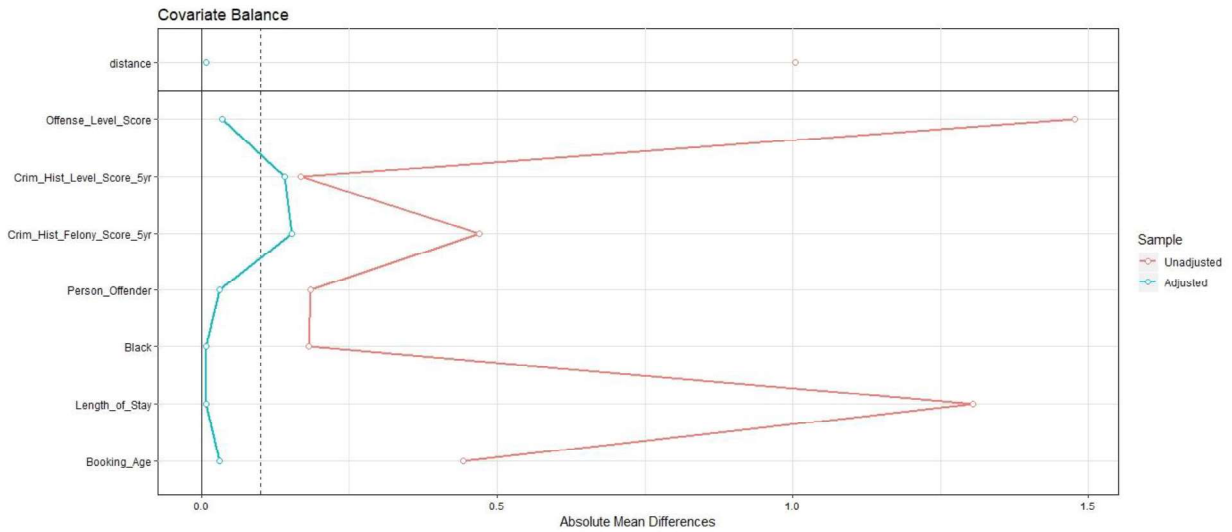


Figure 3. Plot of ACF Balance of Unmatched and Matched Groups.



Probation Treatment Setting

Table 4 provides summary statistical comparisons of the balance of the treatment group with the unmatched and matched comparison groups following PSM analysis. For continuous and interval variables, the average for each group is displayed. For binary variables, the percentage within each group is displayed. For unmatched and matched comparison groups, a significant difference in average score (t-test) or percentage (chi square) from the treatment group is identified.

Table 4. Summary of Probation Treatment, Comparison and Matched Groups									
Matching Variables	Treatment (N = 323)		Comparison (N = 1712)			Matched (N = 323)			% Balance Improvement (Mean Diff)
	Avg. or %	SD	Avg. or %	SD	V. Ratio	Avg. or %	SD	V. Ratio	
Propensity Score	.204	.097	.150**	.079	.815	.203	.094	.975	98.1%
Criminal History Score (5 yr)	8.30	7.26	11.56**	3.32	1.31	8.35	7.12	.981	98.5%
LSCMI Risk Classification	3.84	.428	3.75**	.554	1.28	3.85	.449	1.05	89.4%
Current Age	33.59	11.61	32.14*	10.34	.886	33.59	10.80	.929	99.6%
Primary Drug Offense	24%	-	12%**	-	-	24%	-	-	97.6%
Primary DWI Offense	3%	-	7%**	-	-	4%	-	-	85.0%
Black Racial Designation	67%	-	56%**	-	-	67%	-	-	97.1%

*Significant at the .05 level (2-tailed) **Significant at the .01 level (2-tailed)

Figures 4 and 5 give visual depictions of gains in balance with PSM. Figure 4 displays density and histogram comparisons of the propensity score and all variables in the predictive model. Figure 5 shows standardized balance comparisons of the unmatched and matched groups to the treatment group.

Figure 4. Density and Histogram Plots of Probation Sample Groups

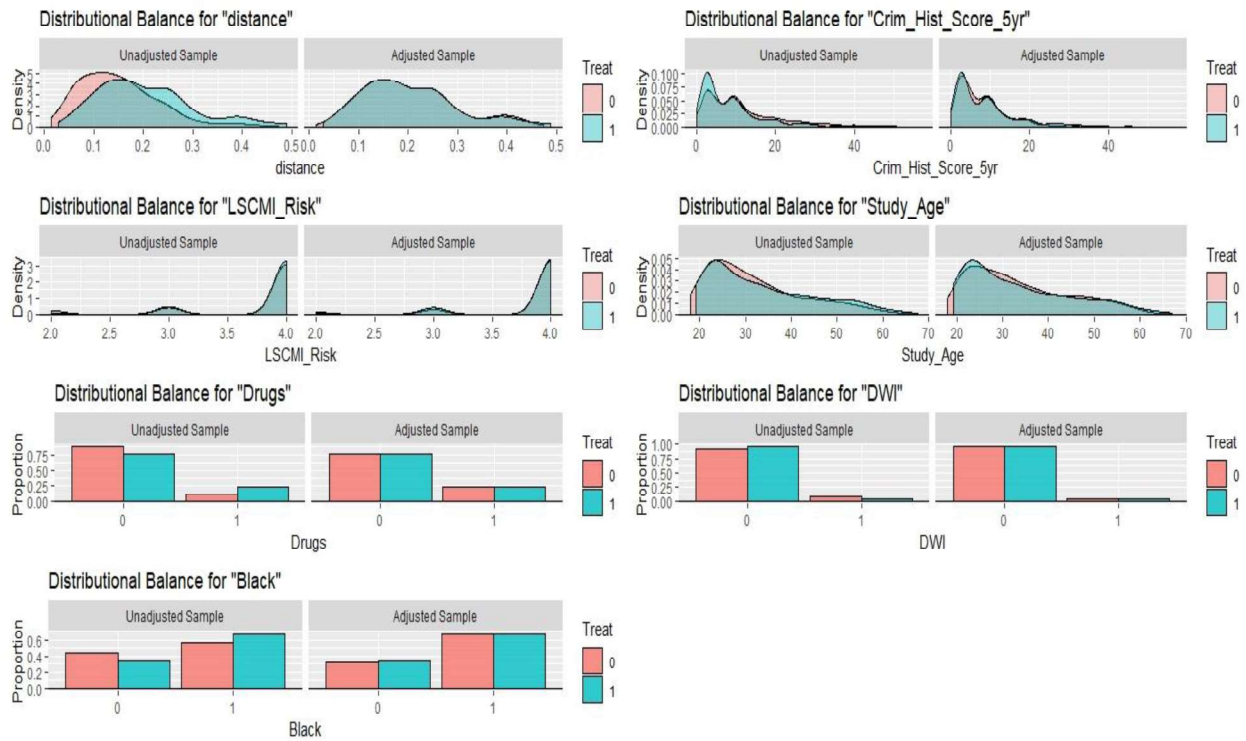
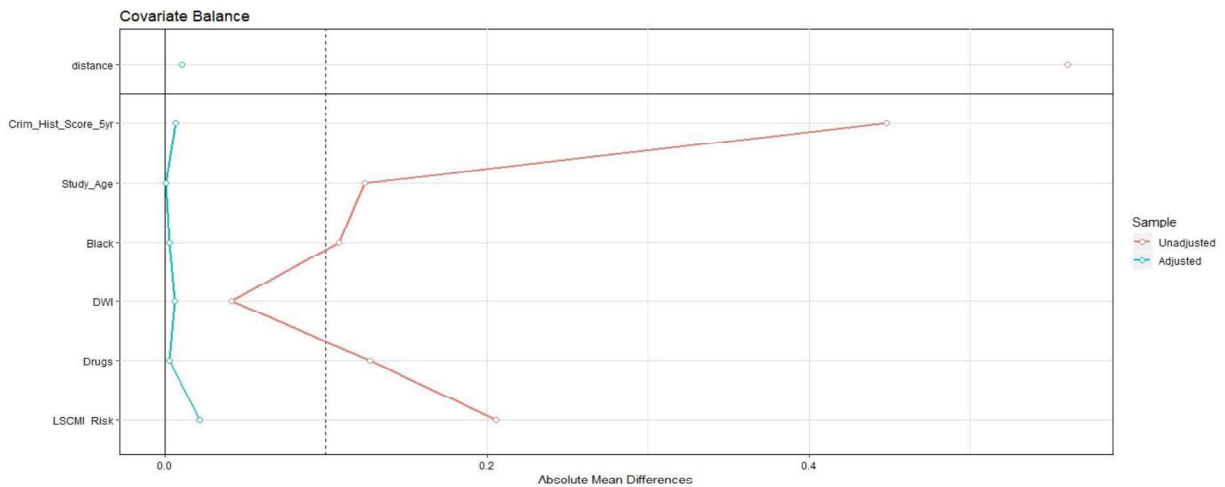


Figure 5. Plot of Probation Balance of Unmatched and Matched Groups.

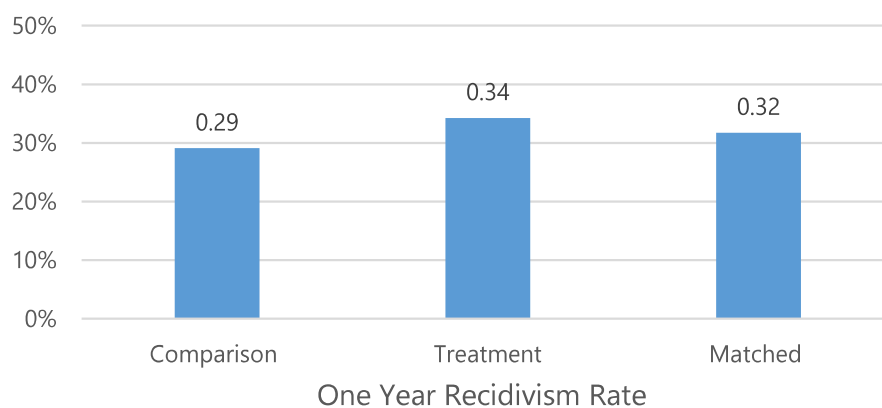


Results

ACF Treatment Setting Results

Figure 6 displays the primary outcome variable of one year recidivism for the ACF full comparison, treatment, and matched control groups. There is no significant difference in the rate of the T4C treatment group compared to the matched control group (Pearson Chi-Square = .570, $p = .45$). No significant differences are evident for smaller samples comparing two and three year recidivism as well as for shorter recidivism time frames of three months and six months. Table 5 displays these recidivism rates for full comparison, treatment, and matched control groups.

Figure 6. One Year Recidivism Rates for ACF Groups



One year recidivism rates are similar for ACF T4C treatment (34%) and matched control (32%) groups.

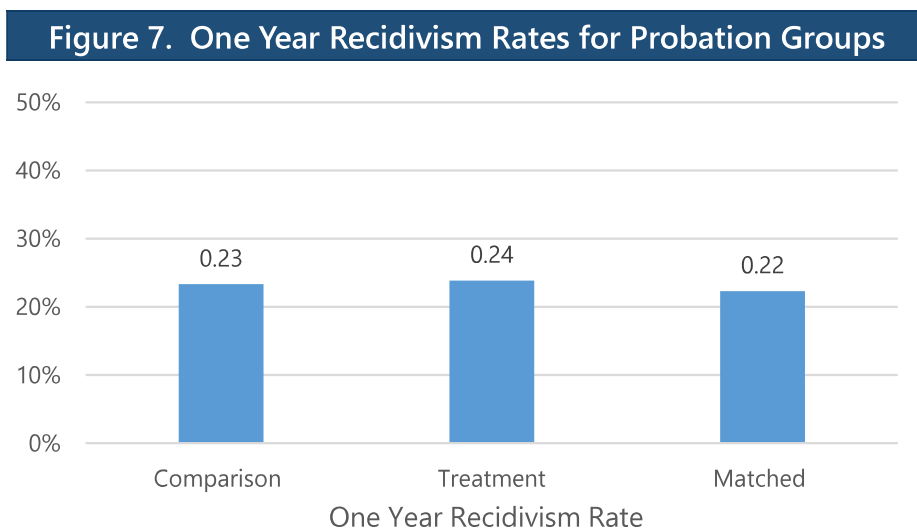
Table 5. ACF Treatment Setting Recidivism Rates							
Recidivism Period	Full Comparison		Treatment		Matched		Treatment/Matched Comparison
	N	Rate	N	Rate	N	Rate	Chi Square
3 Month	3844	12.7%	397	15.1%	397	13.9%	.254, $p = .614$
6 Month	3844	19.9%	397	23.2%	397	21.4%	.356, $p = .551$
1 Year	3844	29.1%	397	34.3%	397	31.7%	.570, $p = .450$
2 Year	3021	40.3%	278	48.6%	297	44.8%	.824, $p = .364$
3 Year	2130	47.4%	186	49.5%	106	52.0%	.243, $p = .622$

Comparing one year recidivists across treatment and matched groups, any differences in the nature of recidivism can be investigated. Table 6 presents the results of this comparison. As indicated, there are no discernable statistical differences in the timing, frequency or type of recidivist when comparing recidivists in T4C treatment and matched control groups.

Table 6. Comparison of ACF One Year Recidivists							
Recidivism Variable	Full Comparison Recidivists (N = 1118)		Treatment Recidivists (N = 136)		Matched Recidivists (N = 126)		Treatment/Matched Comparison
	Avg.	SD	Avg.	SD	Avg.	SD	T-Test
Days to Recidivism	145.7	109.4	158.9	115.0	154.1	119.2	-.331, p=.741
Number of Offenses	1.75	1.54	1.58	1.11	1.66	1.46	.486, p=.627
Number of Felonies	0.68	1.04	0.84	1.13	0.90	1.20	.462, p=.645
Number of Person Offenses	0.93	0.89	1.09	0.86	1.01	0.96	-.709, p=.479
Recidivist Score	1.61	1.72	1.93	1.76	1.91	1.98	-.060, p=.952

Community Probation Treatment Setting Results

Figure 7 displays the primary outcome variable of one year recidivism for the probation full comparison, treatment, and matched control groups.



One year recidivism rates are similar for probation T4C treatment (24%) and matched control (22%) groups.

There is no significant difference in the one year recidivism of the T4C treatment group compared to the matched control group (Pearson Chi-Square = .218, $p=.64$). No significant differences are evident for smaller samples comparing two and three year recidivism as well as for shorter recidivism time frames of three months and six months. Table 7 displays these recidivism rates for full comparison, treatment, and matched control groups.

Recidivism Period	Full Comparison		Treatment		Matched		Treatment/Matched Comparison
	N	Rate	N	Rate	N	Rate	Chi Square
3 Month	1712	7.4%	323	6.8%	323	7.1%	.024, $p=.877$
6 Month	1712	12.8%	323	14.2%	323	10.5%	2.05, $p=.152$
1 Year	1712	23.3%	323	23.8%	323	22.3%	.218, $p=.641$
2 Year	1267	36.5%	268	37.3%	240	32.1%	1.526, $p=.217$
3 Year	866	45.8%	203	44.8%	169	38.4%	1.535, $p=.215$

Comparisons of one year recidivists across comparison, treatment and matched groups in a probation setting are displayed in Table 8.

Recidivism Variable	Full Comparison Recidivists (N = 399)		Treatment Recidivists (N = 77)		Matched Recidivists (N = 72)		Treatment/Matched Comparison
	Avg.	SD	Avg.	SD	Avg.	SD	T-Test
Days to Recidivism	169.4	114.3	169.4	113.1	180.1	108.4	.586, $p=.056$
Number of Offenses	1.52	1.13	1.26	0.72	1.42	0.76	1.30, $p=.197$
Number of Felonies	0.57	0.67	0.38	0.51	0.42	0.69	.405, $p=.686$
Number of Person Offenses	0.33	0.56	0.12	0.32	0.26	0.50	2.11, $p=.037^*$
Recidivist Score	4.18	4.10	2.35	2.49	3.46	3.95	2.03, $p=.044^*$

*Significant at the .05 level

When comparing one year recidivists within T4C treatment and matched control groups, there are no statistical difference in the timing, total frequency, or frequency of felony recidivism offenses. Those graduating from T4C do have fewer public safety related offenses and lower recidivism scores on average ($p < .05$) compared to the matched control group.

Comparison of T4C Graduates and Referrals/Participants

For clients referred to T4C at the ACF, almost three fourths (73.7%) complete the program. The completion rate for referrals in the community probation setting is much lower (58.7%). In this two sample design, these clients are not included in treatment or matched control samples. However, a comparison of differences in characteristics between T4C graduates and failures can provide insight into referral policies.

One year recidivism rates for graduates, participants, and referrals in both treatment settings are shown in Table 9. The rate of recidivism for participants/referrals who do not graduate is significantly higher than rates for graduates. This is true in both treatment settings.

Table 9. One Year Recidivism by Treatment Status and Treatment Setting							
Treatment Setting	Graduates		Participants		Referrals		Treatment Status Comparison
	N	Recidivism Rate	N	Recidivism Rate	N	Recidivism Rate	Chi-Square
ACF**	398	34.2%	142	49.3%	-	-	10.14, p=.001
Probation*	433	23.6%	152	30.3%	153	33.3%	6.54, p=.038

*Significant at the .05 level **Significant at the .01 level.

There are no significant differences across treatment status groups in demographic variables such as age, race, ethnicity (Hispanic), marital status, number of children, or veteran status. Clients across treatment status groups have similar LSCMI scores and risk levels within both treatment settings. There are also no significant differences between treatment status groups in comparisons of booking/probation offense, including offense level, type of offense, and offense rank score.

With the exception of first offense age, there are significant differences in all criminal history variables across treatment status. Those clients who are referred for treatment but do not participate have the most frequent and serious criminal history, followed by those who participate in T4C but do not graduate. T4C clients have the lowest criminal history scores of any treatment status group. These results are displayed in Table 10.

Criminal History Variables (5 yr)	ACF			Probation			
	Graduate	Participant	Comparison T-Test	Graduate	Participant	Referral	Comparison ANOVA
Number of Offenses	3.87	4.96	-3.52, p=.001**	3.01	3.68	3.88	7.15, p=.001**
Offense Level Score	35.34	44.51	-3.26, p=.001**	12.00	14.38	15.09	7.56, p=.001**
Offense Rank Score	51.18	60.70	-2.64, p=.009**	39.28	46.14	49.27	7.03, p=.001**
Number of Felonies	2.82	3.31	-2.40, p=.000**	1.28	1.44	1.51	3.90, p=.021*
Number of Person Offenses	4.48	4.50	-3.61, p=.000**	0.56	0.72	0.83	4.92, p=.008**
Criminal History Score	7.31	9.11	-3.67, p=.000**	7.84	9.71	10.54	8.39, p=.000**
Age at First Offense	23.33	22.55	-0.86, p=.390	26.05	24.17	23.43	4.42, p=.012*

*Significant at the .05 level **Significant at the .01 level.

Discussion

In this quasi-experimental study, clients graduating from T4C in two different treatment settings, the ACF and community probation, were compared to matched control groups chosen through propensity score matching. Within both treatment settings, there were no significant differences in the primary outcome variable of one year recidivism when comparing T4C graduates to control groups. In addition, when viewing a variety of recidivism time frames spanning from three months to three years, recidivism rates were similar for those who graduated compared to similar DOCCR clients who were not referred for treatment.

Recidivism rates are similar for T4C graduates compared to matched control groups.

Recidivist in treatment groups and matched control groups were also compared on a variety of recidivism variables reflecting the frequency, severity, and type of recidivism offenses. For treatment and control comparisons within the ACF, no significant differences were detected among recidivists. In the community probation treatment setting, no differences among recidivists were found in the timing, overall frequency, or severity of offenses. However, T4C graduates who subsequently reoffended did have fewer public safety relevant offenses and lower overall recidivism scores compared to control group recidivists.

With few exceptions, the factors used in matching for both treatment settings are also related to the primary outcome measure of one year recidivism. This is helpful in controlling sample bias in outcome

measures introduced by the treatment selection process. However, with a propensity score matching study, the development of a strong model predicting selection for treatment is necessary for outcome differences to suggest the causal influence of treatment upon outcomes. The model developed for the ACF treatment setting displays excellent goodness of fit (AUC = .850) while the model for the community probation setting is in the borderline range (AUC = .670). Due to the weakness in the treatment prediction model within community probation, the two significant outcome differences in probation group comparisons must be viewed with less statistical confidence. These differences may be the result of an inadequate control group selection process.

There were greater methodological challenges in the control matching process for community probation compared to the ACF setting. ACF control clients were gathered from among males receiving adult probation services, incarcerated during the same time period as the treatment group, and having a sufficient length of stay to have completed the T4C treatment program. For the community probation treatment setting, control clients were gathered from among males receiving probation services and having an active court condition of cognitive class completion. However, almost one fifth (19%) of the probation T4C graduates did not have a court condition of cognitive class completion. This difference between treatment and comparison groups may have made the development of a predictive model for treatment selection more difficult.

A second methodological problem within the probation treatment setting was determining a recidivism start date for potential controls. With ACF clients, this date was easily set for both treatment and controls as the date of release from the ACF. In a community setting, no such comparable date was available. The best option for setting the recidivism start date for controls was determined to be the average days from probation start to T4C graduation for the treatment group. Though treatment graduation was one year from probation start on average, the range was from four days to six years. The point in the probation term when a probation officer makes a referral to T4C may have key ramifications. Referrals might be made when probation officers recognize an increase in motivation and treatment readiness. Conversely, perhaps referrals are triggered by a recognition of increased stressors and greater need for intervention. While using the average of this time period for controls does minimize the statistical differences of the groups as a whole, it is a

major methodological weakness that introduces differences between the treatment and control groups.

Much of the data regarding T4C treatment is maintained in a separate database with no direct connection or incorporation with major database systems utilized at DOCCR. This data recording system is vulnerable to data recording errors and makes treatment information less accessible to DOCCR staff. When data for this study was gathered, multiple data recording problems were encountered, including duplicate records, missing data, and inaccurate client identification numbers. Some errors may not have been detected during the data cleaning process. Going forward, the development of an alternative to the current cognitive group treatment data system is recommended.

The T4C treatment completion rate at the ACF was almost three fourths (73.7%), with a lower completion rate in the community probation setting (58.7%). When comparing T4C graduates to referrals and participants who did not graduate, there were significant differences in a variety of criminal history variables. This suggests that incorporating criminal history factors into referral criteria may lead to improved completion rates.

Considering the similarity of T4C graduates and matched controls on most outcome variables as well as the methodological challenges of this study, no firm conclusions regarding the effects of T4C treatment can be drawn from these results. With little evidence to the contrary, it may be that the T4C treatment is not effective at reducing risk. It may be the case that real treatment effects are being masked by uncontrolled confounding variables. It is also possible that key treatment selection factors are not present in the control matching model used to generate a propensity matching score. While these results provide no encouragement for the continued use of T4C intervention with males at DOCCR, there is also no evidence to discourage the continued use of this intervention.

While this has been described as a program evaluation study, this is only partially true. This study explores only two aspect of a program evaluation, completion rates and outcome measures. A complete program evaluation evaluates all aspects of the intervention, including referral criteria, program fidelity, staff training, scheduling, record keeping, and process evaluation. Problems in any of these areas could impact treatment outcomes. The results of this study should be viewed in conjunction with these other evaluative aspects to gain a full picture of the T4C treatment program and next steps going forward.

Appendix

Table A1. Offense Rank Score					
Offense	Rank	Offense	Rank	Offense	Rank
Status/Other	1	Prostitution	11	Harassment	21
Gambling	2	Crimes Against Government	12	Other Person	22
Traffic	3	Crimes Against Justice	13	Robbery	23
Disturbing the Peace	4	Escape	14	Vehicular Assault	24
Receiving Stolen Goods	5	Crimes Against Family	15	Assault	25
Property	6	Burglary	16	Domestic Assault	26
Theft	7	Drugs	17	Kidnapping	27
Counterfeiting/Fraud	8	DWI	18	Criminal Sexual Conduct	28
Vehicle Theft	9	Arson	19	Vehicular Homicide	29
Obscenity	10	Weapons	20	Homicide	30

Table A2. Type of Offense	
Offense Category	Definition
Crim Sex/Obscenity	Sex related crimes, including obscenity. (Ex. Criminal Sexual Conduct, Indecent Exposure, Possession of Pornography, Failure to Register as Predatory Offender)
Domestic Assault	Threat, violence, abuse, or willful neglect toward someone in a family or intimate relationship. (Ex. Domestic Assault, Violation of Order for Protection)
Drugs	Crimes involving the possession or selling of illegal substances. (Ex. Drug Possession or Sale)
DWI	Crimes involving driving while intoxicated. (Ex. DWI, Refusal to Test)
Person (Non-Domestic)	Crimes involving willful attempt or threat to injure someone else, excluding domestic assault. (Ex. Homicide, Assault, Kidnapping, Robbery)
Property	Crimes involving a focus upon property and not persons. (Ex. Burglary, Fraud, Forgery, Theft, Vehicle Theft, Arson, Property Damage, Trespassing)
Prostitution	Crimes involving the commission of a sex act for monetary consideration or other thing of value. (Ex. Prostitution in Public Place)
Societal Conduct	Crimes involving disruption of public peace or order. (Ex. Disorderly Conduct, Escape, Rioting, Public Intoxication, Loitering,)
Traffic/Other	All traffic crimes, excluding DWI, (ex. Hit and Run, Criminal Vehicular Operation, Careless Driving, Driving After Suspension) as well as crimes not otherwise classified (Ex. Status Offenses)
Weapons	Crimes involving the illegal possession or use of weapons. (Ex. Prohibited Person in Possession of Firearms, Reckless Discharge of Firearms)

Table A3. DOCCR Thinking for a Change (T4C) Referral Criteria

Current LS/CMI score 21 or greater. The enforcement of the cognitive behavioral probation condition is at the discretion of DOCCR. Assessment scores will inform this discretion. Referrals can also be made without this ordered condition.

Clients who score 14-20 on the LS/CMI may be referred following consultation with the cognitive behavioral coordinator.

Current attendance in chemical health treatment aftercare is permissible. Client is not actively chemically dependent.

An approximate 6th grade reading level is required and an ability to benefit from the group process.

Significant mental health issues are managed through medication/treatment.

Table A4. DOCCR Thinking for a Change (T4C) Attendance Requirements

Attendance at the first T4C session is mandatory and the client will be dismissed from the group for non-attendance.

All referents must attend orientation unless they had previously attended in last 3 months.

Clients will attempt to attend all scheduled sessions.

In the event of illness or emergency which results in missing a session or being later than the scheduled start time, the client must contact the group facilitator.

The client cannot miss more than two sessions and they cannot be two sessions in a row. A 3rd missed session will result in termination from the program.

Clients will be on time for all sessions, planning on arriving 10-15 minutes before start time. Clients will not be admitted to class 10 minutes after the group begins.

Clients must actively contribute to group discussion and participate in class activities and assignments.

Clients must treat group members and facilitators respectfully.

Clients understand that personal issues discussed in group are confidential and respect the confidentiality of others by not discussing people's names or problems addressed in group with anyone outside of group. Clients also understand that facilitators are mandated reporters and under special conditions will bring information to the supervising agent/supervisor.

