

## 2. Research Questions and Key Findings

This chapter summarizes major findings structured as the answers to research questions posed by stakeholders and derived from previous MST studies. An effort has been made to present data in ways that communicate practical significance. At this point, the two groups – MST and usual services – are not statistically distinguishable on any measure of recidivism except one. The members of the MST group were more likely to be sentenced to at least one term of open custody but less likely to be sentenced to a term of secure custody. Cox regression did not demonstrate a treatment effect. Some differences were observed in patterns of breach of dispositions. Removing the MST drop-outs from the analysis, some statistically significant differences emerge on some outcome indicators but the number needed to treat figures remain high. Moreover, these differences would probably disappear if we could identify the usual service drop outs. A benefit-cost analysis by the National Crime Prevention Centre later this year will investigate the cost-efficiency questions.

These topics are reviewed...

### A Note on Statistics

- Number Needed to Treat
- Risk Ratio and Percentage Difference
- Standardized Mean Difference
- Cox Regression
- Moving Beyond Group Differences

### Research Questions & Empirical Answers

- Are Recipients of MST Less Likely to be Convicted of Offences Than Youth who did not Receive MST?
  - Conviction for At Least One Offence During the Follow-up
  - Conviction For Any Type of Offence, Four Follow-up Periods
  - Survival Curves, Four Follow-up Time Periods
- Do Recipients of MST who Offend do so after a Longer Period?
- Are Recipients of MST Less Likely to be Sentenced to Youth Custody?
- Do Recipients of MST Spend Less Time in Custody?
- Are Recipients of MST Re-convicted of Fewer Offences than Youths who did not Receive MST?
- Are Those who Drop out of MST More Likely to Offend Than Program Completers?
  - MST Drop-outs and MST Completers
  - MST Drop-outs and Usual Services
  - MST Completers and Usual Services
- Do Recipients of MST Commit Less Serious Offences?
- Will the Cost of the MST Intervention be Recouped by Savings to the Correctional System?
- Will the MST Intervention Reduce Problems Measured by Psychological Testing?

### Summary and Conclusions

### Endnotes



## Results

# F rom the outset of

the project, the intent of the research component has been to answer pre-defined questions, all related to the ability of multisystemic therapy (MST) to reduce recidivism and tax-payer costs associated with criminal offending. In conducting preliminary analyses for the semi-annual update reports, interesting differences were noted in outcome trends depending upon the type of offence. Accordingly, some analyses are conducted with all offences and some are conducted excluding offences against the administration of justice (e.g., breach of disposition). This chapter presents the research questions and the tentative answers suggested by the interim data but it begins with an explanation of the statistical tests for those not familiar with their interpretation.

Consumers of research should be vigilant and judge the usefulness of results against the quality of research design, the validity of measures, and the meaningfulness of statistical associations.

### A Note on Statistics

Every attempt has been made to present statistics in ways that explain their *practical* significance. *Statistical* significance as a threshold for treatment effect is of little assistance in program evaluation and should be abandoned in favour of cost-efficiency analyses and statistics such as the Number Needed to Treat. Moreover, based on the findings here, a replication of this study, or indeed any randomized trial of MST, would have to use a sample of 800 youths for sufficient power (0.8) to detect a treatment effect with a significance test, if one exists. These and other aspects of the statistics used here are discussed elsewhere.<sup>1</sup>

Too much emphasis has been put on “statistical significance” as a threshold for accepting a finding as important. Significant usually means “probably not zero.”

### Number Needed to Treat

In randomized studies such as this, the number needed to treat (NNT) statistic is becoming popular, in great measure because it is a straight forward way to present the magnitude of differences and also because it is amenable to cost efficiency comparisons.<sup>2</sup> In this approach, developed for use in the clinical trials of medical interventions, one can calculate how many individuals must be treated with an experimental intervention to save the life of one patient compared with the control intervention. It can be used when the outcome is any adverse incident, such as a criminal conviction or a custody sentence that can be expressed as a binary variable. The lower the NNT, the stronger the treatment effect compared with the other intervention. A negative NNT means the experimental treatment was followed by a greater proportion of the adverse outcome than was observed in the control group.

The Number Needed to Treat (NNT) statistic explains in a straightforward way the practical implications and cost efficiency of outcome differences between two groups.

As an example, using admission to a custody sentence as the adverse event, an NNT of five means that treating five individuals with a new method prevented a custody sentence for one individual, if those individuals had received a comparison service instead. Fiscal savings can be calculated if the costs of both interventions and the adverse outcome are known. The NNT to break even will vary across jurisdictions depending upon the per diem costs of custody and the relative costs of the two interventions. In this study, most members of both groups were on probation, costs that would therefore be held constant, but many members of the usual services group received additional interventions provided at a cost to the government. Using average length of custody stay per sentence, and presuming no additional cost to the usual services beyond the costs of probation, the NNT to re-coup custody costs ranges from three to nine with a sample average of five. Similar numbers can be calculated for other types of outcome.

### **Risk Ratio and Percentage Difference**

The risk ratio is easy to calculate and can be used to show the percentage difference between the binary outcomes of two groups. A risk ratio of zero means there is a large difference between two groups while a value close to one means there is little difference. A value greater than one mean would mean the control group did better. Here is an example. By September of 2001, 50.3% of the MST group has been convicted of an offence compared with 51.3% of the usual services group. The risk ratio is .981, very close to 1 because the difference is so small. The percentage difference is 1.9. In other words, 1.9% fewer members of the MST group have been convicted so far in the follow-up.

Of special note here, a percentage difference should never be considered independent of the two proportions being compared. For example, the difference between 60 and 80 – 20 percentage points – is 25%, but so is the difference between 3 and 4.

### **Standardized Mean Difference**

Another popular way to describe treatment effect is the effect size which, for continuous data, is usually the standardized mean difference called Cohen's *d*. Its interpretation is fairly subjective, but it permits comparisons across studies. An effect size may look like a correlation co-efficient but it should not be interpreted in the same way. For example, an effect size of 0.5 has a much lower magnitude than a correlation of 0.5. An effect size of 0.5 is equivalent to a Pearson's *r* of 0.24. Put another way, a Cohen's *d* of 0.5 means that the ability to predict recidivism based on knowledge of group membership (control or experimental) is 0.60, or 60%. Effect sizes can range from 0 to infinity but 3.0 is nearly perfect. Cohen has suggested a rough guideline for the interpretation of these effects sizes: 0.2 is small, 0.5 is moderate, and 0.8 is large.<sup>3</sup>

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### **Cox Regression**

Cox regression is used for survival data because it can accommodate the fact that not all members of the sample “fail.” It can be used to determine if group membership (e.g., MST or usual services) is a predictor of time to “failure.” In this case, failure is defined as conviction.

### **Moving Beyond Group Differences**

While no treatment effect can be identified for MST at this point, using aggregate data to dismiss MST as a viable option for Ontario may be to throw out the baby with the bathwater. Future analyses will attempt to determine if there is a type of youth with whom MST is more effective than usual services.

## Research Questions & Empirical Answers

The stakeholders in this project were clear in the research questions. These questions were also derived from previous research on MST.

**? Are recipients of MST less likely to be convicted of offences than youth who did not receive MST?**

At this point in the follow-up, the two groups cannot be statistically distinguished in terms of rates of conviction. The data were organized in several ways,<sup>4</sup> but the conclusion is the same. Some site level differences have been found but readers are cautioned to consider the information in chapter six about referral profile and community context when making comparisons.

At this point in the follow-up, there are no differences between the two groups in rates of convictions.

### Conviction for At Least One Offence During the Follow-up

In terms of convictions for criminal offences, there is no difference between the MST group and the usual services group. When convictions only for administration of justice offences<sup>5</sup> are excluded, as in the top half of Table 2.1, 3% fewer members of the control group have been convicted (43.7%) compared with the MST recipients (45.2%), not a significant difference and one in the opposite direction to that hypothesized. Including all offences in the analysis, the MST group evidences 1.9% fewer convictions. Neither difference, nor any of those at the site level, is significant.

What is the practical significance? It would be necessary to treat 100 youths with MST before the conviction of one youth could be prevented. Lower NNTs were observed in Simcoe County and also in Mississauga when administrative offences are excluded from consideration.

The lowest rate of conviction (all offences) relative to usual services is found in Simcoe County with 12.8% fewer convictions and an NNT of 14.

### Conviction For Any Type of Offence, Four Follow-up Periods

The next way to answer the question is to examine conviction rates on a cross-sectional basis at four time periods. In this analysis, administrative offences are assigned to a separate category when they are the only offence of conviction. At six months, 72.6% of the MST group have not been convicted of any offence, 4.6% have been convicted only of an offence against the administration of justice, and 22.8% have been convicted of at least one criminal offence (and possibly administration of justice offences also). The 29 cases not tracked to six months are excluded from the analysis. Note that the samples decrease in size to the point that, at three years, only the first 82 cases are included.

Table 2.1

**Ever Convicted of Offence in Follow-up Period by Site and Total Sample (n=380)**

	<b>MST</b>	<b>Usual Services</b>	<b>Percentage Difference</b>	<b>NNT</b>
<b>EXCLUDING ADMINISTRATION OF JUSTICE OFFENCES</b>				
Simcoe County	45.7%	50.0%	8.6%	23
London	58.6%	46.4%	(21)	negative
Mississauga	46.9%	52.2%	10.2%	19
Ottawa	25.0%	23.1%	(7.6)	negative
Total Sample	45.2%	43.7%	(3)	negative
<b>ALL OFFENCES</b>				
Simcoe County	47.8%	54.8%	12.8%	14
London	69.0%	58.9%	(14.6)	negative
Mississauga	55.1%	54.3%	(1.5)	negative
Ottawa	27.3%	28.2%	3.2%	111
Total Sample	50.3%	51.3%	1.9%	100

Table 2.2

**Convictions for Any Offence at Four Time Periods, MST Completers and Usual Services**

	<b>MST</b>	<b>Usual Services</b>	<b>Percentage Difference</b>	<b>NNT</b>
Six Months (n=380)	27.4%	28.0%	2.1%	167
One Year (n=323)	44.2%	44.3%	0.2%	1,000
Two Years (n=192)	64.3%	67.0%	4.0%	372
Three Years (n=82)	85.4%	73.1%	(14.4)	negative

These data are presented in Figures 2.1 to Figures 2.4. Again, there are no significant differences. However, at all four points in time, the MST group evidenced higher rates of administration of justice offences, where the youths were convicted of (usually) breach of probation only. The precise reasons for the higher rate of administrative offences among the MST group are not known. One hypothesis is that parental monitoring and communication with the probation officer was improved by the MST intervention. This could result in proactive action on the part of the probation officer to breach because he or she has more information about the youth.

Applying the NNT technique to these cross-sectional data, at six months the NNT is 167 (Table 2.2). In other words, it is necessary to treat 167 youths with MST to prevent the conviction of one youth

within six months. The 12-month figures are exactly the same (44.2% MST, 44.3% usual services) so the NNT is extremely high. At the two-year point, the MST group is 4% less likely to have been convicted, but the NNT is high at 372. At the three year point (n=82), the NNT is negative because the MST group so far was more likely to be convicted (85.4%) than the members of the usual services group (73.1%). We will continue to monitor these trends.

### **Survival Curves, Four Follow-up Time Periods**

The next way to answer the question posed above is presenting the data as a survival curve (Figures 2.5 to 2.12). In this approach, 100% of the youth begin at “time zero” with no convictions, in the top left corner of the graph. Should a youth be in custody at discharge, the tracking begins when that custody sentence is over. The youth who are convicted in the first month cause the line to drop. Those convicted during the next month are added to this group and cause another drop. In other words, the position of the line at six months represents the cumulative total of all youths who have been convicted at least once since time zero. A treatment effect for MST would be demonstrated by a line for the MST higher than the line for the usual services group, meaning fewer convictions. Reference to the graphs shows no treatment effect in any of the four time periods. As with most analyses presented here, outcomes differ among the sites (see Appendix B for survival curves).

#### **Six Months**

By September 2001, the six-month curve represents 380 of the 409 youth. With 93% of the sample, the trends in Figures 2.5 and 2.6 will change little with the addition of the remaining 29 cases. In the six-month graphs, the two lines are very similar. Excluding the administrative offences, the six months end with 22.3% of MST youth convicted compared with 25.1% of the usual services group, a non-significant difference of 2.8 points in the favour of the MST group (risk ratio of .89 and a difference of 11.2%). The NNT is 36. Including administrative offences, as in Figure 2.6, the margin narrows and the six-month period ends with 27.4% of the MST group convicted compared with 28% of the usual services as reported above for a 2.1% difference and an NNT of 167 (see Table 2.2). In both cases, Cox regression does not identify treatment type as a predictor of conviction.

#### **Twelve Months**

About three quarters of the sample have been tracked at least 12 months. Again, the two lines are separate but not far apart (Figure 2.7 and 2.8). Excluding administrative offences, over one third have been convicted, 37.2% of the MST group and 39.7% of the usual services group (risk ratio .937, 6.3% difference, NNT 40). With all offences considered, the difference is smaller (44.2% and 44.4%, risk ratio .995, 0.2% difference, NNT 1,000). In both cases, Cox regression does not identify treatment type as a predictor of conviction.

#### **Two Years**

In the two-year graphs (Figures 2.9 and 2.10), with 47% of the sample, there is no clear trend because the lines cross at several places.

#### **Three Years**

Only 82 youth have been tracked for three years. At 20% of the sample, the trends in Figures 2.11 and 2.12 are provisional and caution should be exercised in interpretation. Also a factor, these 82 cases are the first of those referred and this group, or the services received, may differ from later cases. The three year data at this early point show the usual service group performing better in the long term.

Figure 2.1  
**Conviction at Six Months Post-Discharge, MST and Usual Services Groups (n=380)**

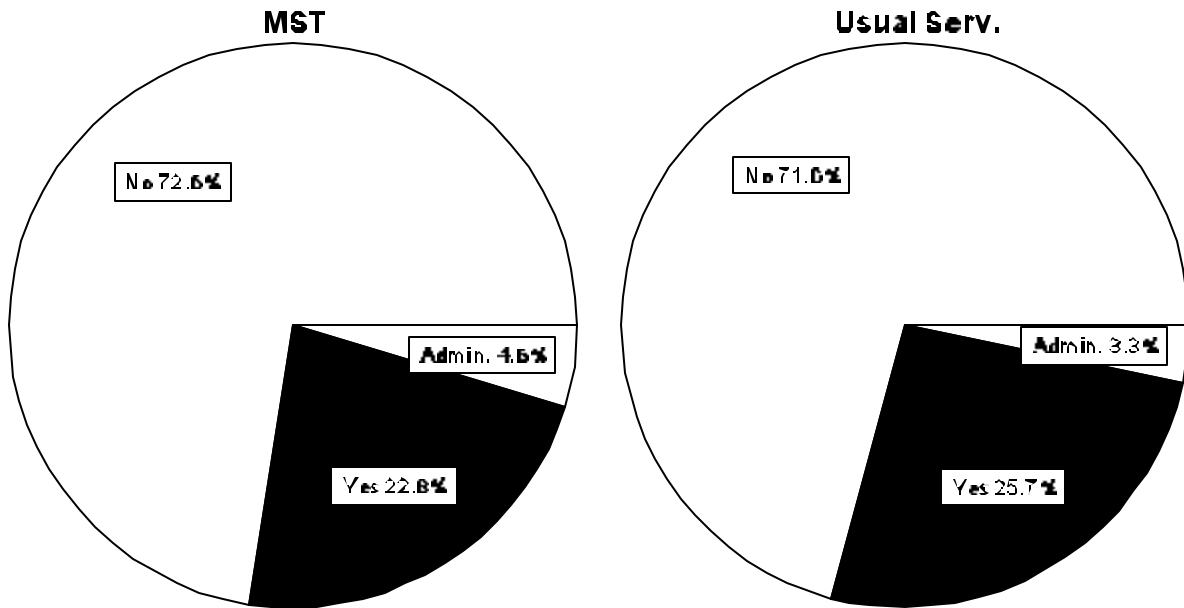


Figure 2.2  
**Conviction at One Year Post-Discharge, MST and Usual Services Groups (n=323)**

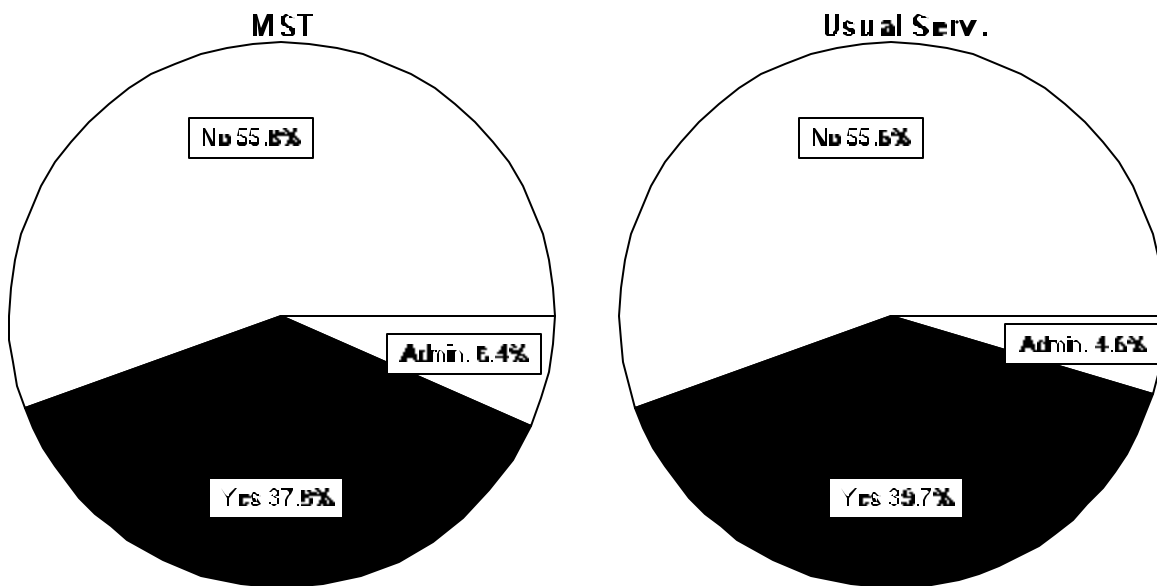


Figure 2.3

**Conviction at Two Years Post-Discharge, MST and Usual Services Groups (n=192)**

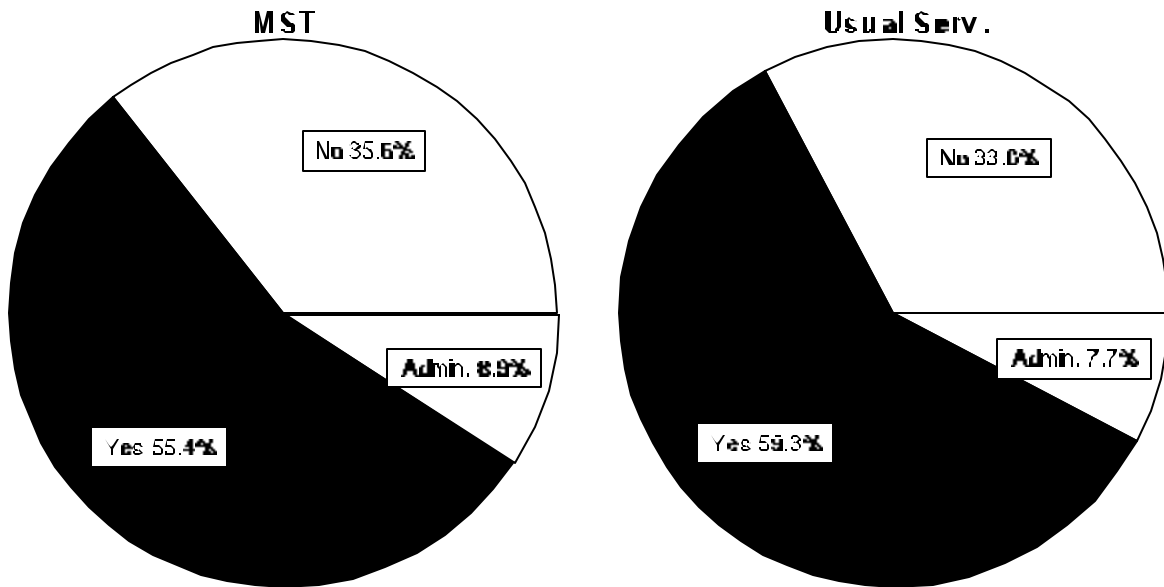


Figure 2.4

**Conviction at Three Years Post-Discharge, MST and Usual Services Groups (n=82)**

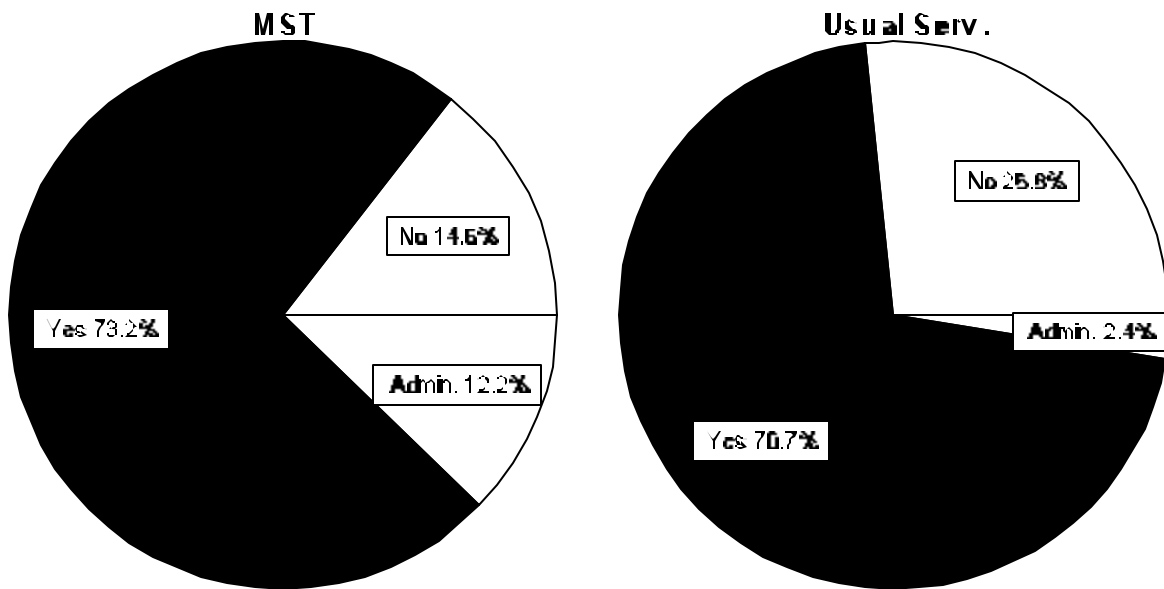


Figure 2.5  
**Six Months Survival Data, Excluding Administration of Justice Offences (n=380)**

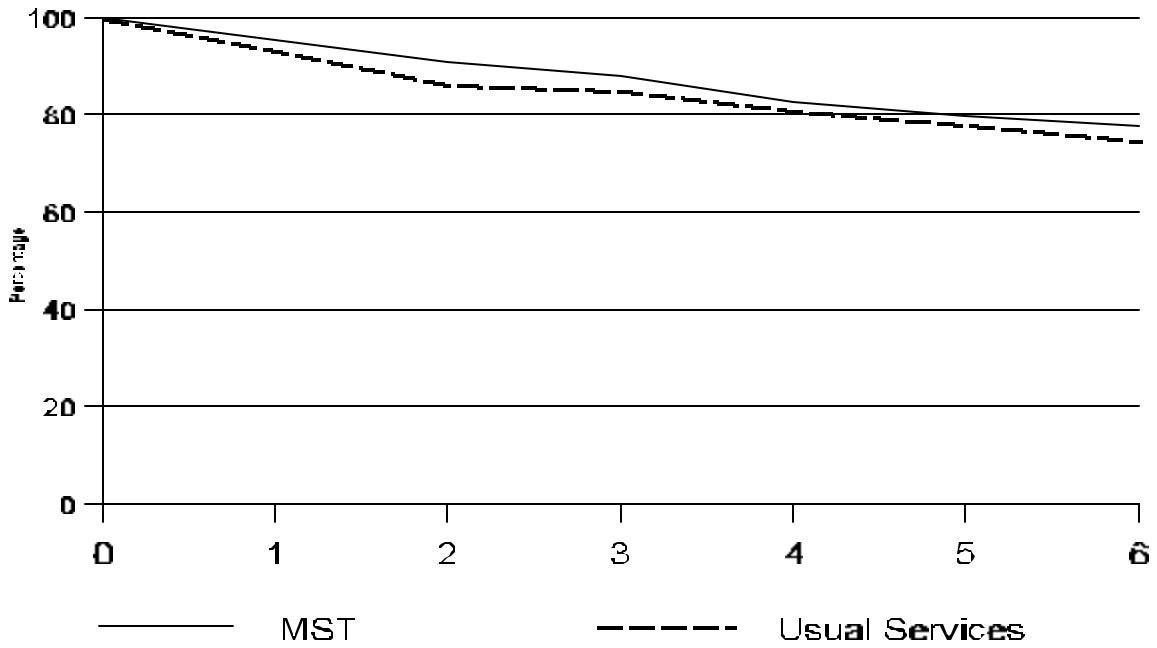


Figure 2.6  
**Six Months Survival Data, All Offences (n=380)**

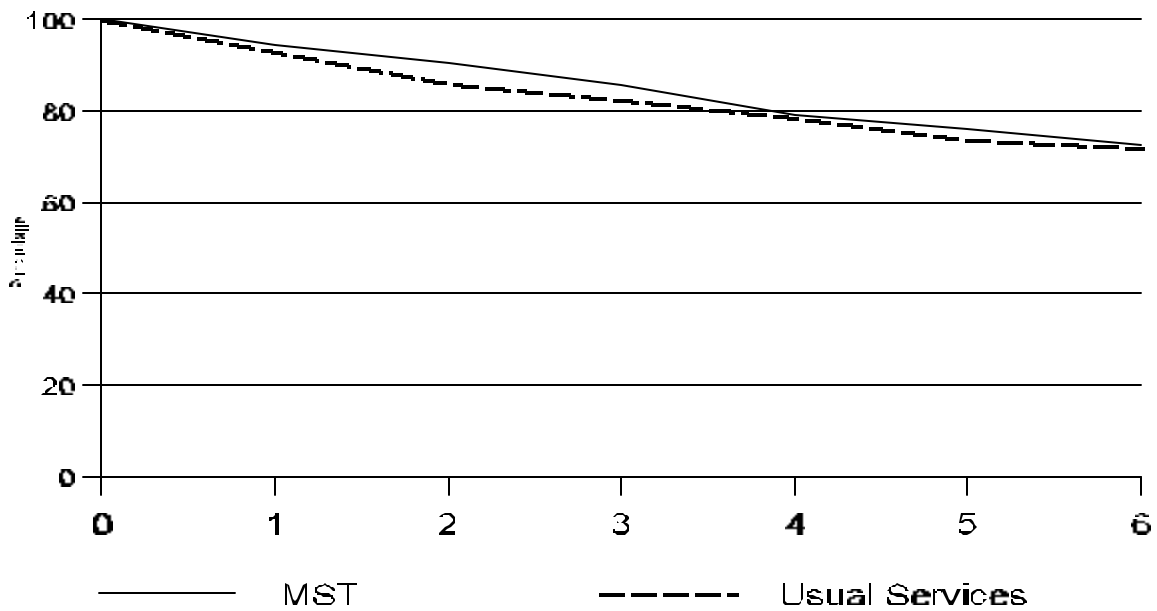


Figure 2.7  
**One Year Survival Data, Excluding Administration of Justice Offences (n=323)**

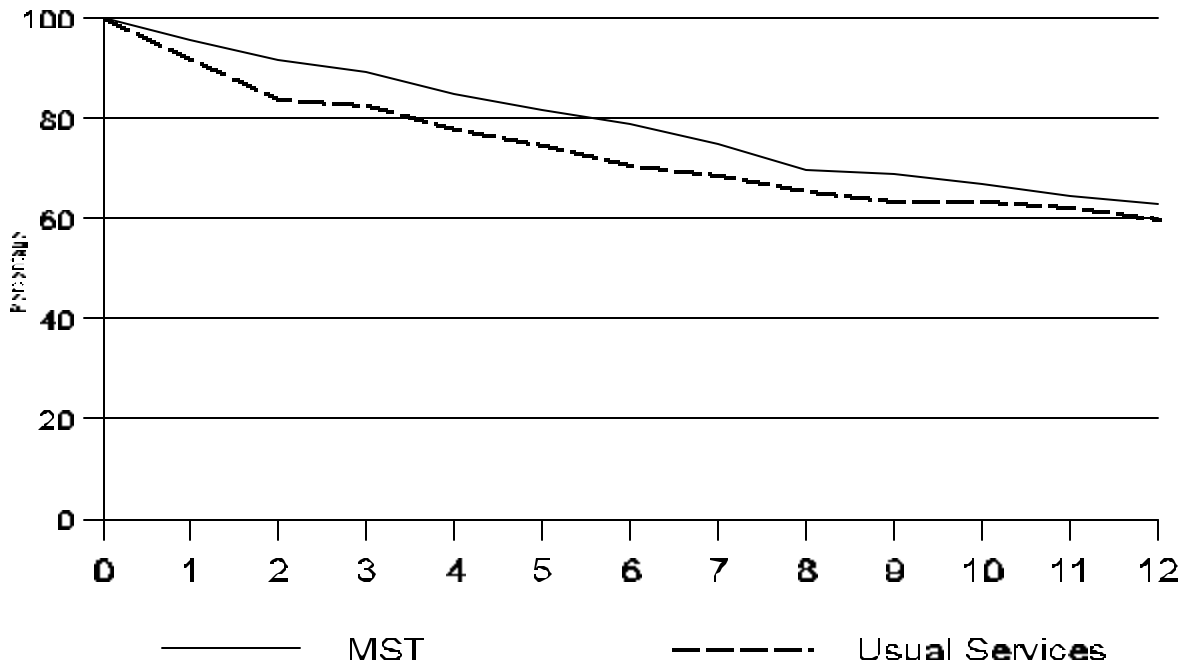


Figure 2.8  
**One Year Survival Data, All Offences (n=323)**

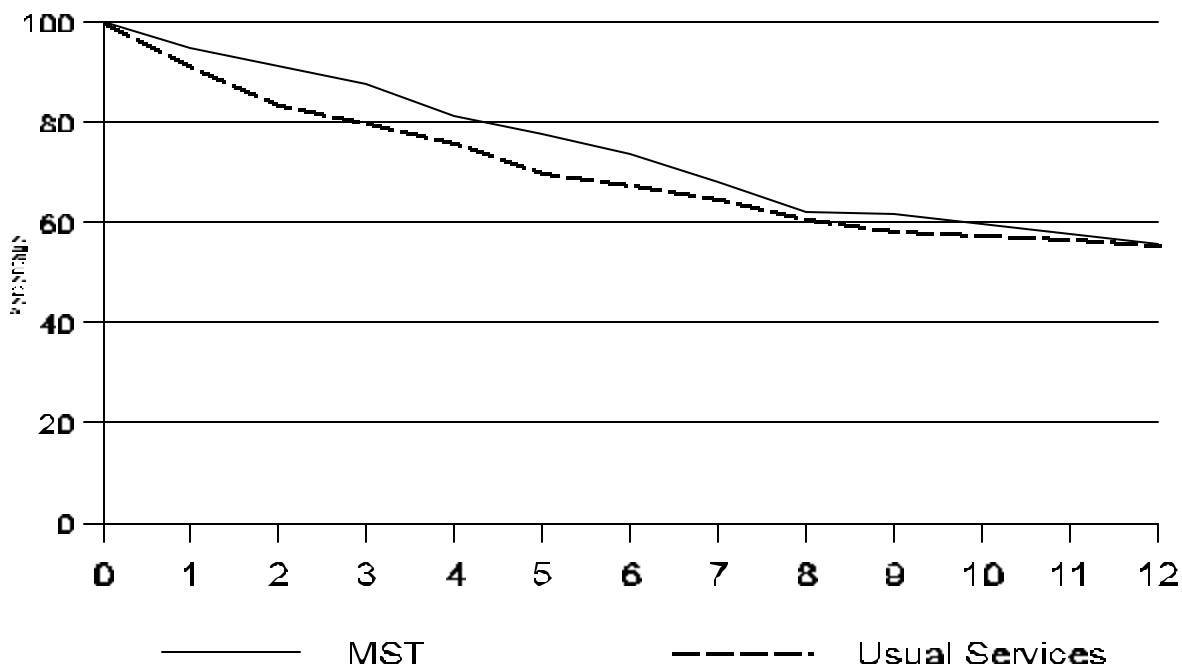


Figure 2.9  
**Two Year Survival Data, Excluding Administration of Justice Offences (n=192)**

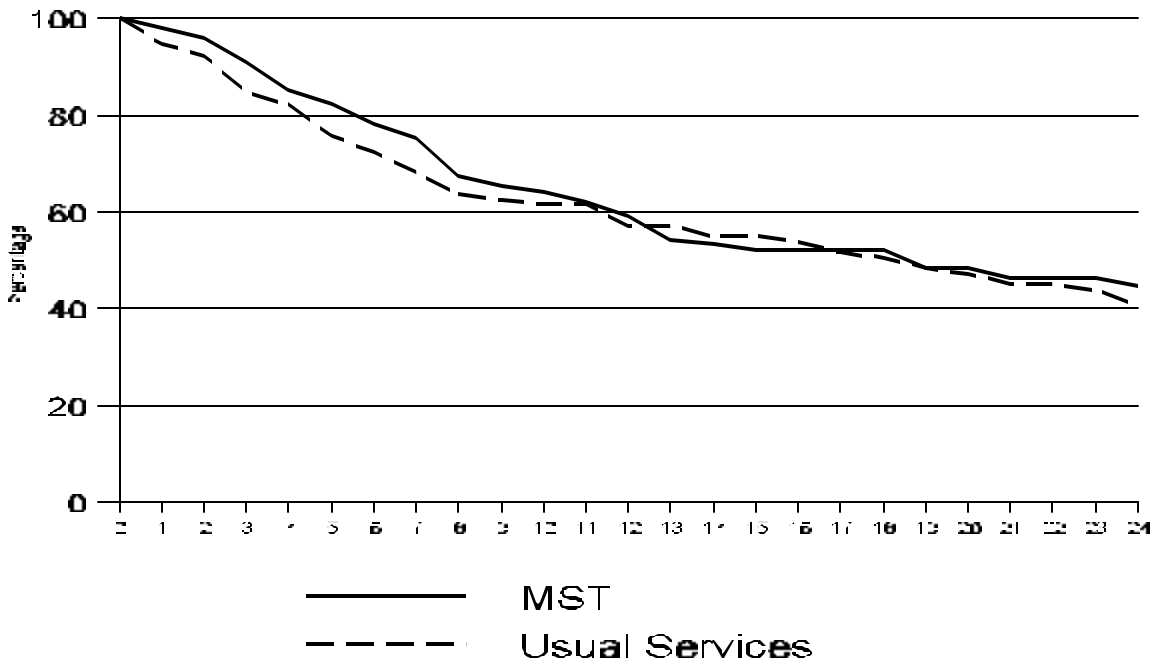


Figure 2.10  
**Two Year Survival Data, All Offences (n=192)**

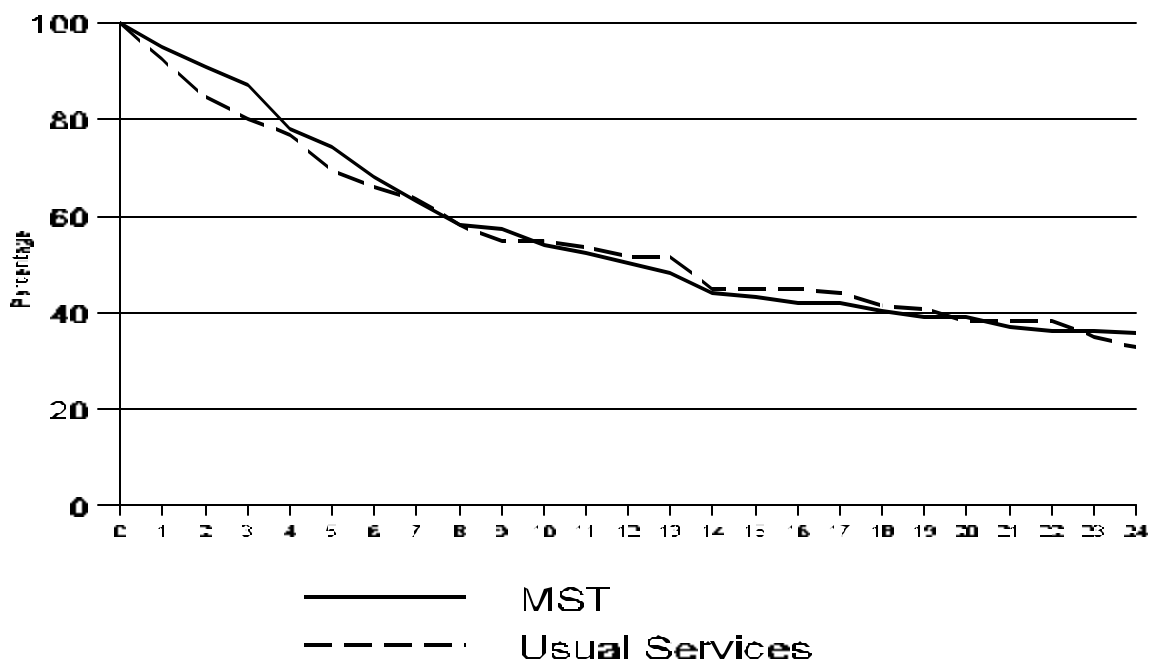


Figure 2.11  
**Three Year Survival Data, Excluding Administration of Justice Offences (n=82)**

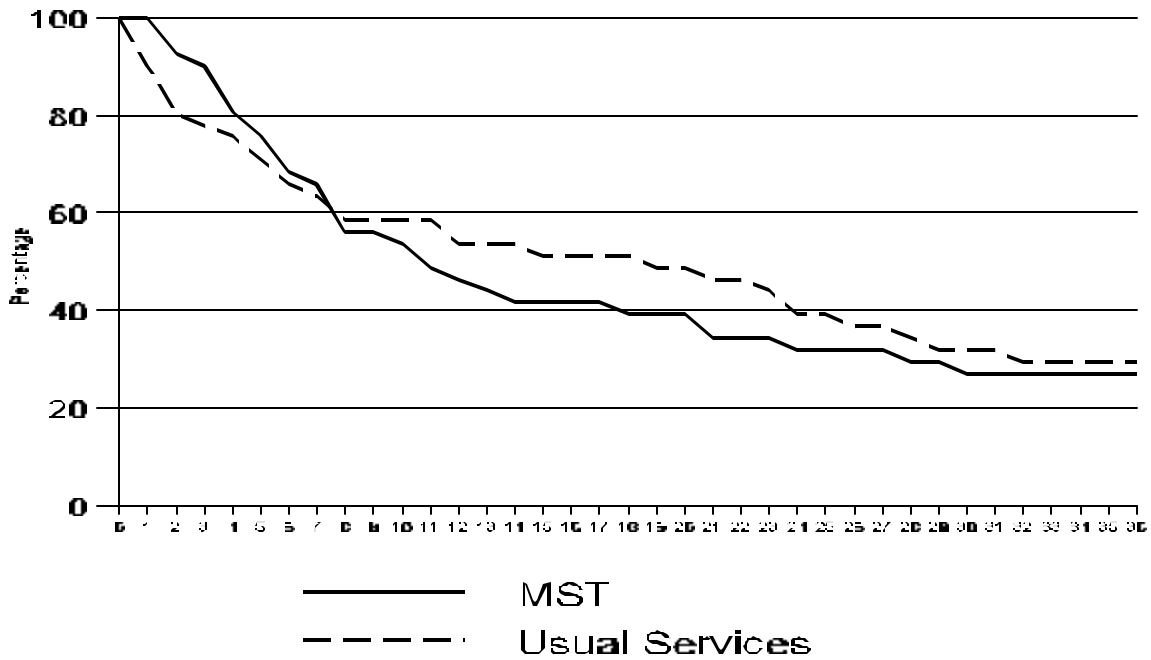
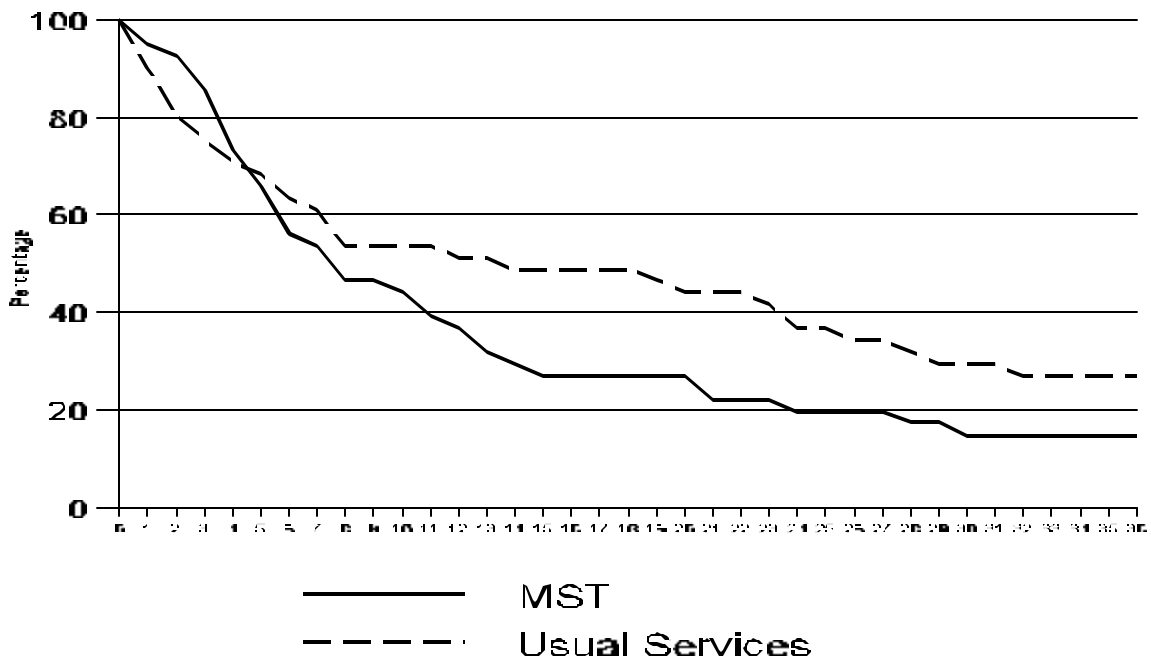


Figure 2.12  
**Three Year Survival Data, All Offences (n=82)**



**? Do recipients of MST who offend do so after a longer period than youth who did not receive MST?**

“No.” The differences were not statistically significant but the MST group was on average convicted sooner, after 210 days compared with 230 days for control. Excluding the administration of justice offences, the average is 222 days for the MST group and 241 days for the usual services group. The average number of days to admission to custody was 234 for the MST group and 246 for the usual services group. Site differences are tabled in Appendix B.

The data are examined another way in Figure 2.13 where the similarities between the two groups are evident. There is a slight tendency for the MST youth to be convicted sooner and the usual services group to be convicted later. We also see that most youths who “fail” do so within the first year of the tracking period, at least so far. However, the rate of conviction is fairly steady over the follow-up period, as illustrated in Figure 2.14. There, it is evident that a drop-off in offending has not occurred at the aggregate level. About one third of the youth registered at least one conviction in the first six months of the follow-up and about a quarter were convicted at least once between six months and one year after discharge. Some youths registered a conviction in both periods and some were convicted in neither.

**? Are recipients of MST less likely to be sentenced to youth custody?**

The answer is “no.” So far in the follow-up period, 36.5% of the MST group have been sentenced to youth custody while the comparable figure for the usual services group is 36.6%, a difference so small that the NNT is 1,000. As shown in Table 2.3, there are some (non-significant) differences by site, most pronounced in Simcoe County where with an NNT of 12 and a 17.9% difference. For every 12 youth treated with MST in Simcoe County, the incarceration of one youth was prevented.

There is no difference in the rate at which the two groups have been sentenced to custody during the follow-up.

There were some notable differences in the type of custody sentence (Table 2.4). The MST recipients were more likely to be sentenced to at least one period of *open* custody (31.5% versus 23%). However, they were less likely to be sentenced to at least one period of *secure* custody (16.2% versus 25.7%). These differences were significant, albeit with very weak, Chi-squares. Members of the MST group were significantly more likely to be sentenced to an open custody term than the usual services group ( $P^2 = 3.1$ ,  $df=1$ ,  $p < .04$ ). Conversely, members of the usual services group were more likely to be sentenced to at least one term of secure custody ( $P^2 = 4.6$ ,  $df=1$ ,  $p < .016$ ). With the smaller samples, no significance was found at the site level. However, the pattern holds. In each site, the rate of sentencing to open custody was higher and (with the exception of Ottawa) the rate of sentencing to secure custody was lower.

Figure 2.13  
**Time to Conviction After Discharge Grouped in Quarters, All Offences**

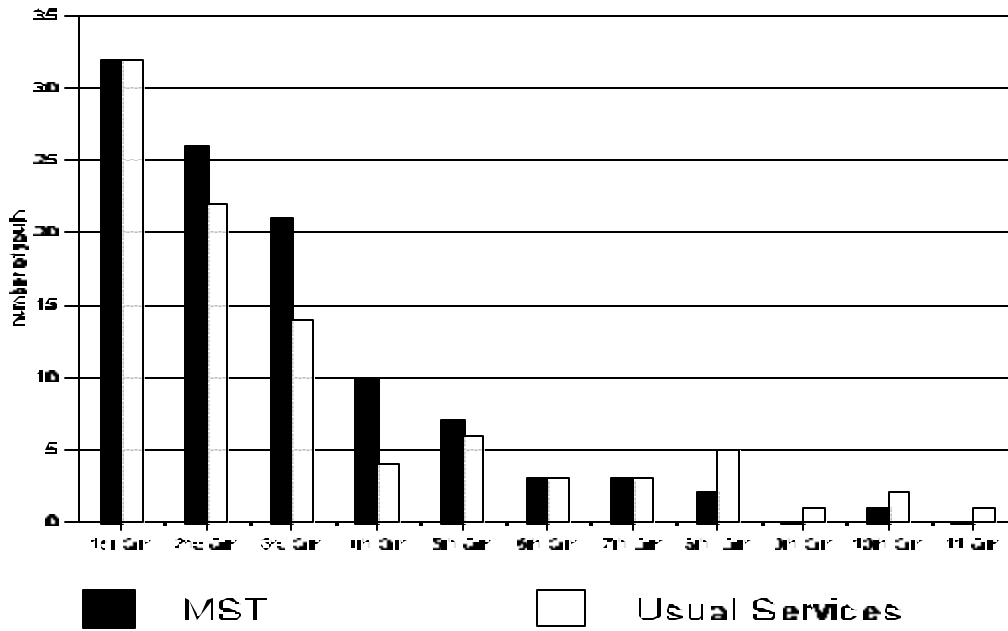


Figure 2.14  
**Rates of Conviction During Four Follow-up Segments, All Offences**

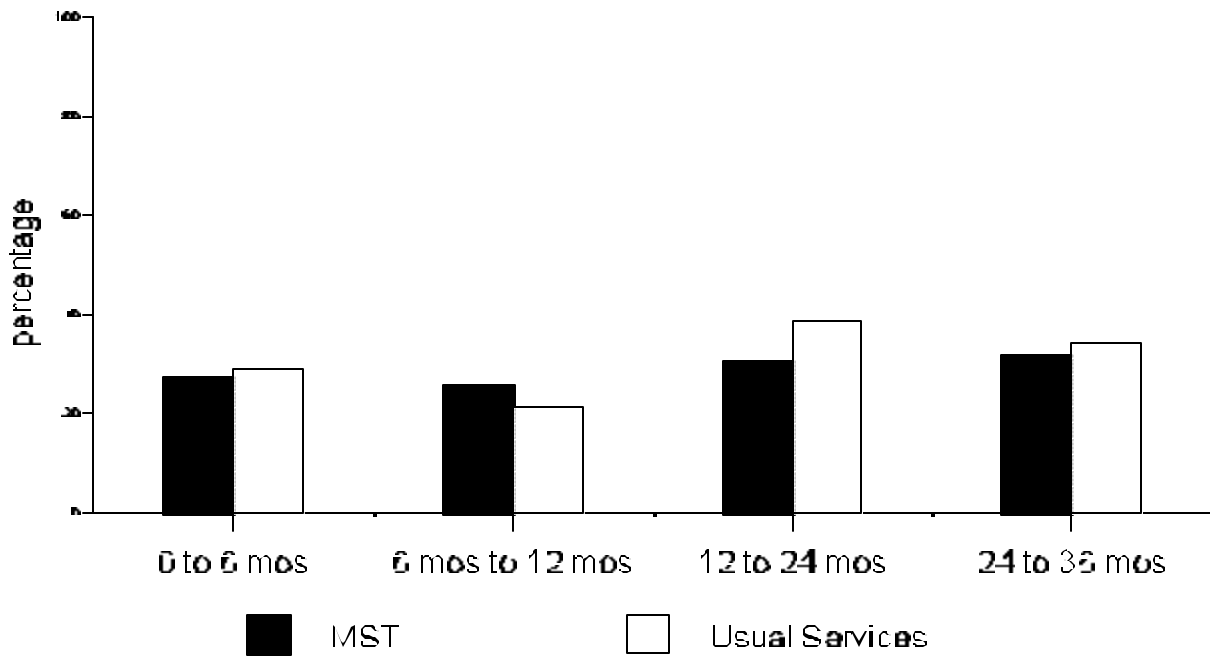


Table 2.3

**Ever Sentenced to Custody in Follow-up Period by Site, MST and Usual Services by Site**

	<b>MST</b>	<b>Usual Services</b>	<b>Percentage Difference</b>	<b>NNT</b>
Simcoe County (n=88)	39.1%	47.6%	17.9%	12
London (n=114)	44.8%	39.3%	(12.3)	negative
Mississauga (n=95)	40.8%	41.3%	1.2%	200
Ottawa (n=83)	18.2%	15.4%	(15.4)	negative
Total Sample (n=380)	36.5%	36.6%	0.3%	1,000

Table 2.4

**Rates of Sentencing to Open and Secure Custody, by Site and Entire Sample**

	<b>MST</b>		<b>Usual Services</b>	
	<b>Open</b>	<b>Secure</b>	<b>Open</b>	<b>Secure</b>
Simcoe County (n=88)	30.4%	21.7%	16.7%	31.0%
London (n=114)	39.7%	15.5%	35.7%	28.6%
Mississauga (n=95)	34.7%	20.4%	21.7%	34.8%
Ottawa (n=83)	18.2%	6.8%	12.8%	5.1%
Total Sample (n=380)	31.5%	16.2%	23%	25.7%

Members of the MST group were significantly more likely to be sentenced to a term of open custody and significantly less likely to be sentenced to a term of secure custody. This pattern was observed in three sites.

An important finding was the high rate of custody sentences for administrative offences alone, true of 13.7% of the MST group and 10.3% of the usual services group, or 2,187 open custody days and 1,088 secure custody days. In such cases, a youth will usually be incarcerated for breach of a technical condition of probation (e.g., curfew violation) but not for any criminal offence. MST youth were sentenced to 7.6 days of open custody and 3.1 days of secure custody on average, solely for administrative offences. The same figures for usual services were 3.8 and 2.6. Combined, almost \$1 million has been spent so far for custody costs alone, excluding court and probation costs.

So far, 13.7% of the MST group and 10.3% of the usual services group have been sentenced to custody solely for an administrative offence, for an approximate cost of \$933,000.

**? Do recipients of MST spend less time in custody than those who do not receive MST?**

There are no statistically significant differences and many of the differences are in the opposite direction to that hypothesized (see Table 2.5). In most cases, the MST group was sentenced to longer terms in custody, true of total custody days, total open custody days, and secure custody days when non-incarcerates were excluded from the analysis. The trend of adult sentences, now an issue for 87 youths who are over 18 years of age, will be tracked further before any firm conclusions can be made.

In total so far, this group of 380 youth have been sentenced to 10,582 days of open and 9,114 days of secure custody for an estimated cost of over \$5.8 million.

**? Are recipients of MST convicted of fewer offences than youth who did not receive MST?**

There are some non-significant differences, as can be seen in Table 2.6. MST recipients were prosecuted fewer times on average and were re-convicted of fewer offences on average than those who received usual services, when all 380 youth are included in the analysis. Differences are strongest in the category of breach of disposition. There were also some site differences, as tabled in Appendix B.

The total number of prosecutions may be the best indicator of recidivism used here (see Figure 2.15). This variable is measured at the ratio level of measurement. It describes the number of times each youth has an entry on CPIC with a conviction for one or more offence. In the MST group, 48.7% have never been convicted of any type of offence so far in the follow-up and the same figure for the usual services group is 49.7% (this is the same variable dichotomized in Table 2.2). The number of offences of conviction is illustrated in Figure 2.16.

**? Are those who drop out of MST more likely to be convicted than program completers?**

“Yes,” the MST drop outs performed poorly compared with both the MST completers and the usual services group. In total, 41 MST cases (19%) were classified as drop outs, leaving the program prematurely for reasons that included withdrawal of consent to MST by the family, youth going into custody, family and/or youth moving from the jurisdiction, and the youth being AWOL. In addition, one youth was taken

Table 2.5  
**Average Sentenced Days in Youth Custody**

	<b>MST</b>	<b>Usual Services</b>
<b>ALL YOUTH</b>		
Total Youth Custody Days	54 days	50 days
Open Custody Only	33 days	23 days
Secure Custody Only	21 days	27 days
Adult Incarceration (n=87)	6 days	11 days
<b>ONLY THOSE SENTENCED TO CUSTODY</b>		
Total Youth Custody Days	149 days	134 days
Open Custody Days	104 days	98 days
Secure Custody Days	129 days	106 days
Adult Incarceration (n=9)	55 days	118 days

Table 2.6  
**Average Number of Convictions and Prosecutions in Follow-up Period**

	<b>Mean of MST</b>	<b>Mean of Usual Services</b>
<b>INCLUDING NON-OFFENDERS</b>		
Breach of Disposition Convictions	.32	.38
Other Administrative Offences	.15	.21
Convictions for Non-Administrative Offences	.98	1.07
Total Offences of Conviction (All Types)	1.48	1.79
Total Prosecutions (All Offences)	.89	.95
<b>EXCLUDING NON-OFFENDERS</b>		
Breach of Disposition Convictions	1.5	2.0
Other Administrative Offences	1.5	1.5
Convictions for Non-Administrative Offences	2.2	2.4
Total Offences of Conviction (All Types)	2.9	3.6
Total Prosecutions (All Offences)	1.7	1.9

Figure 2.15

**Number of Prosecutions (Any Offence) in the Follow-up by Type of Intervention**

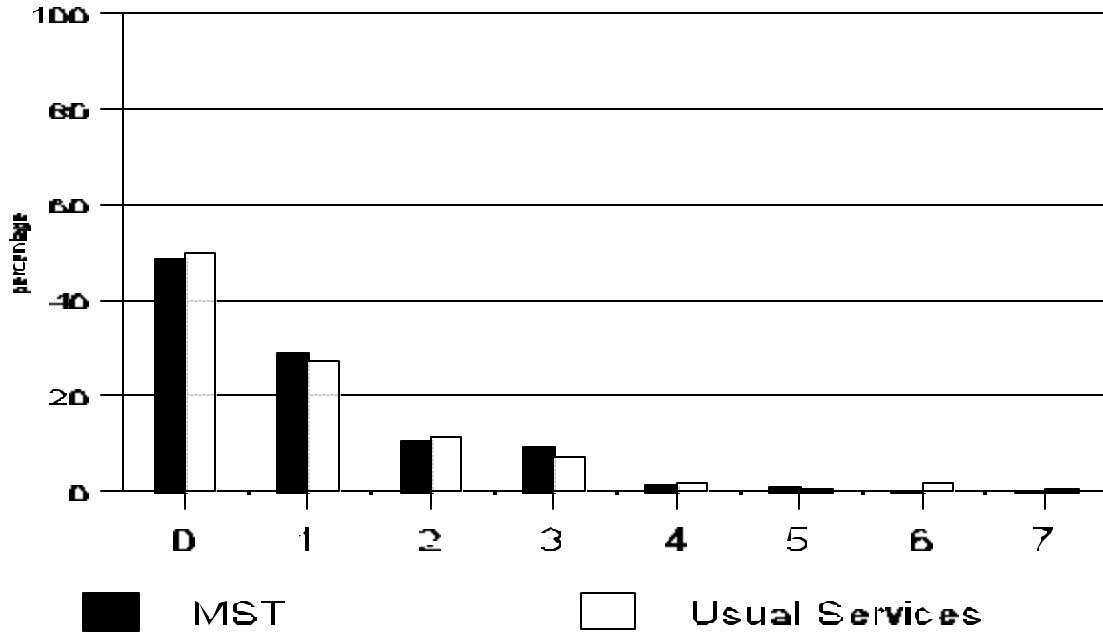
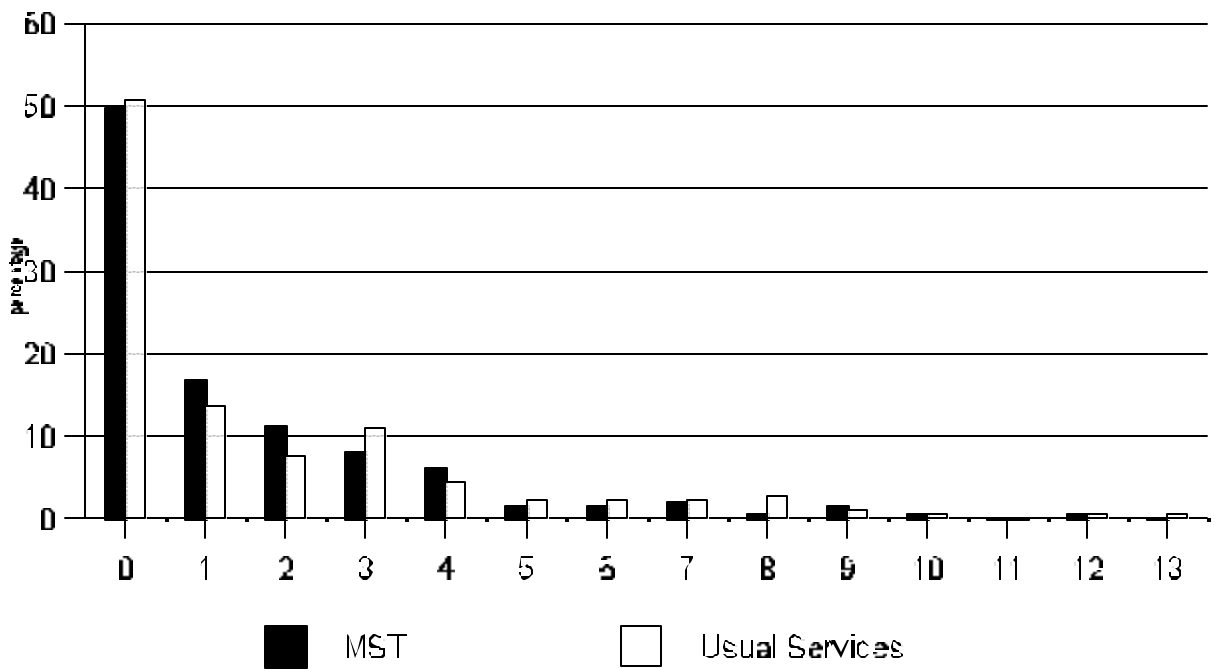


Figure 2.16

**Number of Offences of Conviction in Follow-up Period by Type of Intervention**



into the care of the Children's Aid Society and one youth was placed in a residential program because of the severity of his psychiatric needs. One case closed because the level of violence in the family was inconsistent with a home-based intervention.<sup>6</sup>

There are two notes of caution here. First, we are unable to identify the usual services drop outs. Were this to be possible, a very different picture could emerge because those who dropped out of usual service interventions could also do poorly. Second, no conclusion on this point should be drawn until the entire sample has been tracked for at least two years. As can be seen in Figures 2.17 to 2.18, the six-month data reveal little differences between the three groups, suggesting that caution should be exercised in interpreting the 12 and 24 month trends.

### **MST Drop-outs and MST Completers**

The MST drop outs were significantly more likely to be convicted of a criminal offence during the follow-up (63.4%) than the MST completers (40.4%,  $P^2 = 6.1$ ,  $df = 1$   $p < .014$ ). Significant differences were also noted for number of secure custody days ( $t = 40.8$ ,  $df = 42.7$ ,  $p < .02$ ), number of offences of conviction in the follow-up period including administrative ( $t = 5.7$ ,  $df = 50.6$ ,  $p < .03$ ), number of criminal offence convictions in the follow-up period ( $t = 1.3$ ,  $df = 195$ ,  $p < .04$ ), and total number of prosecutions (all type of offences) ( $t = 4.7$ ,  $df = 53.7$ ,  $p < .01$ ).

### **MST Drop-outs and Usual Services**

It had been hypothesized, based upon the Missouri study (see the fifth chapter of this report) that MST drop-outs would fair less well than MST completers but better than the usual services group. This hypothesis was not borne out. Recipients of usual services generally performed better than the MST drop outs on two outcome measures. Specifically, the MST drop-outs were significantly more likely to be convicted of a criminal offence during the follow-up (63.4%) than the usual services group (43.7%,  $P^2 = 4.5$ ,  $df = 1$   $p < .035$ ). A significant difference was also found for total number of sentenced custody days ( $t = 18.6$ ,  $df = 45.4$ ,  $p < .033$ ).

### **MST Completers and Usual Services**

Excluding MST drop outs, there were three differences between MST completers and the usual services group, specifically in total days of secure custody ( $t = -2.3$ ,  $df = 324$ ,  $p < .024$ ), average number of offences of conviction ( $t = -2.0$ ,  $df = 324$ ,  $p < .042$ ) and average number of administrative offences excluding breach of disposition ( $t = -2.2$ ,  $df = 320$ ,  $p < .043$ ). The NNT statistics (see Tables 2.7 to 2.9) remain high, but are lower than those calculated for the entire sample. However, none of these differences between the MST completers and the usual services groups are statistically significant.



**Do recipients of MST commit less serious offences than those who did not receive MST?**

Not having access to detailed descriptions of the offences committed by the youths in this sample, it is difficult to measure offence seriousness. The figures discussed above about type of custody suggest that sentencing judges may perceive the offences of MST recipients to be less deserving of secure custody sentences. The only other way at our disposal to assess offence seriousness is by considering the most

Figure 2.17  
**Six Month Survival Data with 41 MST Drop Outs, Excluding Administrative Offences (n=380)**

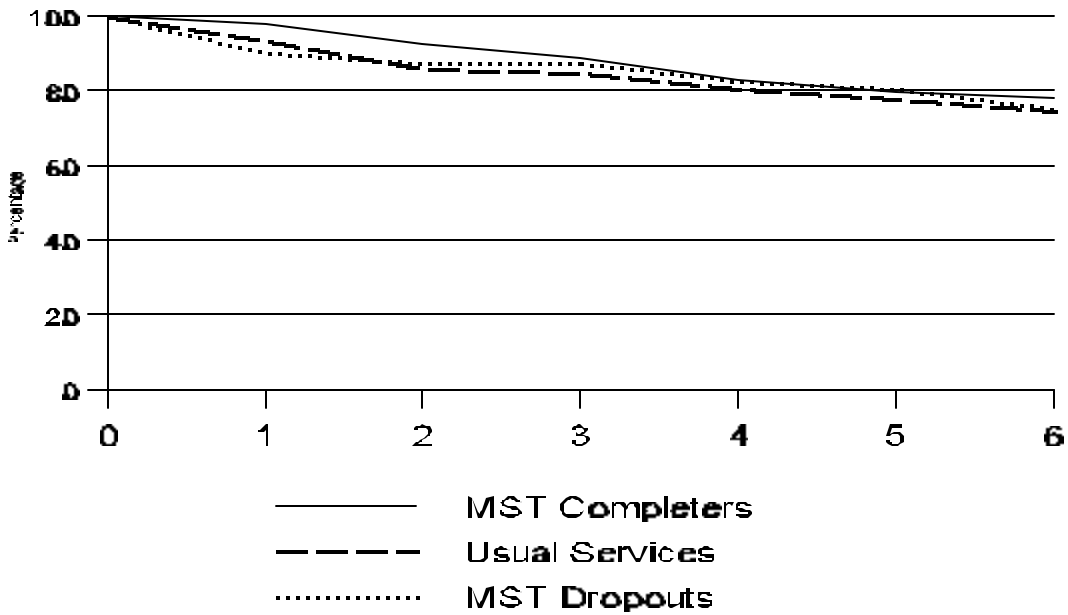


Figure 2.18  
**Six Month Survival Data with 41 MST Drop Outs, All Offences (n=380)**

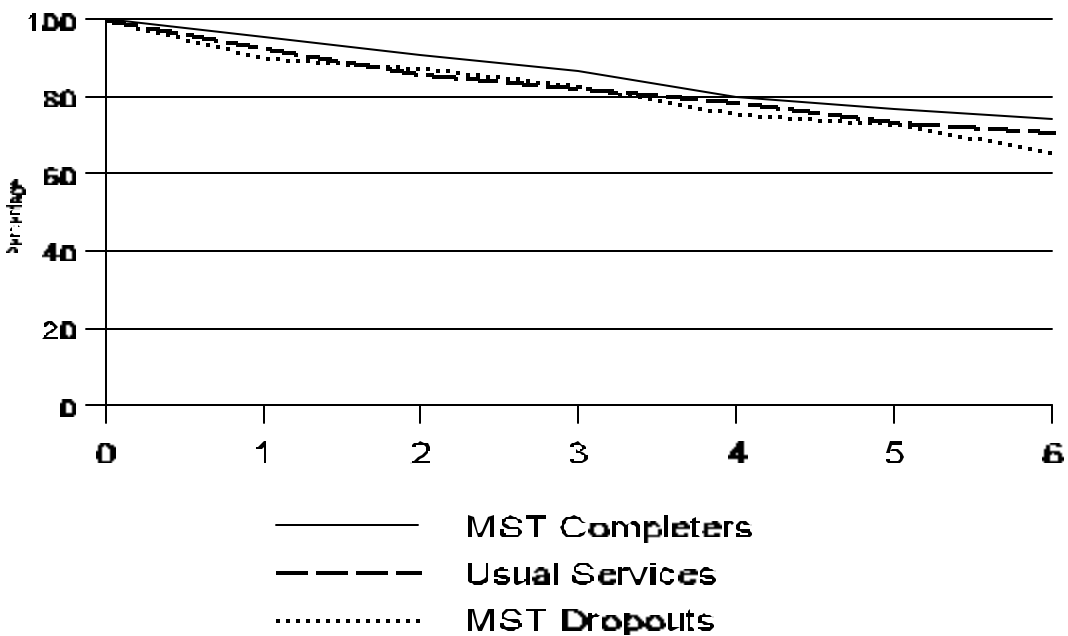


Figure 2.19  
**One Year Survival Data with 35 MST Drop Outs, Excluding Administrative Offences (n=323)**

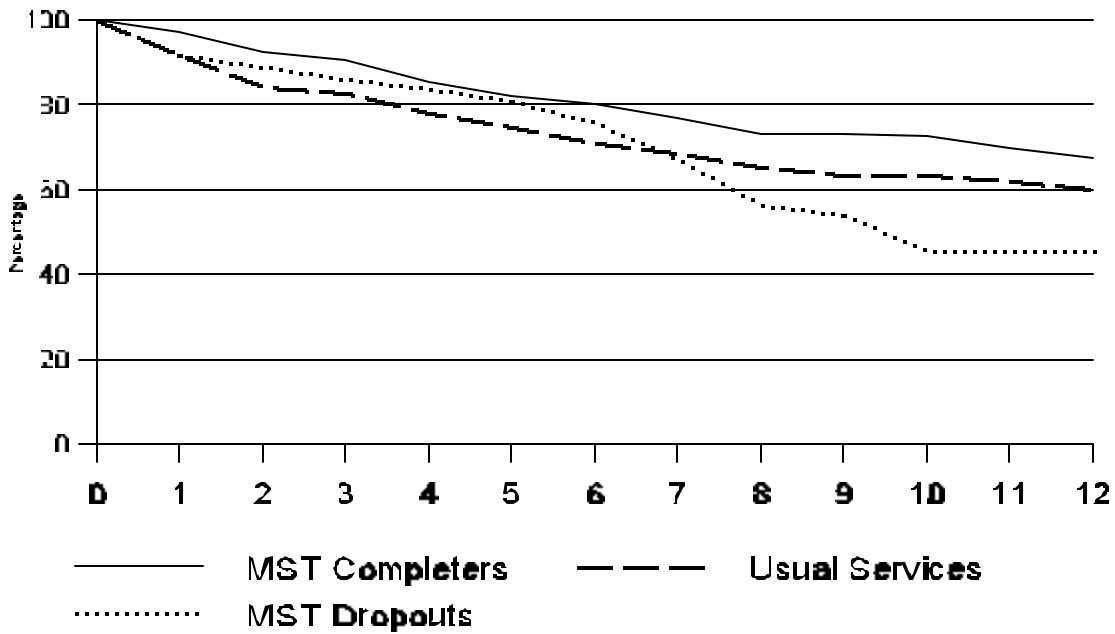


Figure 2.20  
**One Year Survival Data with 35 MST Drop Outs, All Offences (n=323)**

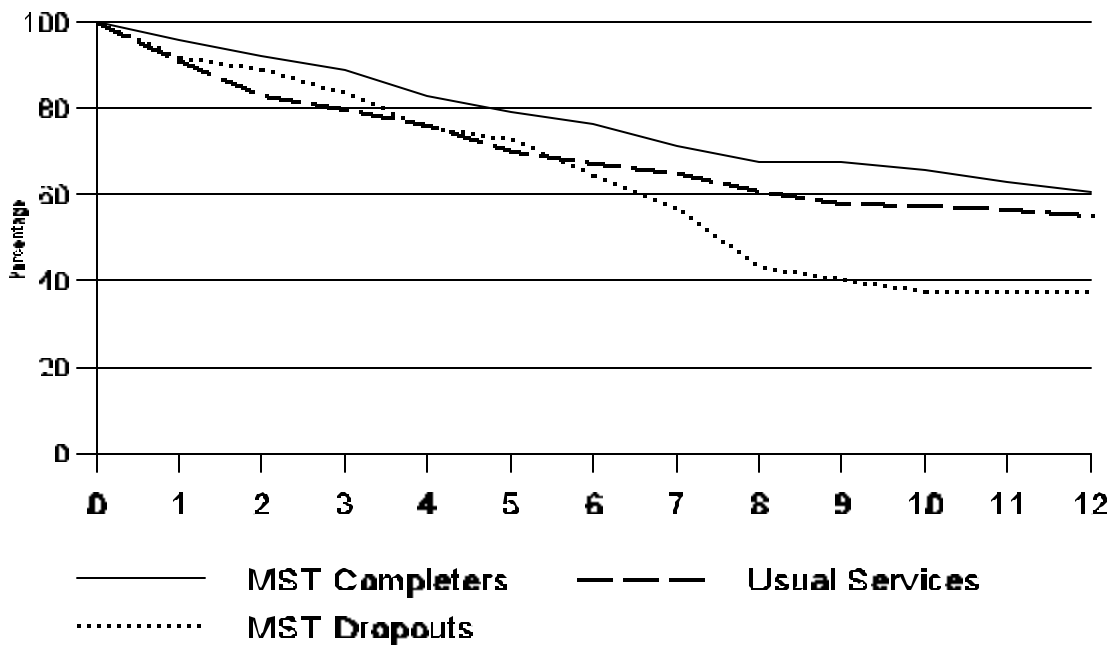


Figure 2.21  
Two year Survival Data with 22 MST Drop Outs, Excluding Administrative Offences (n=192)

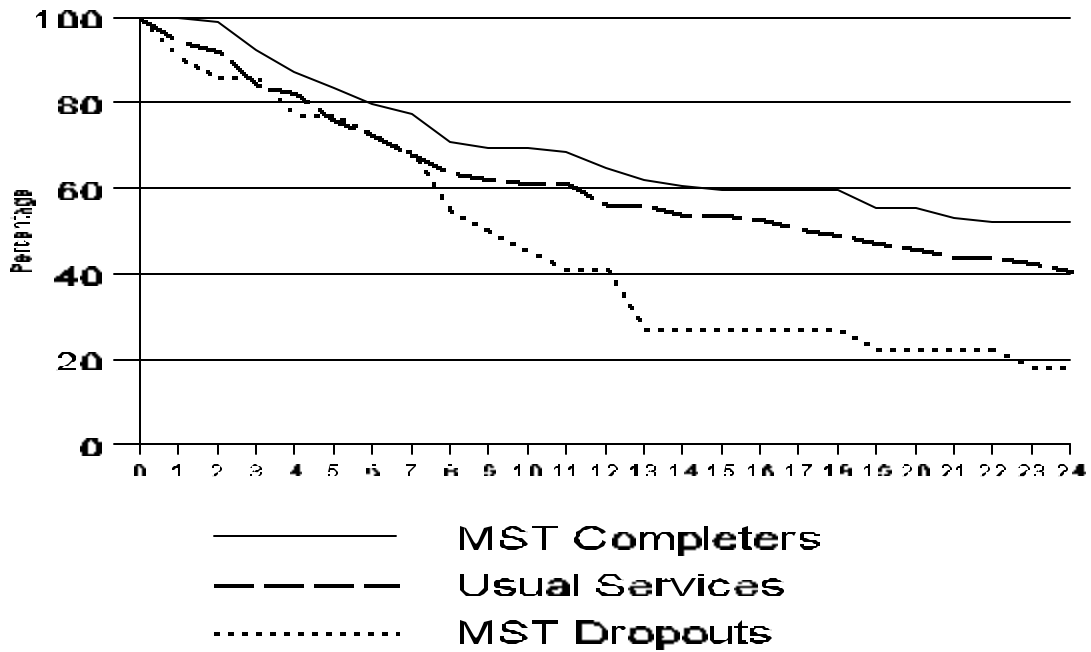


Figure 2.22  
Two year Survival Data with 22 MST Drop Outs, All Offences (n=192)

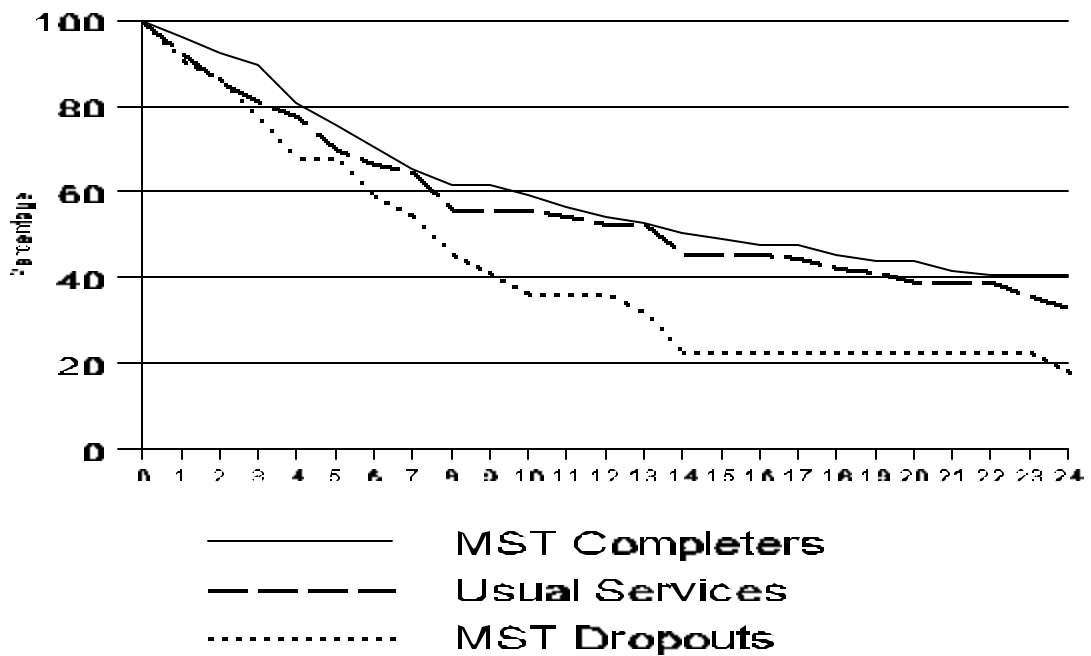


Figure 2.23  
**Six Month Survival Data (Simcoe County) with 13 MST Drop Outs, All Offences (n=88)**

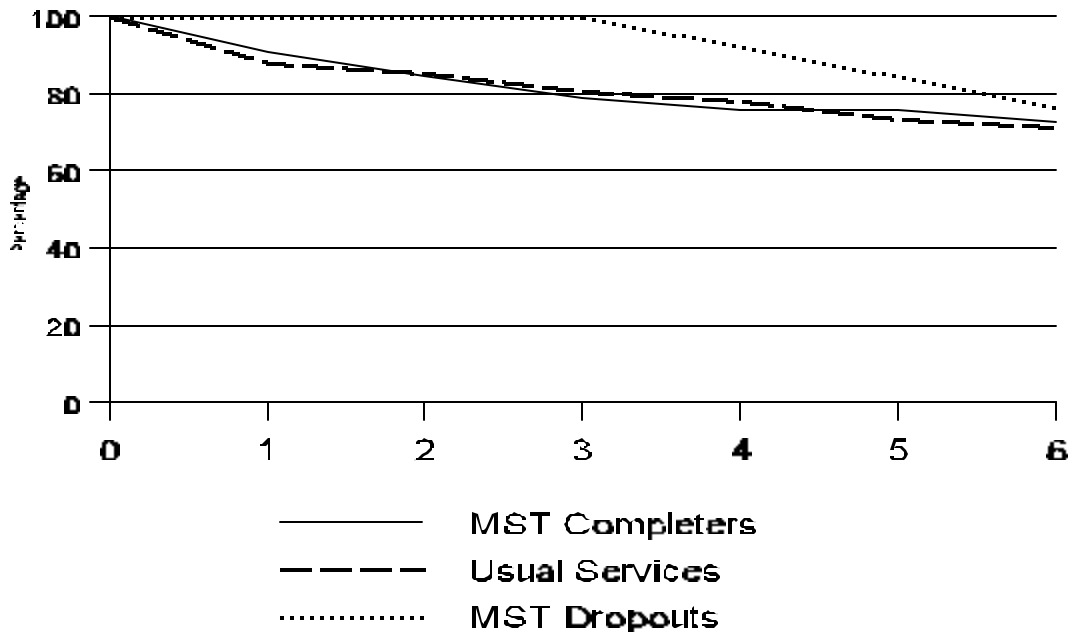


Figure 2.24  
**Six Month Survival Data (London) with 14 MST Drop Outs, All Offences (n=114)**

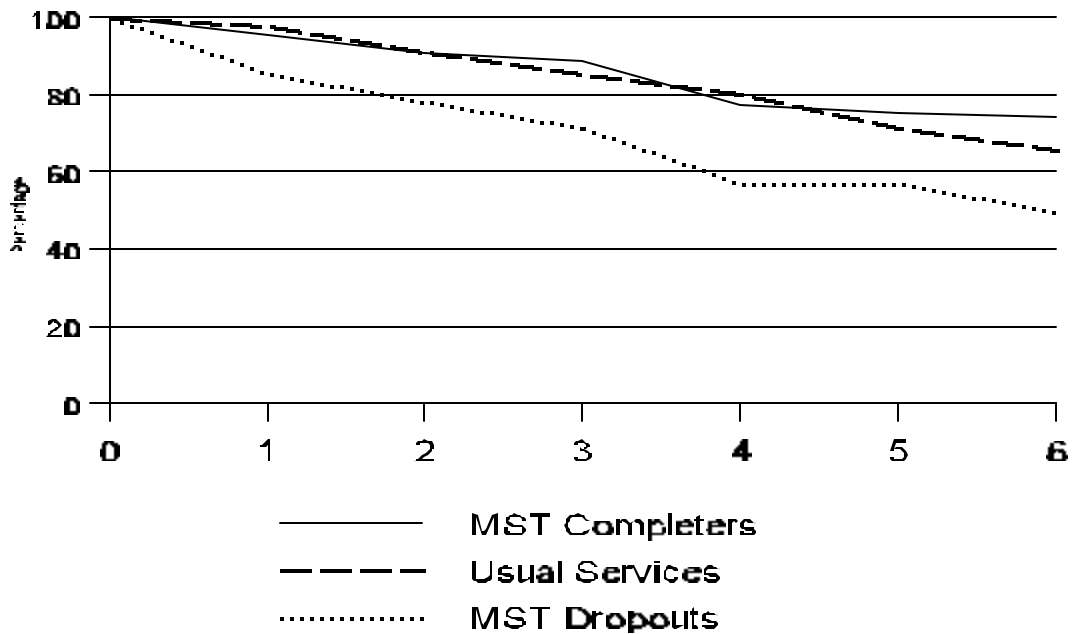


Figure 2.25  
Six Month Survival Data (Mississauga) with 7 MST Drop Outs, All Offences (n=95)

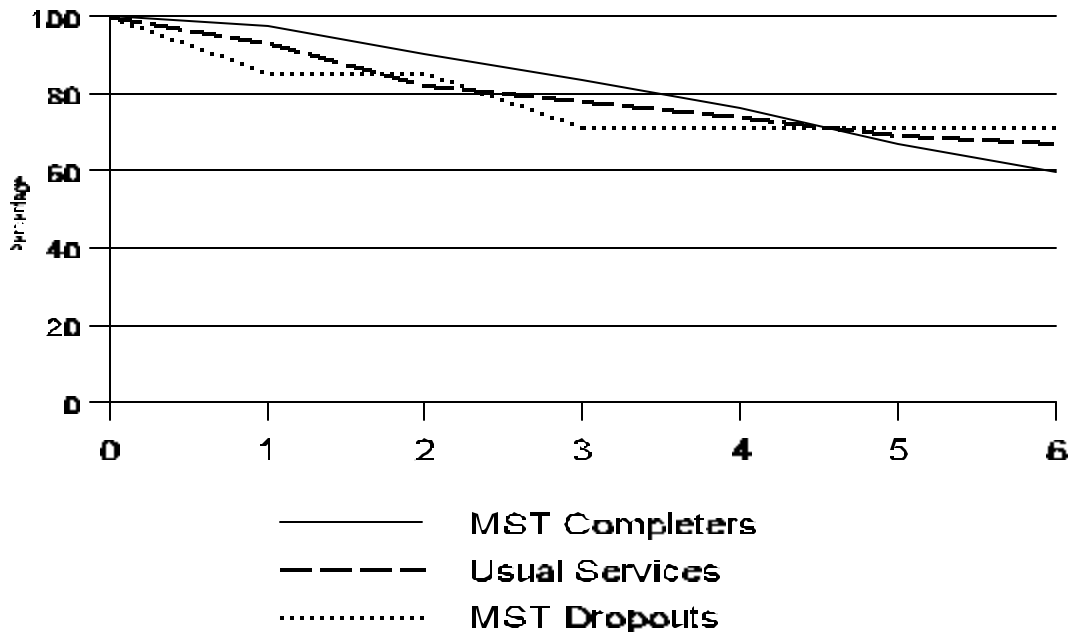
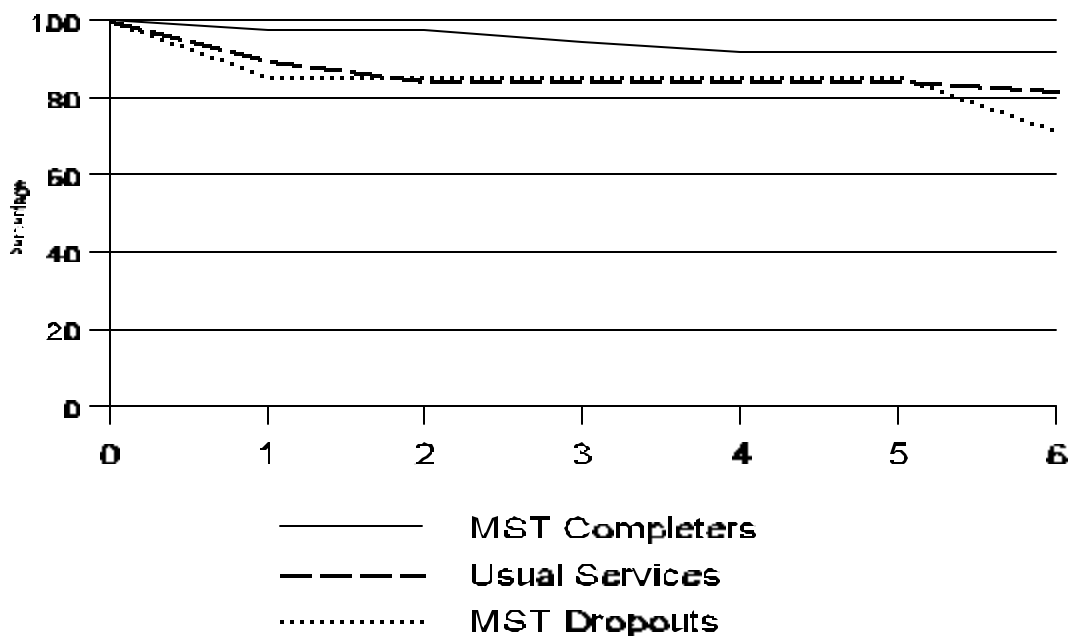


Figure 2.26  
Six Month Survival Data (Ottawa) with 7 MST Drop Outs, All Offences (n=83)



serious offence of conviction.

Using the offence seriousness ranking employed by Statistics Canada, the most serious offence of conviction was recorded for those cases where a conviction had been registered at any point in the follow-up period. These offences were then collapsed into four categories: interpersonal, property, narcotics, and administrative offences only. The “administrative” offence category is made up primarily of breach of disposition and is recorded as the most serious offence only if no other offence of conviction is present. Members of the MST group were slightly more likely to be convicted of an administrative offence in the absence of any other offence. It is also the case that the usual services group was somewhat more likely to be convicted of an interpersonal offence. Generally, however, the differences are not remarkable.

About one third of the sample were sentenced to youth custody terms at some point during the follow-up period so far. As noted above, that was more likely to be true of the MST group where open custody was the sentence and more likely to be true of the usual services group if secure custody was all or part of the sentence. There were some differences across sites (see Table B.6 in Appendix B). This difference in open/secure custody could indicate a lesser offence severity on average.

Table 2.7  
**Ever Convicted in Follow-up, MST Completers and Usual Services by Site**

	<b>MST Completers</b>	<b>Usual Services</b>	<b>Difference</b>	<b>NNT</b>
<b>EXCLUDING ADMINISTRATION OF JUSTICE OFFENCES</b>				
Simcoe County (n=75)	39.4%	50.0%	21.2%	9
London (n=100)	59.1%	46.4%	(21.5)	negative
Mississauga (n=88)	42.9%	52.2%	17.8%	11
Ottawa (n=76)	16.2%	23.1%	30.0%	14
Total Sample (n=339)	40.4%	43.7%	7.6%	30
<b>ALL OFFENCES</b>				
Simcoe County (n=75)	42.4%	54.8%	22.6%	8
London (n=100)	68.2%	58.9%	(13.6)	negative
Mississauga (n=88)	54.2%	54.3%	0.2%	1,000
Ottawa (n=76)	18.9%	28.2%	33%	11
Total Sample (n=339)	46.8%	50.3%	7%	29

Table 2.8

**Convictions at Four Time Periods, MST Completers and Usual Services**

	<b>MST Completers</b>	<b>Usual Services</b>	<b>Difference</b>	<b>NNT</b>
<b>EXCLUDING ADMINISTRATION OF JUSTICE OFFENCES</b>				
Six Months (n=339)	22.8%	25.7%	11.3%	35
One Year (n=286)	37.2%	39.7%	6.3%	40
Two Years (n=170)	55.4%	59.3%	6.6%	26
Three Years (n=71)	73.2%	70.7%	(3.4)	negative
<b>ALL OFFENCES</b>				
Six Months (n=339)	25.6%	29.0%	11.7%	29
One Year (n=286)	39.3%	44.3%	11.3%	20
Two Years (n=170)	59.5%	67.0%	11.2%	13
Three Years (n=71)	82.4%	73.1%	(11.3)	negative

Table 2.9

**Ever Sentenced to Custody in Follow-up by Site, MST Completers and Usual Services by Site**

	<b>MST Completers</b>	<b>Usual Services</b>	<b>Difference</b>	<b>NNT</b>
Simcoe County (n=75)	36.4%	47.6%	23.5%	9
London (n=100)	38.6%	39.3%	1.8%	143
Mississauga (n=88)	40.5%	41.3%	1.9%	125
Ottawa (n=76)	13.5%	15.4%	12.3%	53
Total Sample (n=339)	32.7%	36.5%	10.4%	26

Table 2.10

**Most Serious Offence of Conviction During Follow-up, MST and Usual Services Groups**

	<b>MST</b>	<b>Usual Services</b>
Weapons	3	0
Level II and III Assaults	5	9
Level I Assaults	20	17
Robbery	2	6
Threats	4	7
Extortion	1	0
<b>INTERPERSONAL</b>	<b>35 (48.6%)</b>	<b>39 (53.4%)</b>
Taking Auto. without Consent	0	1
Mischief	5	3
Fraud	2	1
Poss'n. Stolen Property	3	2
Theft Under	8	8
Theft Over	2	2
Arson	0	1
Break and Enter	5	6
<b>PROPERTY</b>	<b>25 (34.7%)</b>	<b>24 (32.9%)</b>
Controlled Substances & Drugs	0	3
Admin. of Justice Offences	12	7
<b>TOTAL</b>	<b>72 (100%)</b>	<b>73 (100%)</b>



**Will the cost of MST be recouped by savings to the correctional system?**

An independent benefit-cost analysis is planned by the National Crime Prevention Centre, a study that will answer this question.

How much does MST cost? MST is undeniably an expensive intervention compared with other community-based programs. The costs of MST are discussed in the fifth chapter of the report, where it is reported that the cost per case in the United States is estimated at between \$4,500 and \$5,000 (USD). Because referrals were lower than expected, the cost per case during the study was extraordinarily high. Assuming that each therapist can service 15 cases each year, the hypothetical per case cost of MST in Ontario

under non-research conditions is estimated at between \$6,000 and \$7,000, depending on therapist salary level and the type of MST oversight (i.e., MST Services Inc. or the Ontario system supervisor). In other words, the cost of the MST intervention is roughly equivalent to 20 days in secure custody or 30 days in open custody.

The per case cost of MST is high but it is equivalent to 20 days in secure custody or 30 days in open custody.

? Will the MST intervention reduce problems as measured by psychological testing?

Yes, but so did the usual services. While both groups improved on most variables measured by pre- and post-testing, improvements were more pronounced for the MST group on some measures. Controlling for the improvements of the control group, the MST groups improved on parent report of family adaptability ( $F = 8.0, p < .005$ ), caregiver depression ( $F = 4.1, p < .043$ ), and youth's externalizing symptoms ( $F = 5.7, p < 0.18$ ). The MST group also improved on youth report of internalizing symptoms ( $F = 8.6, p < .004$ ).

A description of the tests can be found in Appendix A and a summary of the intake scores is in Appendix C. Intake testing is available for all but five cases but there was a low response rate for discharge testing, especially true of the usual services group (52%) compared with the MST group (72%). No response bias could be identified, but caution should be exercised in interpretation of the testing data. For the teacher information, there was a low response rate both at intake (57%) and at discharge (35%). Accordingly, it was not used in the pre/post analyses.

### Parental Supervision

Using the self-report Parental Supervision Index, youths were asked how frequently their parents knew where they were when they went out (Q1) and how frequently they knew whom they were with (Q2). This instrument was selected because attempts to increase parental monitoring are often features of MST interventions. Aggregate responses can be found in Appendix C (Figure C.1). There it can be seen that most youths who completed this form ( $n=367$ ) indicated that their parents sometimes or often knew where they were. It was somewhat less likely that parents knew with whom they were. Both groups showed similar improvements on the extent to which parents knew who they were with when away from home. The MST group showed better but non-significant improvements on the extent to which the parents knew where they were (31% of the MST group improved versus 25% of the usual services group).

There are two caveats about this data. First, there were differences at intake in the responses of the two groups to the first question, probably the result of random error. The members of the usual services group were more likely to say their parents *never* or *seldom* knew where they were when away from home ( $P^2 = 10.2, df = 3, p < .017$ ). On the other hand, almost half of the MST parents knew the whereabouts of their children *sometimes* (see Figure C.2 in Appendix C). Differences are not as evident in the relative distribution of responses from the second question.

The second caveat is that pre/post data are available for only half the sample and reasons for non-response at post include the youth being AWOL, out of the home or in custody, so caution should be

exercised in interpretation. Looking at the intake scores of the non-responders, they tended to endorse higher levels of parental supervision but there were no significant differences. The analyses reported in Figures 2.26 and 2.27 use only the youth for whom both pre and post data are available.

### **Parent Knowing Where Youths are When Away from Home**

The first question on the Parental Supervision Index pertains to the frequency with which parents know the whereabouts of their children when the children were away from home. At post, there was little difference in the distributions of the two groups, except that the MST youth were less likely (2.6%) to say that a parent *never* knew where they were compared with the usual services (7.5%). As can be seen in Figure 2.28, there was little change in the responses of the usual services group. However, the responses of the MST group moved to become similar to those of the usual services group at intake. Accordingly, caution should be exercised in making any conclusions based upon these shifts because some factor other than treatment effect at least contributed to the change.

Looked at another way, one half of the MST group placed themselves in the same category at pre and post (50%, mostly people who already indicated high levels of supervision), 31% indicated increased levels of parental supervision and 20% indicated a reduction. Among the usual services group, 55% stayed in the same category (again mostly those who indicated high levels of supervision), 25% indicated increased supervision and 20% indicated reduced levels of supervision. If the mean scores of the two groups are any indication, both groups evidenced non-significant improvement. Interestingly, the rate of reduced levels of supervision were the same, suggesting that a factor such as maturation might explain the reduction.

### **Parent Knowing With Whom Youths Are When Away from Home**

The youths in the MST group and the usual services group both reported improvements in the extent to which their parents knew who they were with when they went out, true of 43% of the MST group and 42% of the usual services group. The increases were significant for both groups using a comparison of means test ( $t = -3.2, df = 110, p < .002$ ;  $t = -2.4, df = 75, p < .018$ ). The majority reported the same pre/post level of parental knowledge of companions (37% MST and 40% usual services) and about one fifth reported lower levels.

### **Family Functioning**

Six aspects of family functioning were measured with the FACES-II and the SCIS as part of the pre and post testing: youth report of family adaptability and cohesion, parent report of family adaptability and cohesion, caregiver report of family functioning and caregiver self-report of depression. The intake scores are summarized in Appendix C.<sup>7</sup> Parents provided generally lower ratings of family adaptability and cohesion than their children but the mean t-scores of both groups are lower than average. Parents also reported high levels of depression and poor family functioning, with approximately one third of respondents scoring over the clinical cut-off.

At intake, there were no differences between the scores of the two groups except that the parents subsequently assigned to the MST group reported higher levels of depression on average ( $t = 2.6, df = 389, p < .01$ ). There were no differences on the intake scores between those who responded at discharge and those who did not. However, readers are cautioned to read the caveats about response rate and response bias in Appendix A before making any conclusions about these figures.

Figure 2.27  
**Pre and Post Responses on Parental Supervision Index, MST Group (n=116)**

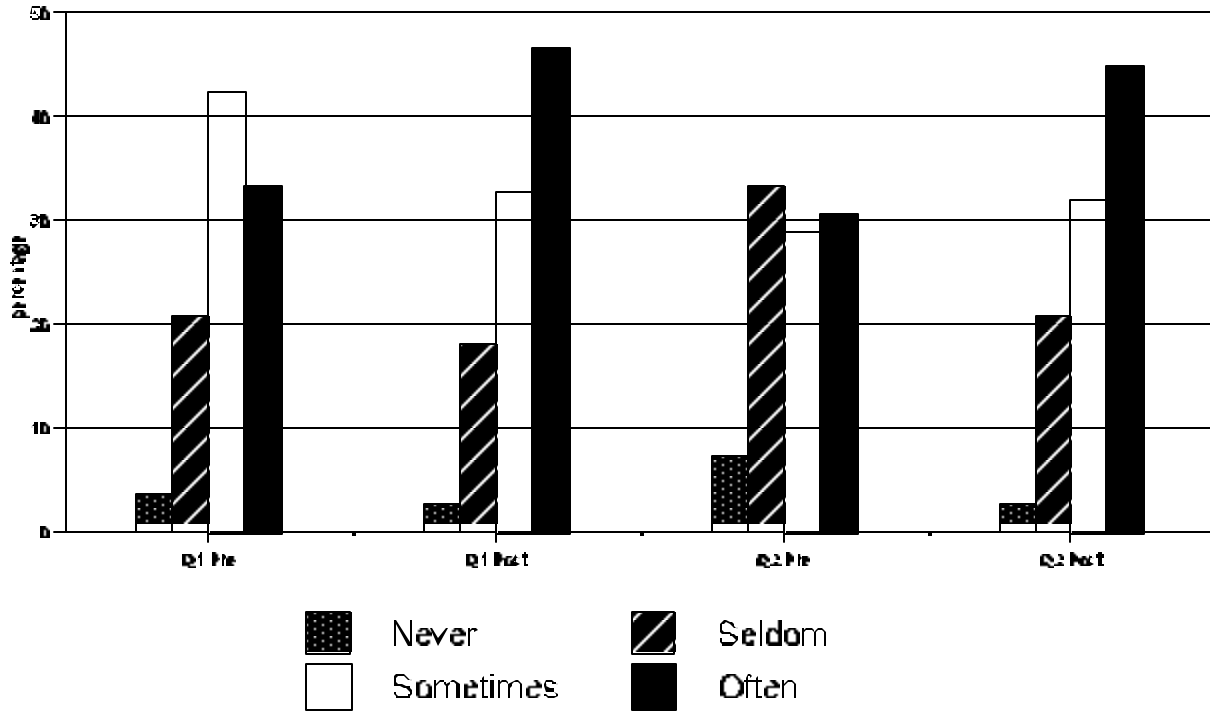
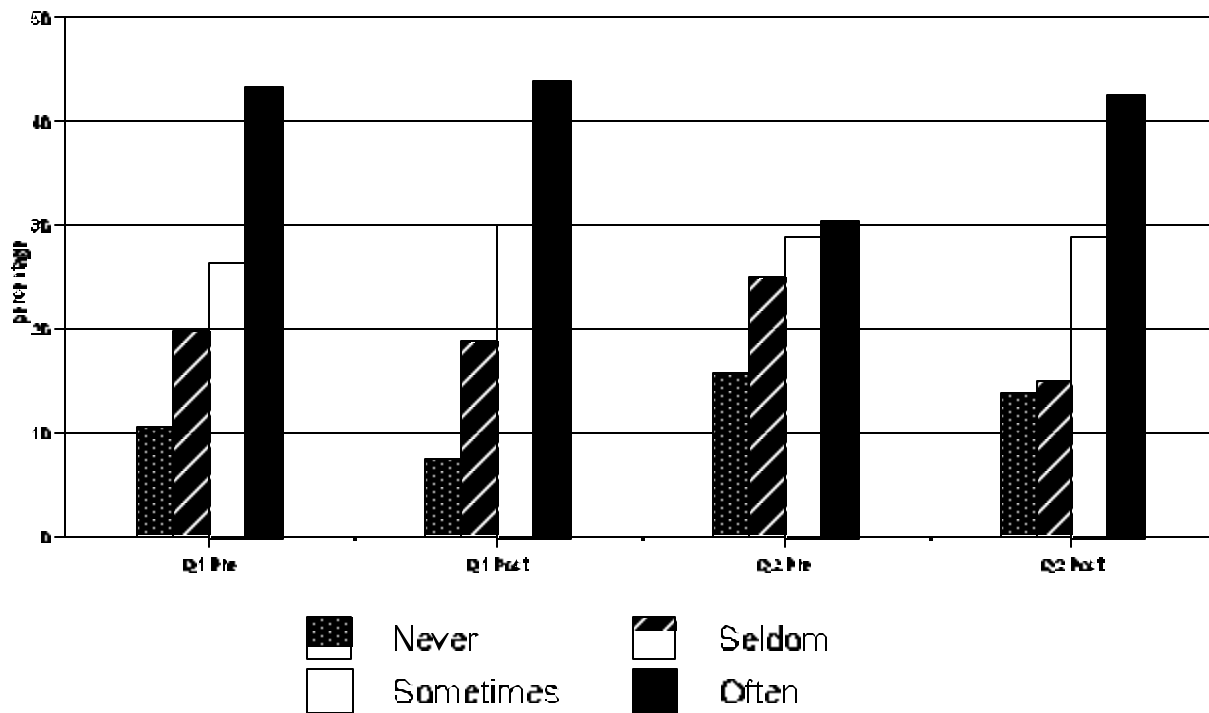


Figure 2.28  
**Pre and Post Responses on Parental Supervision Index, Usual Services Groups (n=80)**



### Family Adaptability and Cohesion

Family adaptability as measured by the FACES-II includes negotiation style, roles, assertiveness, leadership, discipline, child control, and rules. Family cohesion includes emotional bonding, coalitions, space, family boundaries, shared time/friends, decision-making, and shared activities. According to youth self-report, the average scores of both groups on both variables improved between intake and discharge. However, for the MST group the improvements were classified as significant (see Table 2.11). Examining the parent reports, both groups improved on family cohesion but only the MST group improved significantly on family adaptability (Table 2.12). Indeed, as noted above, the MST group improved significantly on family adaptability (parent report) even after controlling for the increase observed in the usual services group.

Table 2.11

#### Summary of Youth Self-Report Pre and Post Testing (Paired Samples, MST=105, US=83)

	MST		Usual Services		Differences
	Pre	Post	Pre	Post	
Family cohesion	39.8	42.8	40.6	42.5	MST: $t = -2.8$ , $df = 104$ , $p < .006$ Usual Services: not significant
Family adaptability	43.7	46.4	44.1	45.5	MST: $t = -2.7$ , $df = 104$ , $p < .009$ Usual Services: not significant

Table 2.12

#### Summary of Parent Self-Report Pre and Post Testing, Family Functioning (Paired Samples)

	MST		Usual Services		Differences
	Pre	Post	Pre	Post	
Family cohesion (FACES)	33.3	36.4	33.3	35.8	MST: $t = -3.5$ , $df = 126$ , $p < .001$ Usual Services: $t = -2.3$ , $df = 87$ , $p < .025$
Family adaptability (FACES)	38.5	42.6	40.5	41.5	MST: $t = -4.5$ , $df = 126$ , $p < .001$ Usual Services: not significant
Family Functioning (SCIS)	65.8	62.4	64.6	62.6	MST: $t = 4.3$ , $df = 140$ , $p < .001$ Usual Services: $t = 2.1$ , $df = 98$ , $p < .041$
Caregiver Depression (SCIS)	65.4	58.8	62.5	60.4	MST: $t = 5.7$ , $df = 137$ , $p < .001$ Usual Services: not significant

Table 2.13  
**Summary of Youth Self-Report Pre and Post Testing (Paired Samples)**

	MST		Usual Services		Differences
	Pre	Post	Pre	Post	
Social Skills (SSRS)	92.8	95.7	89.3	92.1	MST: not significant Usual Services: not significant
Criminal Sentiments (BAS)	25.7	23.3	25.0	24.0	MST: $t = 2.4$ , $df = 109$ , $p < .016$ Usual Services: not significant
Beliefs and Attitudes (BAS)	67.1	57.3	65.6	60.7	MST: $t = 3.5$ , $df = 108$ , $p < .001$ Usual Services: not significant
Externalizing Symptoms (SCIS)	63.0	58.2	64.3	60.0	MST: $t = 5.1$ , $df = 129$ , $p < .001$ Usual Services: $t = 3.0$ , $df = 90$ , $p < .004$
Internalizing Symptoms (SCIS)	55.5	52.0	53.7	54.3	MST: $t = 3.8$ , $df = 128$ , $p < .001$ Usual Services: not significant

### Family Functioning

The SCIS form completed by primary caregiver creates a score for family functioning. As tabled in Appendix C, about one third of families are over the clinical cutoff at intake. The pre- and post testing available from those who responded revealed that both groups showed significant improvement on family functioning. However, at discharge, only 19.2% of the MST group compared with 24% of the usual services group were still over the clinical cutoff.

### Caregiver Depression

The same instrument that measures family functioning also measures caregiver depression. About one third of caregivers were over the clinical cutoff at intake. As noted above, through random chance, parents subsequently assigned to the MST had reported higher levels at intake. Both groups evidenced lower levels of depression on average but only for the MST group was the mean score significantly lower. At discharge, 18.9% of the caregivers in the MST group were over the clinical cutoff compared with 27.5% of the usual services group. This represented a significantly better improvement for the MST groups

While both groups improved on caregiver depression, the parents in the MST group improved more.

### Social Skills

Social skills were measured through both youth and parent self-report using an instrument called the Social Skill Rating System. According to the youth self-report, both groups evidenced non-significant improvements. According to the parent report, both groups evidenced significant improvements (Table 2.13).

### Criminal Beliefs and Attitudes

This variable was measured with the Beliefs and Attitudes Scale which is completed by the youth. It is an adolescent version of the Criminal Sentiments Scale. Both groups evidenced reductions in the extent to which they acknowledged anti-social attitudes but the reductions in the MST group were significant (Table 2.13).

### Externalizing Symptoms

Behavioural problems such as conduct problems, oppositional behaviour, and attention deficit improved significantly in both groups, as measured by both the SCIS and the Social Skills Rating System. However, on the SCIS measure, the MST parents reported a significantly better improvement.

### Internalizing Symptoms

While internalizing problems such as anxiety, depression, and self-esteem are not typically a target of MST interventions, significant improvements were observed in both parent and youth reports. By youth report, the average score in the usual services group increased, the only instrument on which either group registered a decline. Comparatively, the MST group reported a significant improvement.

Table 2.14

#### Summary of Parent Self-Report Pre and Post Testing (Paired Samples)

	MST		Usual Services		Differences
	Pre	Post	Pre	Post	
Social Skills (SSRS)	76.7	84.8	76.9	81.7	MST: $t = -5.8$ , $df = 105$ , $p < .001$ Usual Services: $t = -3.0$ , $df = 73$ , $p < .004$
Problem Behaviours (SSRS)	121.1	111.4	126.6	120.0	MST: $t = 5.1$ , $df = 98$ , $p < .001$ Usual Services: $t = 4.0$ , $df = 72$ , $p < .001$
Externalizing Symptoms (SCIS)	78.9	69.1	77.4	72.9	MST: $t = 8.3$ , $df = 141$ , $p < .001$ Usual Services: $t = 3.4$ , $df = 98$ , $p < .001$
Internalizing Symptoms (SCIS)	64.8	60.6	62.8	62.0	MST: $t = 4.6$ , $df = 140$ , $p < .001$ Usual Services: not significant

### Summary and Conclusions

With the interim data available thus far, having tracked the recidivism of 380 youth to September of 2001, these observations can be offered:

- overall, there were no differences between the post-discharge conviction rates of the MST versus usual services groups and group membership does not predict likelihood of conviction
- there are no differences in time to conviction, rate of admission to custody, time to admission to custody, number of days in sentenced custody, number of days in open custody, number of days in secure custody, number of offences of conviction, or number of prosecutions
- there were some promising patterns in the number of offences of conviction – particularly for breach of disposition – that are reflected in a small effect size of .26 in one outcome measure when excluding non-recidivists from the analysis
- MST recipients were somewhat more likely to be sentenced to a period of open custody and somewhat less likely to be sentenced to a period of secure custody
- there are many differences among the sites, with one site where the MST recipients do reasonably well, one site where the usual service recipients do well, and two sites with variable findings

- the MST dropouts performed poorly compared with both the MST completers and the usual services group
- when MST drop outs are excluded from the analysis, the MST completers have fewer offences of conviction, fewer administrative offences (other than breach of disposition), and fewer average days in secure custody than the usual services group
- it is difficult to make conclusions about the seriousness of offences committed in the follow-up period but it does not seem to have been affected by the MST intervention
- while the response rate at discharge suggests that caution should be exercised in interpretation, both groups evidenced improvement on the psychometric instruments used at intake and discharge, differences which were significant for parent report of family cohesion, family functioning, externalizing symptoms, and social skills of youth, as well as youth report of externalizing symptoms
- controlling for the increases observed in the usual services group, the MST group improved significantly on parent report of family adaptability, caregiver depression, and externalizing symptoms of youth, as well as youth report of internalizing symptoms (e.g., anxiety, self-esteem)
- the per-case cost of MST during the study was extraordinarily high but the hypothetical cost of \$6,000 to \$7,000 is equivalent to 30 days in open custody and 20 days in closed custody
- we await the results of an independent benefit/cost analysis to make conclusions about cost savings to the criminal justice and youth correctional system
- at this point, \$5.8 million have been spent to incarcerate these 380 youths since discharge, a number that will grow as the follow-up is extended
- almost \$1 million has been spent so far in incarcerating these youth for administrative offences alone

Almost \$6 million has been spent so far incarcerating these 380 youth during the follow-up period, not including adult sentences.

It is important to stress that this document is an interim report, comparing the relative outcomes of youths in the two groups, 380 of whom have spent at least six months since the termination of treatment. Not until 2004 will all the youth have spent at least three years being tracked.

## Endnotes

1. A. Cunningham (2002). *One Step Forward: Lessons Learned from a Randomized Study of Multisystemic Therapy in Canada*. London ON: Centre for Children and Families in the Justice System, London Family Court Clinic.
2.  $NNT = 1/(\text{prop. of failures in control group} - \text{prop. of failures in experimental group})$ . See H.T Reynolds (1977). *Analysis of Nominal Data*. Beverley Hills: Sage Publications; and, R.J. Cook & D.L. Sackett (1995). The Number Needed to Treat: A Clinically Useful Measure of Treatment Effectiveness. *British Medical Journal*, 310: 452-454.

3. J. Cohen (1988). *Statistical Power Analysis for the Behavioral Sciences, 2<sup>nd</sup> Edition*. Lawrence Erlbaum & Associates.
4. Conviction for at least one offence at any time over the follow-up dichotomized as yes/no but excluding cases where the only offence was an administrative offence, conviction for any type of offence at any time over the follow-up dichotomized as yes/no, conviction for any type of offence at four time periods (cross-sectional), conviction for at least one non-administrative offences graphed as survival curves at four time periods, and conviction for at least one offence (all types) graphed as survival curves at four time periods.
5. Administration of justice offences include primarily breach of probation but also include failure to appear in court, failure to abide by release conditions, being unlawfully at large, obstructing a police officer, etc. In this analysis, youth convicted only of an administrative offence are placed in the no convictions category.
6. The rate of drop-out varied among the sites from 26.5% in Simcoe County to 14% in Mississauga. There was no connection between risk category and likelihood of drop out, nor were patterns evident for sex of youth, existence of prior record, or age. But drop outs tended to have more offences of conviction prior to referral ( $t = -2.7$ ,  $df = 46$ ,  $p < .01$ ). In addition, drop-outs with prior records tended to have been first convicted at a younger age ( $t = 2.0$ ,  $df = 144$ ,  $p < .05$ ).
7. On the FACES-II, lower t-scores mean lower levels of adaptability and cohesion. On the SCIS, higher scores indicate higher levels of problems.