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Multidimensional Treatment Foster Care for Girls in the Juvenile Justice System: 2-Year Follow-up of a Randomized Clinical Trial

Abstract

This is a 2-year follow-up of girls with serious and chronic delinquency who were enrolled in a randomized clinical trial conducted from 1997 to 2002 comparing Multidimensional Treatment Foster Care (MTFC) and Group Care (GC) (N = 81). Girls were referred by juvenile court judges and had an average of over 11 criminal referrals when they entered the study. A latent variable ANCOVA model controlling for initial status demonstrated maintenance of effects for MTFC in preventing delinquency at the 2-year assessment as measured by days in locked settings, number of criminal referrals, and self-reported delinquency. A latent variable growth model focusing on variance in individual trajectories across the course of the study also demonstrated the efficacy of MTFC. Older girls exhibited less delinquency over time relative to younger girls in both conditions. Implications for gender-sensitive programming for youth referred from juvenile justice are discussed.

Keywords

gender; delinquency; girl; intervention; foster care

Although girls have multiple factors in common with their male counterparts that put them at risk for delinquency (i.e., low parental monitoring, association with delinquent peers, substance use, family criminality and instability), other factors identified from developmental psychopathology appear to play a role in how delinquency unfolds for girls. Specifically, longitudinal and developmental research suggests that girls' involvement in juvenile justice often follows from exposure to trauma and abuse and often co-occurs with anxiety and mood problems (Teplin, Abram, McLelland, Dulcan, & Mericle, 2002), negative interpersonal relationships (Ehrensaft, 2005), and social aggression (Underwood, 2003).

The increasing awareness of the developmental pathways to delinquency for girls, plus concerns about serving girls in existing male-oriented programs and institutions, speak to the need for gender sensitive services. This is underscored by data showing that female delinquency is increasing relative to male delinquency, resulting in problems for existing public child-service systems that have few community-based treatment alternatives for girls (Siegal & Senna, 2000).

In this report, we focus on results of a randomized clinical trial of girls with chronic delinquency who participated in a study comparing Multidimensional Treatment Foster Care (MTFC; Chamberlain 2003) to Group Care (GC). Past studies have indicated that MTFC is an effective treatment approach for delinquent *boys*, producing outcomes superior to GC in terms of arrest and incarceration rates (Chamberlain & Reid, 1998;Eddy, Whaley, & Chamberlain, 2004). In addition, the cost effectiveness of MTFC relative to GC for boys was evaluated in an independent economic evaluation where long-term cost savings to taxpayers was estimated to range from $21,836 to $87,622 per youth (Aos, Phipps, Barnoski, & Leib, 2001). Four variables have accounted for significant variance in delinquency outcomes: relationship with a mentoring adult, close supervision, clear limit setting, and low association with delinquent peers (Eddy & Chamberlain, 2000). The current application of MTFC retained these factors and was modified to map onto recent studies of girls (e.g., Putallaz & Bierman, 2004). Enhanced components include strategies for increasing emotional regulation and coping skills,

recognizing anxiety and symptoms related to abuse and trauma, and decreasing social aggression; areas identified as potentially malleable antecedents of girls' conduct problems.

At 1-year assessments, girls in MTFC had a significantly greater reduction in days in locked settings and caregiver-reported delinquency than girls in GC (Leve, Chamberlain, & Reid, 2005). Therefore, follow-up efficacy models are evaluated here with directional hypotheses (Aron & Aron, 1994). We focus on: (1) maintenance of intervention effects on delinquency at 2 years, and (2) intervention effects on growth trajectories using repeated assessment data.

Method

Participants

Juvenile court judges in Oregon referred 103 girls between 1997 and 2002; girls had been mandated to out-of-home care due to problems with chronic delinquency. The project manager enrolled all referred girls who were 13–17 years old and not currently pregnant. Girls were randomly assigned to the experimental (MTFC; $n = 37$) or control condition (GC; $n = 44$). The flow of participants through the study is presented in Figure 1. Caseworker and youth written consent to participate was attained prior to participation and was accompanied by project staff's verbal explanations of the study and its risks and benefits. All study youth and caregivers knew that they were participating in a research study and receiving treatment services. Analyses included the full intent-to-treat randomized sample, although treatment length varied. The mean length of stay in the randomized placement was 174 days ($SD = 144$ days), and the average time between baseline and intervention entry was 47 days (neither of which differed significantly by group). The study was conducted in compliance with our institution's Internal Review Board.

Girls were 15–19 years old at the 24-month assessment ($M = 17.3$; $SD = 1.0$); 74% Caucasian, 2% African-American, 9% Hispanic, 12% Native American, 1% Asian, and 2% other or of mixed ethnic heritage. In comparison, 93% of girls aged 13–19 living in the region were Caucasian (U.S. Department of Commerce, 1992). Additional demographic information is in Leve et al. (2005). There were no group differences on the rates or types of pre-baseline offenses or on other demographic characteristics. No adverse events occurred during the study.

Procedure

Prior to entering their out-of-home placements, each girl and her parent or other primary pre-placement caregiver participated in a 2-hour baseline (BL) assessment at the research center. Staff members responsible for data collection and data entry were blind to participants' group assignment and were not involved in delivering the intervention. At 12 and 24 months post-BL, girls completed a follow-up assessment, and juvenile court records were collected.

MTFC Intervention—Girls were placed in highly trained and supervised foster homes with state-certified parents. Although the intervention was individualized for each girl, it included standardized components: (a) Daily (M-F) telephone contact with the foster parents using the Parent Daily Report Checklist (Chamberlain & Reid, 1987) monitored treatment fidelity and case progress. Weekday fidelity data were collected on parent implementation of an individualized, in-home, daily point-and-level program to reinforce girls' strengths and provide consequences for problem behaviors. Case progress data tracked girls' performance on the point-and-level system, amount of unsupervised time, school attendance/performance, and foster parent stress level. These data were used to adjust treatment in the foster home during weekly foster parent supervision and support sessions; (b) weekly foster parent group training, supervision, and support meetings led by an experienced Program Supervisor who also coordinated all intervention components across settings and supervised individual and family

therapy; (c) individual therapy for each girl emphasized here-and-now problems; (d) family therapy (for the family of origin) focused on improving parent management strategies; (e) close monitoring of school functioning with a daily school card signed by teachers; (f) program staff on call for the youth and foster and biological parents; and, (g) psychiatric consultation. To implement gender-related components, foster parents and therapists were trained and supervised to teach and reinforce girls to avoid social/relational aggression and to develop alternative strategies for dealing with perceived rejection and other stress. Foster parents and girls were supervised to focus on strategies for emotional regulation (e.g., recognizing feelings of distress and coping strategies), generating options for dealing with problems, and planning for the future. Program supervisors viewed videotaped family and individual sessions and supervised therapists and foster parents to correct fidelity issues (see Chamberlain, 2003, for a program description).

Control Condition—Girls went to 1 of 19 community-based GC care programs located throughout the state of Oregon that represented typical services for girls in out-of-home care. The programs had 2 to 51 youth in residence (M = 21), 1 to 50 staff members (median = 2), and onsite schooling. The majority of programs (86%) reported endorsing a specific treatment model with the primary philosophy being behavioral (70%), eclectic (26%), or family-style (4%). Seventy percent of the programs reported delivering therapeutic services at least weekly.

Measures

Delinquency Construct—A multiple-method delinquency construct was computed from three indicators assessing behavior during the prior 12 months: number of criminal referrals, number of days in locked settings, and self-reported delinquency. *Criminal Referrals* were collected using state police records and circuit court data found to be reliable indicators of externalizing behavior (Capaldi & Stoolmiller, 1999). *Days in Locked Settings* was measured by girls' report of total days spent in detention, correctional facilities, jail, or prison. *Self-reported Delinquency* was measured with the Elliott General Delinquency Scale (Elliott, Huizinga, & Ageton, 1985). The 21-item subscale records the number of times girls report violating laws during the preceding 12 months.

Analytic Approach—Two-year maintenance effects were tested with two methods. The first focused on the 2-year end point to examine whether differences between groups were still evident at 24 months. Therefore, we specified an auto-regressive latent variable construct using structural equation modeling (SEM) specifying the factor measurement loadings as equal across time. This model provided the ability to partial measurement error evaluate measurement invariance across time, and handle missing data; thus providing enhanced validity for the criterion outcome. Second, we examined effects across the course of the study focusing on individual variation in delinquency trajectories using latent growth curve models for experimental designs (Curran & Muthén, 1999). Growth models take into account individual differences in change trajectories. In order to examine trajectories over time, each continuous indicator was rescaled 0 to 1 and then averaged. For example, the minimum and maximum ranges of the Elliot measure were rescaled from 0 to 1 at each wave. For “count data” the data must be bounded by the same minimum and maximum value across time. Therefore, the count data was bounded by the maximum value across time before rescaling. Delinquency indicators were significantly correlated within each wave and a principal components factor analysis produced a single factor solution at each wave with Eigenvalues ranging from 1.5 to 1.6 across time (loadings ranged from .44 to .82). Criminal referrals and days in locked settings were log transformed before rescaling to correct for distributional skewness and kurtosis.

A key advantage for both analytic approaches over repeated measures ANOVA was the ability to control for initial status and the ability to model missing data using full-information maximum likelihood (FIML). Full-information maximum likelihood uses all available information from observed data. Compared to mean-imputation, list-wise, or pair-wise models, FIML provides more statistically reliable standard errors (Wothke, 2000). A missing-values analysis indicated all indicators and predictors were missing completely at random [Little's MCAR χ^2 (44) was 44.82, $p = .43$]. Similarly, there was no differential rate of attrition for those lost to follow up by group, shown in Figure 1.

Results

Means, standard deviations, and comparisons for the delinquency construct and indicators are provided in Table 1. There were no baseline differences for any of the variables. We also note that although individual indicators were differentially affected, the criterion outcome and focus was the delinquency construct. A latent variable comprised of convergent communality across indicators provides a more continuous multi-source measure, and therefore, a more reliable index than any one source alone (Patterson, 1996). Results of the SEM model testing the maintenance effects are shown in Figure 2 using standardized path coefficients.

Controlling for age, MTFC was associated with greater reductions in delinquency compared to GC ($\beta = -.36$, $p < .01$). Older girls exhibited lower levels of 24-month delinquency ($\beta = -.36$, $p < .01$). Factor loadings were strong and the model provided an excellent fit to the data [χ^2 (23) = 18.44, $p = .73$, CFI = 1.00]. In addition, tests of equally constrained factor loadings across time versus freely estimated loadings for each respective indicator demonstrated measurement invariance across time. The MTFC effect size (ES) for the 24-month follow up was estimated as Cohen's *d*, a mean comparison of the delinquency construct shown in Table 1 and as η^2 controlling for baseline and age. Cohen's *d* was .65 and η^2 was .08, both of these ES coefficients were considered a medium effect (Cohen,1988).

We next specified a linear growth curve model with the initial status factor, or random intercept, fixed at 1.0 for each time point and the linear growth factor fixed at 0.0, 1.0, and 2.0 for each respective time period. Inspection of the means in Table 1 indicated that relatively more change occurred from BL to 12 months than occurred from 12 to 24 months. Indeed, a strictly linear model provided a marginally adequate fit to the data with [χ^2 (6) = 14.77, $p = .02$, CFI = .73]. One approach to nonlinear data is to specify an additional quadratic factor. Because there were only three waves of data, however, this would require fixing the error terms at say 20% of the variance (e.g., 1 – reliability). A more appropriate alternative to specifying a quadratic was to specify a linear spline model (Biesanz et al., 2004;Stoolmiller, 1995). A spline factor combines the growth rate information and shape of any nonlinear growth by fixing the growth parameters at 0.0 and 1.0 for the first two waves and freeing the third time point. The spline model provided a significant improvement in fit for a nested comparison ($\Delta df = 1$, $\Delta \chi^2 = 12.82$, $p < .001$). Results of the spline model are provided in Figure 3 [χ^2 (5) = 1.95, $p = .86$, CFI = 1.00]. Controlling for initial status and age, MTFC girls obtained a greater rate of decrease in delinquency over the course of the study relative to GC girls ($\beta = -.42$, $p < .01$). Taken together, theses analyses provided unique information regarding evaluation of the 2-year follow-up assessment. First, the effects were maintained on delinquency at the end of the study, and second, the variation in trajectories of repeated assessments showed a significantly greater rate in reductions of delinquency for MTFC. The group mean trajectories are displayed in Figure 4 for the observed means and their 95 percent confidence intervals. Any mean of one group outside the confidence intervals of another group represents a significant effect of the MTFC treatment.

Discussion

Participation in MTFC resulted in better outcomes than placement in GC at 12- and 24-month follow-ups. Findings showed that effects found at 1 year (Leve et al., 2005) were maintained at the 2-year assessment with a slightly larger effect size, and that trajectories of reductions across the course of the study were significantly larger for MTFC. Age predicted delinquency outcomes as well, with younger girls showing more vulnerability than older girls. These results do not address potential mediators of intervention effectiveness; this work is planned for subsequent analyses. Because we considered it important to first address the intervention's impact on the primary problem for which girls were referred and removed from their family homes by the juvenile court authorities (delinquent behavior), we did not report on a broad array of outcome domains here, as suggested by Hoagwood, Jensen, Petti, and Burns (1996). Some are reported elsewhere (see Leve & Chamberlain, in press). Even the somewhat narrow findings reported here have potential policy and cost implications. It appears that girls, like boys, can be more effectively treated for delinquency in well trained and supervised community foster homes and that recruitment and retention of those foster homes is feasible, speaking to the potential clinical utility of these findings.

In addition, days in locked facilities displayed the largest ES as an indicator and has cost implications. In raw scale number of days, MTFC girls spent over 100 fewer days in locked settings during the 2 years post-BL than GC girls (mean difference = 104.82 days). Previous analyses have found that the daily placement rate in MTFC costs from ⅓ to ½ less than placement in GC (Aos et al., 2001). Participation in MTFC includes attending public school, whereas GC participants most often attend on-site schools contributing to additional costs not captured in program rates.

Limitations of this study include the small sample size, the fact that the majority of participating girls were Caucasian (representative of the region but not of the female juvenile justice population at large), and the fact that the findings are the first of their kind and need to be verified by replication. Although we used the literature on developmental psychopathology in girls to guide modifications to the MTFC model, the 2-condition random assignment design did not allow for disaggregating the intervention to test the efficacy of the added gender-specific components. Future studies will test whether gender-specific treatment components add to intervention effectiveness above factors relevant for both genders. The current study adds to the sparse empirical literature on intervention efficacy for girls and represents a modest step toward the development of research-based approaches for this understudied, vulnerable population.

Appendix

CONSORT Checklist

PAPER SECTION **And topic**	**Item**	**Description**	**Reported on Page #**
TITLE & ABSTRACT	1	How participants were allocated to interventions (*e.g.*, “random allocation”, “randomized”, or “randomly assigned”).	1, 3
INTRODUCTION Background	2	Scientific background and explanation of rationale.	4-5
METHODS Participants	3	Eligibility criteria for participants and the settings and locations where the data were collected.	5-6
Interventions	4	Precise details of the interventions intended for each group and how and when they were actually administered.	6-7
Objectives	5	Specific objectives and hypotheses.	5
Outcomes	6	Clearly defined primary and secondary outcome measures and, when applicable, any methods used to enhance the quality of measurements (*e.g.*, multiple observations, training of assessors).	7-8
Sample size	7	How sample size was determined and, when applicable, explanation of any interim analyses and stopping rules.	5

PAPER SECTION And topic	Item	Description	Reported on Page #
Randomization -- Sequence generation	8	Method used to generate the random allocation sequence, including details of any restrictions (*e.g.*, blocking, stratification)	5
Randomization -- Allocation concealment	9	Method used to implement the random allocation sequence (*e.g.*, numbered containers or central telephone), clarifying whether the sequence was concealed until interventions were assigned.	5
Randomization -- Implementation	10	Who generated the allocation sequence, who enrolled participants, and who assigned participants to their groups.	5
Blinding (masking)	11	Whether or not participants, those administering the interventions, and those assessing the outcomes were blinded to group assignment. When relevant, how the success of blinding was evaluated.	5, 6
Statistical methods	12	Statistical methods used to compare groups for primary outcome(s); Methods for additional analyses, such as subgroup analyses and adjusted analyses.	8, 9
RESULTS Participant flow	13	Flow of participants through each stage (a diagram is strongly recommended). Specifically, for each group report the numbers of participants randomly assigned, receiving intended treatment, completing the study protocol, and analyzed for the primary outcome. Describe protocol deviations from study as planned, together with reasons.	18
Recruitment	14	Dates defining the periods of recruitment and follow-up.	5-6
Baseline data	15	Baseline demographic and clinical characteristics of each group.	5-6
Numbers analyzed	16	Number of participants (denominator) in each group included in each analysis and whether the analysis was by "intention-to-treat". State the results in absolute numbers when feasible (*e.g.*, 10/20, not 50%).	5, 18
Outcomes and estimation	17	For each primary and secondary outcome, a summary of results for each group, and the estimated effect size and its precision (*e.g.*, 95% confidence interval).	9-10; 16, 19-21
Ancillary analyses	18	Address multiplicity by reporting any other analyses performed, including subgroup analyses and adjusted analyses, indicating those pre-specified and those exploratory.	8-10
Adverse events	19	All important adverse events or side effects in each intervention group.	6
DISCUSSION Interpretation	20	Interpretation of the results, taking into account study hypotheses, sources of potential bias or imprecision and the dangers associated with multiplicity of analyses and outcomes.	11-12
Generalizability	21	Generalizability (external validity) of the trial findings.	11-12
Overall evidence	22	General interpretation of the results in the context of current evidence.	11-12

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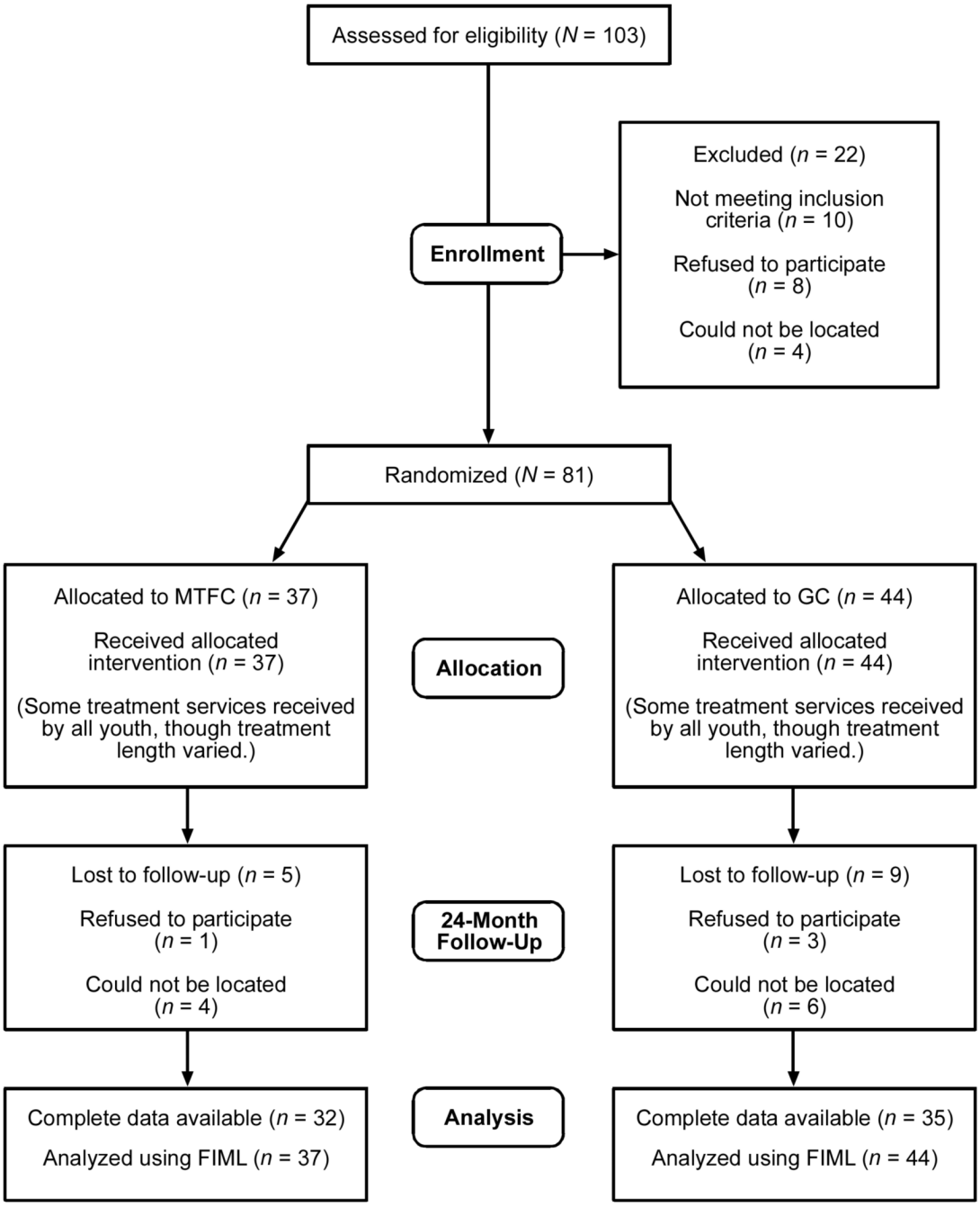

Figure 1.
CONSORT statement flow diagram of participants through each stage of the randomized clinical trial.

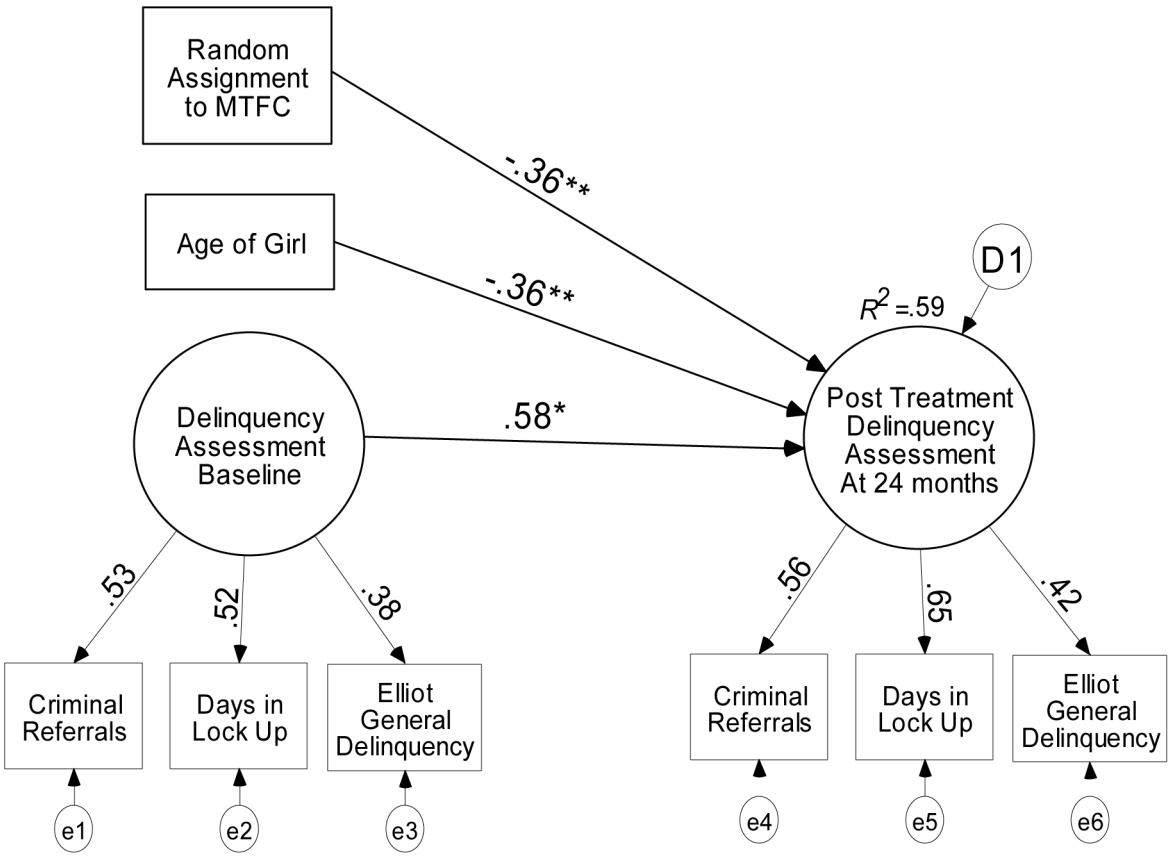

Figure 2.

Latent variable structural equation path model testing 2-year maintenance effects of MTFC on girls' delinquency compared to GC. Paths are standardized coefficients [χ^2 (23) = 18.44, p = . 73, comparative fit index = 1.00]. MTFC = Multidimensional Treatment Foster Care.

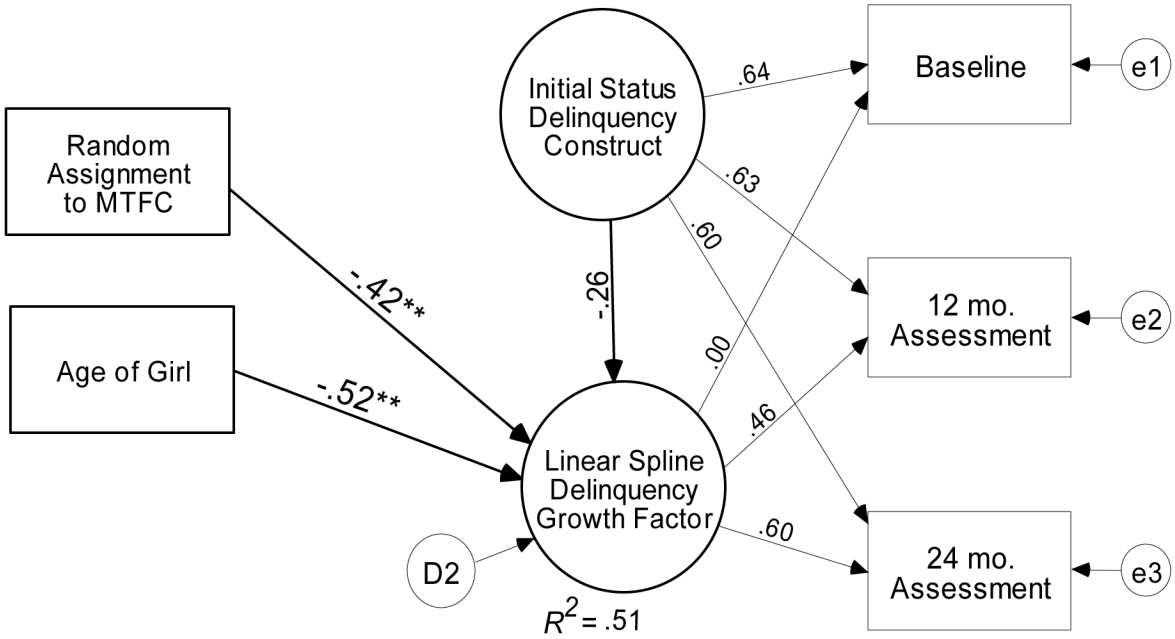

Figure 3.
Latent variable growth model testing MTFC 2-year effects on individual differences in trajectories of delinquency across the course of the study. Paths are standardized coefficients [χ^2 (5) = 1.95, p= .86, comparative fit index = 1.00]. MTFC = Multidimensional Treatment Foster Care.

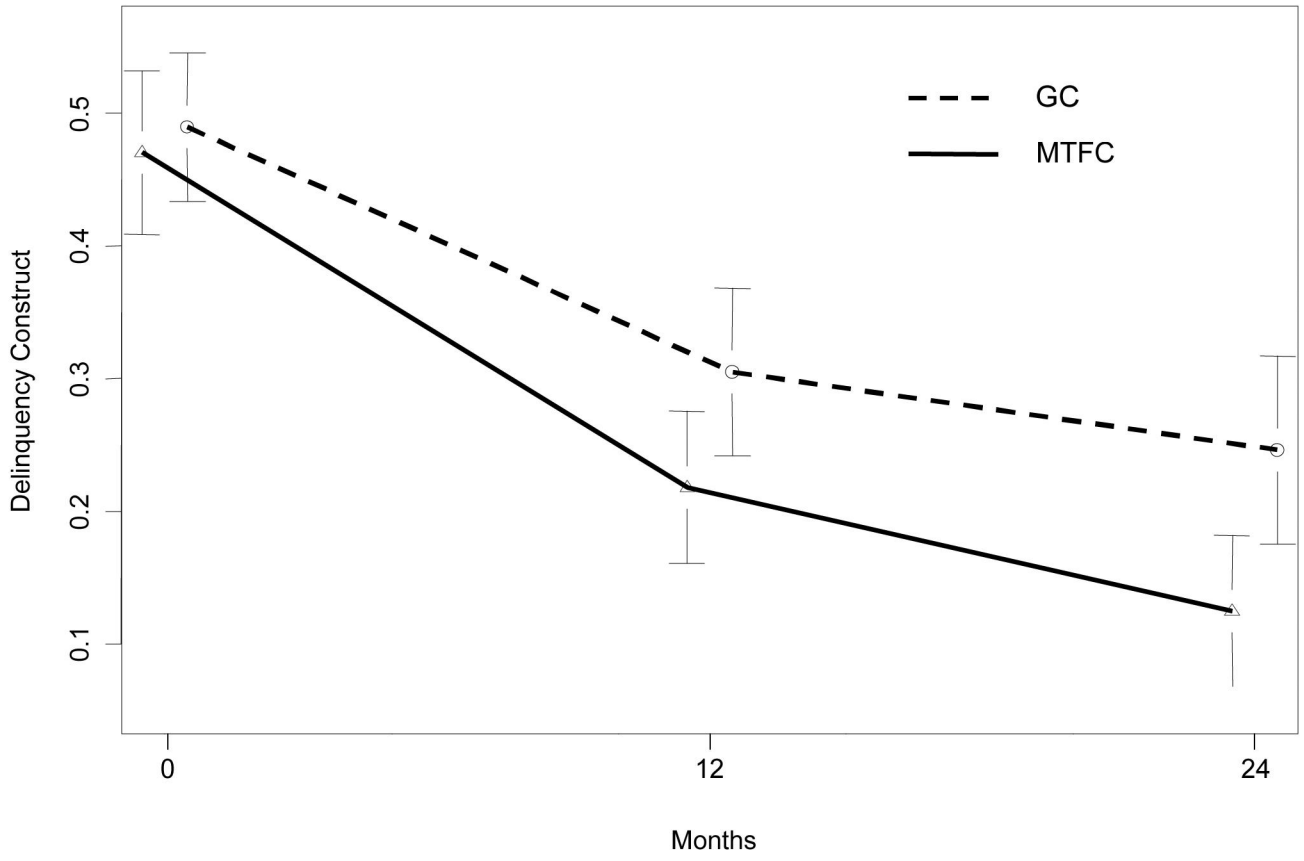

Figure 4.
Group by time observed mean trajectories of delinquency and their 95 percent confidence intervals. Note. By default the SPLUS graphing program “jitters” or slightly offsets the confidence interval bands for ease of interpretation. MTFC = Multidimensional Treatment Foster Care. GC = group care.

Table 1

Means, standard deviations, and comparisons for rescaled delinquency indicators and construct score

	GC		MTFC		
	M	***SD***	***M***	***SD***	***t***
Delinquency growth construct					
Time 1 Baseline	.48	.18	.47	.18	0.46
Time 2 12 Mo.	.30	.20	.22	.17	1.98*
Time 3 24 Mo.	.25	.21	.12	.16	2.66**
Elliot general delinquency					
Time 1 Baseline	.36	.26	.33	.21	0.51
Time 2 12 Mo.	.15	.19	.18	.19	0.82
Time 3 24 Mo.	.12	.16	.11	.18	0.15
Log number criminal referrals					
Time 1 Baseline	.53	.24	.53	.27	0.06
Time 2 12 Mo.	.25	.24	.15	.21	1.93*
Time 3 24 Mo.	.22	.26	.13	.18	1.63†
Log days in locked settings					
Time 1 Baseline	.60	.27	.56	.33	0.59
Time 2 12 Mo.	.51	.38	.31	.34	2.28*
Time 3 24 Mo.	.42	.40	.14	.28	3.10**

Note.

MTFC = Multidimensional Treatment Foster Care. GC = Group Care.

** $p < .01$

* $p < .05$

† $p < .06$