Affiliation with Delinquent Peers as a Mediator of the Effects of Multidimensional Treatment Foster Care for Delinquent Girls

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Abstract

Objective—This study evaluated the ability of delinquent peer affiliation to mediate the effects of Multidimensional Treatment Foster Care (MTFC; Chamberlain, 2003) on girls' delinquent behavior.

Method—This study used a sample of girls from two cohorts ($N = 166$; $M = 15.31$ years old at baseline, range 13–17 years; 74% European-American, 2% African American, 7% Hispanic, 4% Native American, 1% Asian, and 13% mixed ethnicity) and measures of delinquent behavior, including general delinquency (Elliott General Delinquency Scale), number of criminal referrals, and number of days in locked settings. As the mediator, we used self-reports of affiliation with delinquent peers (Describing Friends Questionnaire). Our analytic plan specified an Intent-to-Treat (ITT) analysis within the framework of a randomized controlled trial (RCT) comparing MTFC with traditional community-based group care.

Results—Random assignment to the MTFC program reduced girls' number of criminal referrals and number of days in locked settings at 24 months. The MTFC condition also reduced girls' exposure to delinquent peers at 12 months, which in turn reduced levels of all forms of delinquent behavior at 24 months; indirect effects were statistically significant.

Conclusions—Reduction in exposure to delinquent peers mediated MTFC effects on the number of criminal referrals and number of days in locked settings; delinquent peers also served as an intervening variable between MTFC and self-report delinquency, suggesting that, by reducing contact with delinquent peers, MTFC helped to encourage lower levels of self-report delinquency. Existing prevention and intervention programs targeting similar populations may benefit from increased attention to reductions in delinquent peer affiliation in female samples.

Keywords

Multidimensional Treatment Foster Care; girls; delinquent behavior; delinquent peers; intervention

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Adolescent delinquency has both immediate and long-term implications for adolescent health and well-being. Specifically, delinquent behavior in early adolescence is a strong predictor of academic failure, substance use, and risky sexual activity (Fergusson & Woodward, 2000; French & Conrad, 2001; Windle, 1990). In addition, early delinquency, if

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left unchecked, can escalate to violent crime and incarceration in adulthood (Dishion, Véronneau, & Myers 2010). Taken together, these findings underscore the importance of identifying specific intervention approaches that can reduce or prevent adolescent delinquency.

A key challenge in targeting the reduction of adolescent delinquency is the identification of potential modifiable risk factors. For example, peers become an increasingly strong influence on individual behavior during adolescence (Steinberg & Monahan, 2007), and affiliating with delinquent peers can lead to greater levels of delinquent behavior via a variety of mechanisms, including social learning, peer pressure, and "deviancy training", in which peers reinforce each other by endorsing deviant attributes and behaviors, relating past deviant behavior, and encouraging future deviant activities (Deater-Deckard, 2001; Dishion & Tipsord, 2010; Farrington, 1995; Patterson, Dishion, & Yoerger, 2000). Patterson et al. (2000) demonstrated that involvement with delinquent peers prior to adolescence contributed to growth in antisocial behavior by age 18, and that the effects of delinquent peer affiliation were mediated by deviancy training at age 14. At the same time, selection factors may also be at play, in that troubled or antisocial adolescents tend to select more antisocial peers (Fergusson & Horwood, 1999; Fergusson, Woodward, & Horwood, 1999).

Multidimensional Treatment Foster Care (MTFC; Chamberlain, 2003) is an intervention approach that has demonstrated effectiveness in reducing adolescent delinquency and affiliation with delinquent peers (Chamberlain & Reid, 1998; Eddy, Whaley, & Chamberlain, 2004; Leve & Chamberlain, 2005). MTFC was originally developed as a community-based alternative to incarceration for boys with serious and chronic delinquency. In MTFC, delinquent youth are placed in highly trained and supervised foster homes with state-certified foster parents. Foster parents are trained to minimize negative, aversive interactions with youth; enhance positive interactions; monitor youth's whereabouts, activities, and friends; and reinforce prosocial behavior. Not only does MTFC allow for closer supervision of youth than does traditional group care (GC), but foster families can also effectively model good behavior and provide more focused support and encouragement. In addition, MTFC can short-circuit the potential negative or iatrogenic effects of aggregating groups of delinquent youth together in group care (i.e., "peer contagion"; see Dishion & Tipsord, 2010). Previous research with delinquent male populations indicated that MTFC was an effective treatment approach, producing outcomes superior to traditional group care treatment programs (GC) in terms of referral and incarceration rates (Chamberlain & Reid, 1998; Eddy et al., 2004).

The MTFC model has received national attention as a cost-effective alternative to residential care. For example, the cost effectiveness of MTFC relative to GC has been evaluated and long-term savings to crime victims and taxpayers were estimated to be $88,953 per youth (Drake, Aos, & Miller, 2009). Their results, along with findings from randomized controlled trials, led MTFC to be selected as 1 of 10 evidence-based National Model Programs (Elliott, 1998) by the Office of Juvenile Justice and Delinquency Prevention, and as 1 of 9 National Exemplary Safe, Disciplined, and Drug Free Schools model programs. The MTFC model was also highlighted in two U.S. Surgeon's General reports (U.S. Department of Health and Human Services [USDHHS], 2000a, 2000b) and was selected by the Center for Substance Abuse Prevention and the Office of Juvenile Justice and Delinquency Prevention as an Exemplary I program for Strengthening America's Families (Chamberlain, 1998).

However, recent years have seen an increase in female delinquency relative to changes in the rates of male delinquency (Office of Juvenile Justice and Delinquency Prevention, 2010; Snyder, 2008), and juvenile justice organizations often times lack appropriate treatment services for girls (American Bar Association & National Bar Association, 2001; Snyder &

Sickmund, 2006). In response, the MTFC program was modified to include components designed to reduce behavioral and emotional problems among girls, such as training in strategies for increasing emotional regulation and coping skills, recognizing anxiety and symptoms related to abuse and trauma, and decreasing social aggression (Chamberlain, Leve, & DeGarmo, 2007). Research on the modified program found that girls in MTFC had superior outcomes on a host of delinquency-related behaviors, including significantly lower overall delinquency at a 24-month follow-up (measured by a construct comprised of days in locked settings, criminal referrals, and self-reported delinquency; Chamberlain et al., 2007), and reduced affiliation with delinquent peers at 6- and 12-month follow-ups (Leve & Chamberlain, 2005), when compared to girls in GC. Girls in MTFC also reported significantly lower rates of pregnancy at a 24-month follow-up (Kerr, Leve, & Chamberlain, 2009) and greater school attendance and homework completion at a 12-month follow-up than girls in group care (Leve & Chamberlain, 2007). The current study includes the same sample of girls who participated in the original MTFC girl study (e.g., Chamberlain et al., 2007), and adds a second cohort of girls who were recruited contiguously to the original sample, using identical enrollment criteria and recruitment methods.

Mediating processes

Despite the strong track record of the MTFC program in terms of reducing problem behavior among delinquent youth, less research has examined the processes by which MTFC is influencing these outcomes. This limitation does not only apply to research on MTFC; Liddle (2004) noted that although many family-based intervention programs have demonstrated favorable outcomes, we have a limited understanding of how these outcomes are achieved, and the author called for more research on the exact "mechanisms of action" (p. 83). More recently, Sandler and colleagues (2011) reviewed the literature on effective family interventions for child and adolescent problem behavior and noted that only a few studies examine the process by which effects are achieved in terms of mediation. Indeed, Chamberlain and colleagues (2007) acknowledged the need to investigate mediating processes in MTFC research.

When considering potential mediators, we note that previous research on MTFC has found significant program effects on delinquent peer affiliation over the first 12-months following baseline (Eddy & Chamberlain, 2000; Leve & Chamberlain, 2005). This finding is particularly noteworthy, since, as discussed above, peers become an increasingly strong influence on individual behavior during adolescence and can contribute to escalating levels of delinquent behavior (Deater-Deckard, 2001; Dishion & Tipsord, 2010; Farrington, 1995; Patterson et al., 2000). Further, independent research suggests that delinquent peer affiliation mediates the link between parenting variables and youth delinquency (Ary, Duncan, Biglan et al., 1999; Ary, Duncan, Duncan, & Hops, 1999).

Some research exists investigating the mediating mechanisms of MTFC on delinquent behavior (i.e., Eddy & Chamberlain, 2000), and this includes a consideration of delinquent peer affiliation. However, this research could be usefully extended in several ways. First, Eddy and Chamberlain (2000) combined parenting and peer factors into a single mediating variable, and thus the exact mediating mechanism was unclear. Second, their study was limited to boys, and the links between family variables, delinquent peers, and antisocial behavior may differ for girls. For example, different aspects of family functioning may influence the choice to affiliate with delinquent peers, with father negativity exerting a stronger influence for boys than for girls (Kim, Hetherington, & Reiss, 1999). In addition, some research suggests that girls are less affected by delinquent peers than are boys (van Lier, Vitaro, Wanner, Vuijk, & Crijnen, 2005), although other research finds no sex differences (Werner & Silbereisen, 2003). Thus, the impact of an intervention such as

MTFC that attempts to reduce negative family interactions may be more likely to reduce delinquent peer affiliation among boys, and likewise a reduction in delinquent peer affiliation may be more likely to impact antisocial behavior among boys. Accordingly, although previous work has shown that a composite variable representing both parenting and peer factors mediated MTFC program effects on delinquent behavior for boys, it is unclear whether delinquent peer affiliation itself would mediate program effects on delinquency for girls. Research investigating this issue would not only shed new light on the MTFC intervention but also contribute to general theory and practice by clarifying (1) whether family-based interventions such as MTFC can influence delinquent peer affiliation among girls, and (2) whether delinquent peer affiliation can influence delinquent behavior in girls as well as in boys and, as such, is deserving of more attention in prevention and intervention program development.

Prior work with the first cohort of the present MTFC sample of girls indicated that MTFC does impact delinquent peer affiliation in a combined sample of girls and boys (Leve & Chamberlain, 2005). Specifically, Leve and Chamberlain found that MTFC effects on youth and parent reports of delinquent peer affiliation at 12 months were mediated by delinquent peer affiliation in the intervention setting (3–6 months after baseline). In other words, the ability of the MTFC foster home to reduce delinquent peer affiliation while youth were on-site was a mechanism by which MTFC reduced later delinquent peer affiliation after the conclusion of the intervention. The sample was comprised of boys and girls ($n = 71$ and 81, respectively) and the authors did not explicitly examine whether program effects were the same for boys and girls, Thus, it would be prudent to explicitly evaluate this hypothesis as we do in the current study.

Current study

In this study, we evaluated the ability of delinquent peer affiliation to mediate MTFC program effects among girls on measures of delinquent behavior used in prior reports (see Chamberlain et al., 2007, and Leve, Chamberlain, Smith, & Harold, 2011), including self-reported general delinquency, number of criminal referrals, and number of days in locked settings. Nearly all of the previous research on delinquency and peer outcomes in the MTFC condition has originated from the initial trial (Cohort I), with the one exception being a recent chapter in which the first and second trials (Cohorts I and II) were combined and significant intervention effects were reported on a composite variable representing girls' rates of criminal referrals, days spent in locked settings, and self-reported delinquency at 12 months (Leve et al., 2011). In the present study, we examined whether these outcomes held at 24 months in the combined sample, and whether delinquent peer affiliation at 12 months acted as a mediator of any intervention effects. If links between the MTFC condition, delinquent peers, and delinquent behavior were found, it would be important from both a theoretical and practical standpoint. For example, significant findings would imply that the links among family processes, delinquent peers, and antisocial behavior are not as different across genders as some previous research has suggested, at least among high-risk or delinquent populations. Significant findings could also guide the development and refinement of family-based intervention programs for girls by emphasizing the importance of program components aimed at reducing delinquent peer affiliation.

Method

Participants

Participants were 166 girls who were involved in one of two consecutively run randomized controlled trials. The sample for Study 1 included 81 girls recruited in Oregon between winter 1997 and summer 2002 (MTFC $n = 37$; GC $n = 44$). The sample for Study 2

consisted of 85 girls recruited in the same region in Oregon between fall 2002 and fall 2006 (MTFC $n = 44$; GC $n = 41$). Recruitment procedures for the two studies were identical. An additional intervention component targeting drug use and HIV/AIDS risk was added to Study 2; otherwise, the intervention models tested in the two studies were identical.

The girls had been mandated to community-based, out-of-home care due to problems with chronic delinquency. Girls pregnant at the time of recruitment were excluded from enrollment. Girls referred to the two randomized controlled trials were 13–17 years of age and had at least one criminal referral in the prior 12 months. The project coordinator randomly assigned girls to MTFC ($n = 81$) or GC ($n = 85$; see Figure 1). Enrollment occurred continuously between cohorts, using identical procedures. Analyses included the entire intent-to-treat (ITT) randomized sample. Girls provided assent and their legal guardian provided consent for the girl to participate.

Girls averaged 15.31 years old at baseline ($SD = 1.17$ yrs) and were assessed again 12 months (T2) and 24 months (T3) later. Seventy-four percent were European-American, 2% were African American, 7% were Hispanic, 4% were Native American, 1% were Asian, and 13% reported mixed ethnic heritage. At baseline, 61% of the girls lived with single-parent families, and 32% of the girls lived in families earning less than $10,000. There were no group or cohort differences regarding the rates or types of pre-baseline offenses (e.g., arrests, drug use), documented cases of maltreatment (e.g., physical or sexual abuse), or on other demographic characteristics (e.g., race, age, family income, number of prior placements). The study was conducted in compliance with our institutional review board (IRB).

Procedure

MTFC condition—MTFC girls were individually placed in one of 22 highly trained and supervised homes with state-certified foster parents (see Chamberlain, 2003, for a detailed description of MTFC). Foster parents receive state certification after 20 hours of pre-service orientation. Experienced program supervisors oversaw all clinical staff, coordinated all aspects of each youth's placement, and maintained daily contact with MTFC parents to monitor treatment fidelity and to provide ongoing consultation, support, and crisis intervention services. MTFC placements involve coordinated interventions in the home, with peers, in educational settings, and with the adolescent's birth parents, adoptive family, or other long-term placement resource. Specifically, interventions included all basic MTFC components: (1) daily telephone contact with the foster parents to monitor case progress and adherence to the MTFC model; (2) weekly group supervision and support meetings for foster parents; (3) an individualized, in-home, daily point-and-level program for each girl; (4) individual therapy for each girl; (5) family therapy for the aftercare placement family focusing on parent management strategies; (6) close monitoring of school attendance, performance, and homework completion; (7) case management to coordinate the interventions in the foster family, peer, and school settings; (8) 24-hr on-call staff support for foster and biological parents; and (9) psychiatric consultation, as needed. In Cohort II, the MTFC condition additionally included intervention components targeting substance use (motivational interviewing and incentives for clean urinalyses) and risky sexual behavior (information on sexual behavior norms and HIV-risk behaviors and instruction about strategies for being sexually responsible; girls also participated in an interactive video "virtual date" aimed at helping them identify and avoid sexual coercion). Overall, the MTFC intervention embodies a strong focus on strength-building and positive reinforcement, and specific treatment services are tailored to the child's developmental level.

Five specific adaptations for girls were developed based on previous research and our clinical experiences, each of which focused on additional training for foster parents and

therapists on new strategies and protocols relevant to girls. The female-focused intervention components included the following adaptations: (a) providing girls with reinforcement and sanctions for coping with and avoiding social/relational aggression; (b) working with girls to develop and practice strategies for emotional regulation, such as early recognition of their feelings of distress and problem solving coping mechanisms; (c) helping girls develop peer relationship building skills, such as initiating conversations and modulating their level of self disclosure to fit the situation; (d) teaching girls strategies to avoid and deal with sexually risky and coercive situations; and (e) helping girls understand their personal risks for drug use, including priority setting using motivational interviewing and provision of incentives for abstinence from drug use monitored through random urinalysis.

Control condition—GC girls were placed in 1 of 35 community-based GC programs located in Oregon; across the two trials, each site served 1–12 study participants ($M = 2.18$, $SD = 2.95$). The programs had 2–83 youths in residence ($M = 13$) and 1–85 staff members ($Mdn = 9$); GC facilities either served girls only (68%) or served both genders, but the facilities housed girls and boys in separate units. GC sites either: (a) required schooling on-grounds (41%), (b) sent only some girls to school off-grounds (38%), or (c) sent all girls to school off-grounds (21%). Program philosophies were primarily behavioral (67%) or multi-perspective (33%); 80% of the programs reported delivering weekly therapeutic services.

Intervention services generally lasted less than 6 months ($M = 175$ days, $Mdn = 133$ days). Data were positively skewed, so we used a nonparametric test and found no significant differences in the length of treatment between MTFC ($M = 196$ days, $Mdn = 190$ days) and GC conditions ($M = 154$ days, $Mdn = 115$ days; Mann-Whitney U standardized test statistic $= 1.44$, $p = .15$).

Measures

Prior to entering their out-of-home placement, each girl and her parent or other primary pre-placement caregiver participated in a 2-hr baseline (BL) assessment. 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-baseline, girls and their caregivers completed a follow-up assessment, and juvenile court records were collected. This study uses delinquent peer affiliation measured at 12 months and delinquency outcomes measured at 24 months. The delinquency measures used in the present study were identical to those used in prior reports with Cohort I participants (e.g., Chamberlain et al., 2007; Leve et al., 2011).

Delinquent peer affiliation—Affiliation with delinquent peers was measured at baseline and 12 months via the Describing Friends Questionnaire (DFQ; Capaldi & Dishion, 1985). Girls reported on the extent to which youth associate with friends who engage in delinquent activities. Each youth indicated how many of their friends engaged in 16 different antisocial activities (e.g., cheating on tests, stealing, and getting drunk) during the prior 6-month period on a scale from 1 (*none of my friends*) to 5 (*all of my friends*). Item scores were averaged to create a composite of delinquent peer affiliation. Reliability was acceptable in each of the two cohorts (baseline = .87/.92; 12 months = .94/.95).

General delinquency—Self-reported delinquency was measured with the Elliott General Delinquency Scale (Elliott, Huizinga, & Ageton, 1985) at baseline and 24 months. The 21-item subscale records the number of times girls report violating laws during the preceding 12 months. Each item was capped at a maximum frequency of 7 prior to computing the total score. This strategy was used in samples of male juvenile offenders (Chamberlain & Reid, 1998; Eddy & Chamberlain, 2000) and in our prior work with the female sample

(Chamberlain et al., 2007) to transform the scores closer to normality. Reliability was acceptable in both cohorts (baseline = .84/.84; 24 months = .83/.86).

Number of criminal referrals—Criminal referrals were collected from state police records and circuit court data, which have been found to be reliable indicators of delinquent behavior (Capaldi & Stoolmiller, 1999). We collected juvenile court records data to determine the number of criminal referrals and related offenses over the 12 months prior to baseline and during the 24 months following baseline. Typical referrals include probation violations, status offenses (minor in possession of alcohol or tobacco), and driving violations.

Number of days in locked settings—The number of days spent in locked settings over the 12 months prior to baseline and during the 24 months following baseline was measured by girls' report of total days spent in detention, correctional facilities, jail, or prison using a structured interview that asked the girl about her whereabouts each day over the course of the year.

Intervention condition—Random assignment to MTFC was coded as 1 and assignment to group care (GC) was coded as zero.

Analysis plan: Given that much of the previous research evaluated MTFC program effects by grouping various kinds of delinquent behavior into a single construct (Chamberlain et al., 2007; Eddy & Chamberlain, 2000; Leve et al., 2011), we first evaluated whether our outcomes (i.e., number of criminal referrals, number of days in locked settings, and general delinquency) were significantly correlated and thus appropriately represented as a single latent construct; if not, they were evaluated separately.

Our next step was to examine direct effects of MTFC on outcomes at 24 months while controlling for baseline levels. Following this, we examined the ability of delinquent peer affiliation, measured at 12 months, to mediate the effects of MTFC on these outcomes. In general, requirements for mediation include a significant direct effect of the predictor on the presumed mediator (i.e., path C; see conceptual model in Figure 1) and on the distal outcome (i.e., path A), a significant direct effect of the mediator on the outcome (i.e., path D), and a significant indirect effect of the predictor on the outcome via the mediator (i.e., path C*D; Judd, Kenny, & McClelland, 2001; MacKinnon & Dwyer, 1993). However, some have argued that this approach is too restrictive (e.g., MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) and have advocated for the consideration of other approaches that focus solely on the joint significance of the paths from the predictor to the proposed mediator and from the mediator to the outcome (i.e., path C*D). In the absence of a direct effect of the predictor on the outcome, MacKinnon et al. (2002) refer to the purported mediator as an "intervening variable" rather than as a mediator per se. Thus, if we find direct effects of the intervention on problem behavior outcomes as in Chamberlain et al. (2007), we will evaluate delinquent peer affiliation as a mediator; if direct effects are not present, we will evaluate delinquent peer affiliation as an intervening variable, i.e., a variable that is impacted by the intervention that can, in turn, promote beneficial outcomes and thus is theoretically and clinically meaningful (Sandler et al., 2011). In our model, we controlled for the effects of delinquency at baseline on delinquency at 24 months (path B) as well as delinquent peer affiliation at baseline on delinquent peer affiliation at 12 months (path E) and on the outcomes (path F). Girls' age was controlled throughout the model.

All path modeling was conducted using Structural Equation Modeling (SEM) with Mplus 6.1 (Muthén & Muthén, 2008). Both number of days in locked settings and number of criminal referrals were treated as count variables. Mplus does not provide absolute indices

of fit (e.g., CFI, RMSEA, etc.) for models that contain count variables, so no model fit statistics can be reported. To include the full randomized sample in the analysis, we used full information maximum likelihood (FIML) estimation, which has been shown to provide unbiased estimates when data are Missing at Random (MAR) or Missing Completely at Random (MCAR; Arbuckle, 1996). There was some degree of missing data in our sample (see Table 1), but the data were MCAR [Little (1988) test, $\chi^2(141) = 152.93$, *ns*], so the missing data did not introduce bias into the analyses. Alpha (α) was set to .05.

Standard techniques for assessing the significance of indirect effects assume a normal distribution, so we used an analytic technique that is based upon the *actual* distribution of the indirect effect (PRODCLIN; MacKinnon, Fritz, Williams, & Lockwood, 2007); this technique can provide an unbiased assessment of statistical significance even in situations where the indirect effect is not normally distributed. PRODCLIN provides a 95% confidence interval for the indirect effect, and if this confidence interval does not contain zero, the effect is considered to be statistically significant.

Results

Correlations among model variables are provided in Table 1 (Spearman's rank-order correlations were used for the count-based referral and locked settings data). The intervention condition was negatively correlated with delinquent peer affiliation at 12 months and with days in locked settings, and marginally correlated with number of criminal referrals. Number of criminal referrals and days in locked settings were significantly correlated at both baseline and 24 months, but self-report delinquency was not correlated with these two variables at baseline; thus, we created a latent variable for criminal referrals and days in locked settings but analyzed self-report delinquency separately. Descriptive statistics by intervention condition (i.e., MTFC vs. GC) are provided in Table 2. Both groups appear to decline in delinquency and delinquent peer affiliation across time.

The path coefficients for a direct effects model (i.e., without the mediator) are provided in Table 3. Factor loadings for number of criminal referrals and days in locked settings were significant but not directly interpretable so are not presented. MTFC had a significant direct effect on the latent variable representing referrals and days in locked settings at 24 months, controlling for the same latent variable at baseline; however, the effect on self-report general delinquency was not significant. Thus, we can only discuss mediation in terms of the latent construct, although indirect effects for both outcomes were examined. In this model, girls' age did not predict any outcome.

Our next step was to fit the full model, with the MTFC intervention condition predicting delinquent peer affiliation at 12 months, and delinquent peer affiliation predicting the outcome variables. Path coefficients are provided in Table 3. MTFC predicted significantly lower levels of delinquent peer affiliation at 12 months, controlling for delinquent peers at baseline. In turn, delinquent peer affiliation at 12 months predicted significantly higher levels of both the latent construct and self-reported general delinquency. The indirect effects of MTFC on the both variables via delinquent peer affiliation were negative, and both were significant (see Table 4). Age negatively predicted the latent construct representing criminal referrals and days in locked settings in this model ($\beta = -\ p < .05$), suggesting that younger girls had greater numbers of referrals and days in locked settings; age did not predict self-report delinquent behavior or delinquent peer affiliation.

Discussion

This study extends prior work on MTFC that included only the first cohort of participants (Chamberlain et al., 2007), and our results indicated that participation in the MTFC program can reduce girls' delinquency. Specifically, we found significant reductions in a delinquency construct comprised of criminal referrals and days in locked settings at 24 months among the MTFC condition. We did not find significant direct effects for self-reported general delinquency, replicating a null effect of MTFC on 12-month self-reported general delinquency outcomes found in the first cohort (Leve, Chamberlain, & Reid, 2005). Although the present findings are consistent with prior reports from the first cohort, the discrepancy between self-report and more objective delinquency outcomes (i.e., days in locked settings and number of criminal referrals) noted in multiple studies and at multiple timepoints suggests that for girls, the self-report nature of the general delinquency assessment may make it vulnerable to under- or over-reporting.

We also found that participation in the MTFC program reduced girls' exposure to delinquent peers at 12 months, which in turn predicted lower levels of delinquent behavior at 24 months. We found significant indirect effects for both indices of delinquency (i.e., self-reported delinquent behavior as well as the latent construct representing the number of criminal referrals and days in locked settings). Thus, with regards to the latent construct, delinquent peer affiliation was a mediator of intervention effects; in contrast, with regards to self-reported delinquency, delinquent peer affiliation was an "intervening variable", or a variable that was influenced by MTFC and, in turn, influenced the outcome. Thus, although MTFC did not directly lead to a decrease in self-reported delinquency, it did reduce delinquent peer affiliation, which in turn contributed to lower levels of delinquency.

These results add to the existing literature by suggesting that family-based programs such as MTFC can have positive and lasting effects on delinquent peer affiliation for girls as well as boys. Our findings contrast with some previous research suggesting that caregiving factors were not as strongly linked to delinquent peer affiliation for girls (Kim et al., 1999). This discrepancy may be due to the nature of the two samples, with Kim et al. (1999) possessing a community-based sample as opposed to our high-risk sample, in which the ratio of delinquent to non-delinquent peers may be higher and thus contact with delinquent peers more frequent (and more impactful). Differences may also be due to our use of self-reports for delinquent peer affiliation, whereas Kim et al. (1999) used parent-report.

More importantly, our results demonstrate that reductions in delinquent peer affiliation can have salutary effects on delinquency for girls as well as boys, even though some previous research suggests that delinquent peers have less influence on girls as opposed to boys (van Lier et al., 2005). Differences in this case may be due to the age of the samples, with van Lier et al. (2005) using a younger sample in which peers may be less influential on individual behavior. Alternatively, methodological differences may again be in play, with van Lier et al. (2005) deriving their measure of delinquent peer affiliation from sociometric nominations.

There are multiple mechanisms within MTFC which could be responsible for the program effects on delinquent peer affiliation. For example, MTFC focuses on developing supportive interpersonal relations for delinquent boys and girls (i.e., secure relationships with caregivers and other mentoring adults) and trains caregivers to positively reinforce prosocial behavior, both of which can aid youth in developing social skills and securing effective social support (Chamberlain, 2003; Leve, Fisher, & Chamberlain, 2009). Thus, girls in MTFC may be able to interact more effectively with peers, suffer less peer rejection, and therefore may be less open to affiliating with delinquent peers. In addition, youth in MTFC

receive individual therapy and skills coaching, which can include, for example, role-playing with a therapist to develop more appropriate ways to react to perceived provocations from peers and learning ways to initiate healthier peer interactions oriented toward friendship. A skills coach may, for example, help youth to identify and participate in community activities, which can promote contact with more normative peers. Indeed, it may be that all of these activities contribute to the overall program effects on delinquent peer affiliation. Further research is required to identify the specific components of MTFC that are responsible for these program effects. Such research may focus on additional mediators such as reduced peer rejection, reduced negative perception biases, and increased community involvement or extracurricular activities.

Limitations and conclusion

Limitations of this study include the modest sample size and the fact that the majority of participating girls were European-American, which was representative of the region but not of the female juvenile justice population at large. In addition, we did not have a comparison sample of boys in this study to examine whether the magnitude of associations across study variables was similar for boys and girls. Further, the current study examined outcomes 24 months following baseline, and it is unknown whether the effects would maintain or persist in a longer-term follow-up.

From a statistical perspective, our data were multi-level in nature, with girls nested within treatment locations. Unfortunately the complexity of our model and the fact that two-thirds of sites had only one girl precluded a multi-level analysis in Mplus; however, we were able to replicate components of the model using a multi-level regression technique that accounted for nesting. The results from this analysis did not vary from those presented herein, so we conclude that nesting did not introduce a substantial degree of bias.

Finally, we must consider the possibility that the differences in delinquent peer affiliation at 12 months could be due to processes related to group care (i.e., iatrogenic effects) as much as a result of processes in the MTFC program. As discussed above, community-based group treatment conditions such as the one used as a control in this study may leave youth vulnerable to situations in which delinquent individuals encourage higher levels of problem behavior in one another (i.e., "peer contagion"). Thus, results such as those reported herein could be due to an increase in delinquent peer affiliation in the control group as much as a decrease in delinquent peer affiliation in the intervention group. As shown in Table 2, however, our control group did not seem to suffer from iatrogenic effects, and in fact seemed to demonstrate decreases in all measures of delinquency and delinquent peer affiliation across time. In addition, there was little overlap between the group care condition and the delinquent peer assessment, given that (1) most group care (approximately 70%) was completed within 6 months and (2) the delinquent peer assessment at one year referred to the previous 6 months. Thus, it seems unlikely that group care exerted some sort of promotive influence on later delinquent peer affiliation in our sample. To empirically address this issue, however, a three-way comparison among group care, MTFC, and a third intervention condition that does not aggregate delinquent youth would be required. Ultimately, the purpose in this study was to explore whether MTFC provided benefits over and above current practice (i.e., group care), and that does appear to be the case.

Future research could explore additional mediators, such as parenting processes. Our measures of monitoring and supervision varied somewhat across the two cohorts in ways that were not reliably merged, and since our paper focuses on the combined cohorts, we did not incorporate these data into our analysis. We believe deviant peer affiliation to be a direct consequence of poor monitoring and supervision, and would hypothesize significant mediational effects for these parenting variables as well.

In sum, our results, and the MTFC literature to date, confirm that MTFC can be an effective intervention program for delinquent girls as well as boys. Our findings add to the literature by shedding new light on the processes within MTFC, demonstrating that program effects on delinquent behavior are delivered, at least in part, via reductions in delinquent peer affiliation. In addition, our results suggest that, in the context of a delinquent female population, delinquent peer affiliation can play an important role in the development (and desistance) of many kinds of delinquent behavior. Other prevention and intervention programs targeting similar populations may benefit from increased attention to reductions in delinquent peer affiliation among target youth.

Acknowledgments

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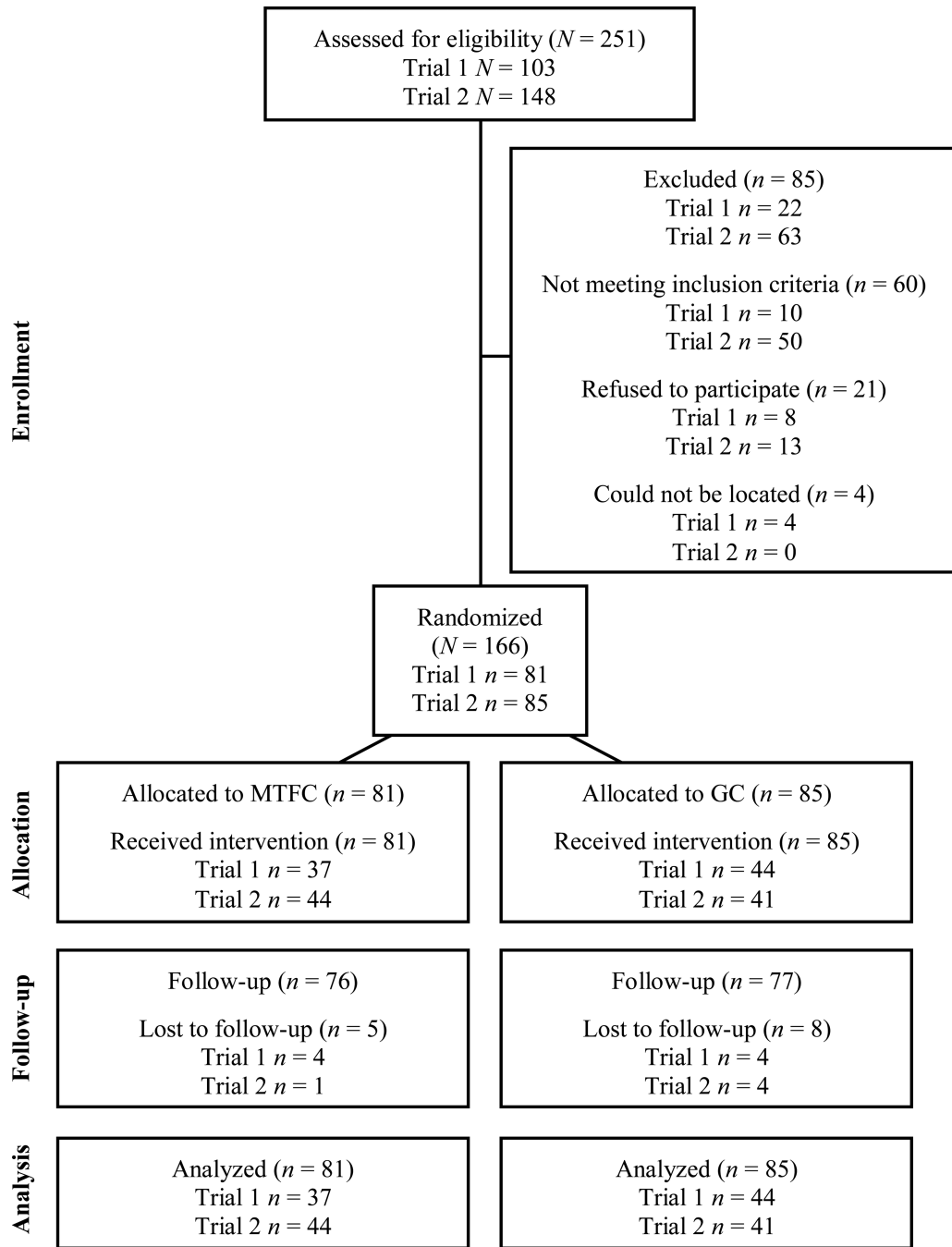**Figure 1.**
CONSORT diagram of participant flow through study recruitment, randomization to MTFC or GC, and 24-month follow-up for girls in Trials 1 and 2.
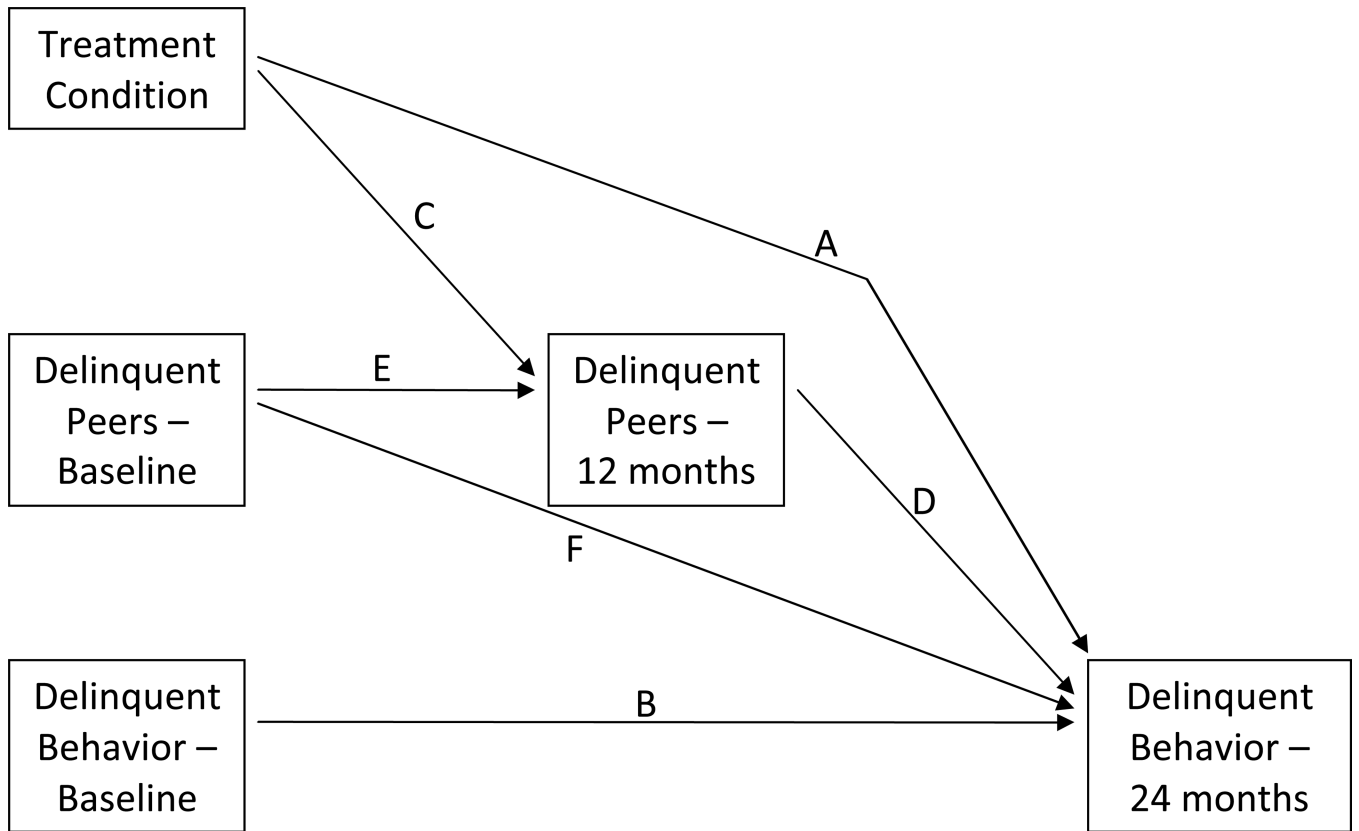
Figure 2.
Conceptual model.

Table 1

Correlations

Variable	1	2	3	4	5	6	7	8	9
1. Intervention condition	—								
2. Delinquent peer affil. (BL)	.01	—							
3. Delinquehnt peer affil. (12 mos.)	−.20 *	.44 ***	—						
4. General delinquency (BL)	.04	.49 ***	.28 **	—					
5. General delinquency (24 mos.)	−.06	.14	.27 **	.17 *	—				
6. Num. of crim referrals (BL)	−.02	−.01	.03	.13	.12	—			
7. Num. of crim referrals (24 mos.)	−.14 †	−.04	.18 *	.10	.15 †	.33 ***	—		
8. Num. of days locked (BL)	−.09	.12	−.03	.11	.00	.20 *	.05	—	
9. Num. of days locked (24 mos.)	−.18 *	.19 *	.33 ***	.28 **	.25 **	.35 ***	.48 ***	.31 ***	—
N	166	160	146	166	135	166	166	157	130

Note. Spearman's correlations used for count-based variables (number of criminal referrals, number of days in locked settings).

†
$p < .10$.

*
$p < .05$.

**
$p < .01$.

***
$p < .001$.

Table 2

Descriptive statistics for key measures

Variable	Mean[a]/Median[b]			SD[a]/Range[b]		
	BL	12 Mo.	24 Mo.	BL	12 Mo.	24 Mo.
	MTFC Condition					
Num. of crim referrals[b]	5.00	.00	1.00	20.00	7.00	12.00
Num. of days locked[b]	41.00	3.00	13.50	291.00	282.00	612.00
General delinquency[a]	1.21	.66	.50	1.02	.96	1.05
Delinquent peer affil.[a]	2.91	1.97	1.88	.79	.91	.89
	Control (GC) Condition					
Num. of crim referrals[b]	4.00	1.00	2.00	23.00	7.00	12.00
Num. of days locked[b]	49.00	15.00	47.50	252.00	365.00	561.00
General delinquency[a]	1.12	.60	.62	1.01	1.08	.96
Delinquent peer affil.[a]	2.89	2.34	2.07	.89	.95	.97

Note. BL = Baseline.

Table 3

Unstandardized and standardized model coefficients

Model Path	Direct Effects Model			Full Model		
	B	SE (B)	β	B	SE (B)	β
MTFC→GD(24)	−.12	.16	−.06	−.04	.16	−.02
GD(BL)→GD(24)	.16	.09	.16	.12	.09	.13
MTFC→Latent(24)	−.37*	.16	−.20	−.26	.15	−.14
Latent (BL)→Latent (24)	.65***	.14	.54	.58***	.18	.51
MTFC→Dev Peers(12)	-	-	-	−.34*	.14	−.18
Delinq Peers(BL)→Delinq Peers(12)	-	-	-	.48***	.08	.42
Delinq Peers(12)→GD(24)	-	-	-	.25*	.12	.24
Delinq Peers(12)→Latent (24)	-	-	-	.30**	.10	.31

Note. GD = General Delinquency. MTFC = Multidimensional Treatment Foster Care. BL = Baseline. Latent = latent variable comprised of number of criminal referrals and number of days in locked settings.

*
p < .05.

**
p < .01.

***
p < .001.

Table 4

Indirect effects

Indirect Effects	Effect	SE	95% CI	β
MTFC→Delinq Peers(12)→GC(24)	−.08	.05	−.203 | −.005	−.04
MTFC→Delinq Peers(12)→Latent(24)	−.10	.05	−.222 | −.017	−.06

Note. Effect is considered significant if the 95% Confidence Interval does not contain zero. Latent = latent variable comprised of number of criminal referrals and number of days in locked settings.