

Pregnancy Rates Among Juvenile Justice Girls in Two Randomized Controlled Trials of Multidimensional Treatment Foster Care

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Preventing adolescent pregnancy is a national research priority that has had limited success. In the present study, the authors examined whether Multidimensional Treatment Foster Care (MTFC) relative to intervention services as usual (group care [GC]) decreased pregnancy rates among juvenile justice girls mandated to out-of-home care. Girls (13–17 years of age) with histories of criminal referrals ($Mdn = 10$) were randomly assigned to MTFC ($n = 81$) or GC ($n = 85$) as part of 2 randomized controlled trials. Pregnancy histories were assessed from baseline through 24 months. Fewer postbaseline pregnancies were reported for MTFC girls (26.9%) than for GC girls (46.9%)—an effect that remained significant after controlling for baseline criminal referrals, pregnancy history, and sexual activity. MTFC has previously been shown to decrease arrest and lock-up rates. The present findings support the long-term preventive effects of MTFC on adolescent girls' pregnancy rates. Findings are consistent with the notion that programs that target delinquency by impacting general risk behavior pathways and contexts may more successfully prevent teen pregnancy than those that directly target sexual behaviors.

Keywords: pregnancy, prevention, juvenile justice, delinquency, RCT

Preventing teenage pregnancy is a national priority in the United States (Kirby, 2007). Early parenthood is associated with negative psychosocial and health outcomes for young mothers and their offspring, in part because of characteristics of those at greatest risk (Jaffe, 2002). Additionally, teen childbearing cost U.S. taxpayers \$9.1 billion in 2004 (Hoffman, 2006).

Annual rates of pregnancy among American girls 15–19 years of age have fallen in recent years (to 7.64% in 2002) but remain high relative to other industrialized nations (Ventura, Abma, Mosher, & Henshaw, 2006). Though official estimates are unavailable, pregnancy rates appear to be even higher

among adolescent girls in the foster care system (Love, McIntosh, Rosst, & Tertzakian, 2005). One survey of child welfare systems in three states found that nearly half of girls served in these systems reported a pregnancy by age 19 years, compared with 20% of 19-year-old girls in the nationally representative Add Health study (Courtney et al., 2005). The high pregnancy rate among foster care girls is consistent with research on the associations between adverse childhood experiences and adolescent pregnancy, and also with data showing that youths in foster care often show a cluster of problem behaviors (e.g., academic failure, delinquency, and substance use) that co-occurs with risky sexual behavior and teenage pregnancy (Ary, Duncan, Duncan, & Hops, 1999; Huizinga, Loeber, & Thornberry, 1993; Landsverk, Garland, & Leslie, 2001; Pilowsky, 1995). Girls in out-of-home care often have limited psychological, economic, and family support resources, and they may be especially ill-equipped to negotiate the difficult task of teen pregnancy and parenthood. Thus, preventing teenage pregnancy in delinquent and foster care populations is of critical importance.

The present study of two randomized controlled trials (RCTs) offers a test of whether a behavioral intervention aimed at delinquency impacts pregnancy rates among adolescent girls in out-of-home care. Multidimensional Treatment Foster Care (MTFC) was previously shown to be more effective than group care (GC) at reducing girls' delinquency at 12- and 24-month follow-ups (Chamberlain, Leve, & DeGarmo, 2007). Because delinquency shares common underpinnings with risky sexual behavior and other problem behaviors (e.g. impulsivity, poor parental monitoring, deviant peer relationships), it is likely that interventions that target outcomes in one domain (delinquency) will influence outcomes in related domains (pregnancy). Indeed, such effects have been shown in prior prevention studies (e.g., Lonczak, Abbott, Hawkins, Kosterman, & Catalano, 2002) and are consistent with

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experts' assertions that prevention programs should impact shared, distal influences on youth risk behavior, rather than problem-specific, proximal ones alone (Flay, 2002). Therefore, we hypothesized that girls assigned to MTFC would be less likely to become pregnant across a 24-month follow-up period than girls assigned to GC. Because all participants had at least one arrest in the past year, often used alcohol/drugs, were frequently sexually active, and in many cases had been pregnant previously, they were considered to be at high risk for a subsequent pregnancy.

Method

Participants

Participants were 166 girls who participated in one of two consecutively run RCTs ($n = 81$ and 85 for Trials 1 and 2, respectively) conducted from 1997–2006 to contrast MTFC and GC conditions. The girls had been mandated to community-based, out-of-home care because of problems with chronic delinquency. In this study, we attempted to enroll all referred girls who were 13–17 years of age, who had at least one criminal referral in the prior 12 months, who were not currently pregnant, and who were placed in out-of-home care within 12 months following referral. The project coordinator randomly assigned (coin flip) enrolled girls to either MTFC ($n = 81$) or GC ($n = 85$; see Figure 1). All youths and caregivers were aware that they were participants in a research study and were aware that they were receiving treatment services.

Girls were 13–17 years of age at baseline ($M = 15.31$, $SD = 1.17$); 74% were Caucasian, 2% were African American, 7% were Hispanic, 4% were Native American, 1% were Asian, and 13% reported mixed ethnic heritage. In comparison, 93% of the girls 13–19 years of age living in the region of the study were Caucasian (U.S. Department of Commerce, 1992). 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 differences on the rates or types of prebaseline offenses or on other demographic characteristics. No adverse events occurred during the course of the study.

Experimental Intervention

The MTFC intervention is more fully described elsewhere (Chamberlain, 2003; Chamberlain et al., 2007; Leve & Chamberlain, 2007). MTFC girls were individually placed in one of 22 highly trained and supervised homes with state-certified foster parents; across the years the trials were conducted, each MTFC home served 1–19 study participants ($M = 3.68$, $SD = 4.53$). Experienced program supervisors with small caseloads (10 MTFC families) supervised 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. Interventions were individualized but included all basic MTFC components: daily telephone contact with the foster parents to monitor case progress and adherence to the MTFC model; weekly group supervision and support meetings for foster parents; an individualized, in-home, daily point-and-level program for each girl; individual therapy for each girl; family therapy (for the aftercare placement

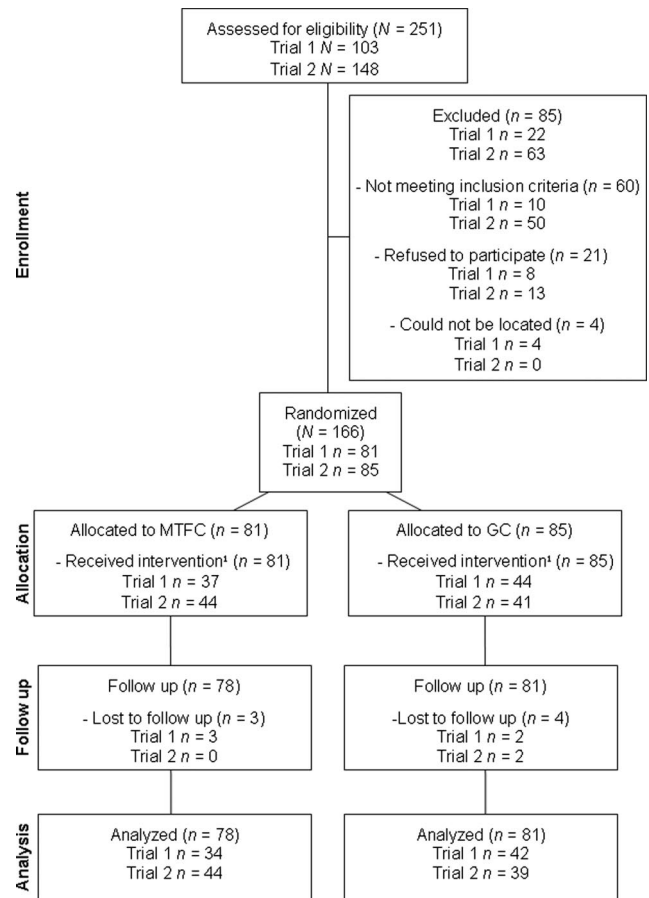


Figure 1. Consolidated Standards of Reporting Trials (CONSORT) diagram of participant flow through study recruitment, randomization to Multidimensional Treatment Foster Care (MTFC) or group care (GC), and 24-month follow-up for girls in Trials 1 and 2. A superscript "1" indicates that some treatment services were received by all youths, though treatment length varied.

family) focusing on parent management strategies; close monitoring of school attendance, performance, and homework completion; case management to coordinate the interventions in the foster family, peer, and school settings; 24-hr on-call staff support for foster and biological parents; and psychiatric consultation, as needed.

In Trial 2, the MTFC condition also included an intervention component that targeted HIV-risk behaviors. The girls were provided with information on dating and sexual behavior norms and on HIV-risk behaviors and were taught strategies for being sexually responsible, including decision making and refusal skills. Role play exercises were conducted with the *Virtual Date* program (Northwest Media, 2002), which depicts key decision points in a practice date. Girls were not randomly assigned to Trial 1 or Trial 2; that is, participation in these consecutively run trials was based on when girls were court-mandated to out-of-home care. Thus, a test of whether the HIV-risk component impacted pregnancy rates beyond the basic MTFC model could not be considered conclusive.

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 ($M = 2.18$, $SD = 2.95$). GC programs represented typical services for girls being referred to out-of-home care by the juvenile justice system. 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 multiperspective (33%); 80% of the programs reported delivering weekly therapeutic services.

Both MTFC and GC program staff generally provided girls with guidance regarding reproductive services. These services were not a core part of intervention services in either condition, and neither the quality nor the types of these services were systematized in either setting. Data pertaining to the provision of such services were not collected.

Measures

Assessment staff persons were blind to group assignment at baseline, and they were not involved in the intervention delivery. Six-month follow-up assessments occurred at a research center or the girl's residence, depending on whether the participant was in a restrictive or locked residential setting. Thus, some 6-month follow-up assessments occurred in the original, randomized placement setting, and unblinded assessors to group assignment. For subsequent interviews, nearly all girls had completed their treatment placement, and thus, assessors were generally blind to study condition.

Baseline criminal referral history. We collected the number of criminal referrals prior to the baseline assessment using state police records and circuit court data. Court records list the individual charges for each girl and the disposition of each charge and are reliable indicators of externalizing behavior (Capaldi & Stoolmiller, 1999).

Baseline sexual activity. The girls reported whether they had been sexually active in the last year (for Trial 1) or in the last 6 months (for Trial 2): 0 (*no*) or 1 (*yes*).

Baseline pregnancy history. Each girl and her current caregiver were separately interviewed at baseline regarding the girl's pregnancy history: 0 (*negative*) or 1 (*positive*). Caregiver reports were used when girls' reports were missing.

Follow-up pregnancy. In Trial 1, each girl and her current caregiver were separately interviewed at 12 and 24 months post-baseline regarding pregnancies that had occurred during the study. In Trial 2, the girls reported at 6, 12, 18, and 24 months post-baseline on whether they had become pregnant in the past 6 months; caregivers reported the girls' past year pregnancies at 12 and 24 months post-baseline. For both trials, the presence or absence of a postbaseline pregnancy was coded in *yes/no* format on the basis of all available information. Pregnancies reported by girls were counted as positive. Caregiver reports were used when girls' reports were missing.

Analyses

We used logistic regressions to predict whether rates of pregnancy across the 24 months postbaseline differed by group assignment (coded 0 [GC] or 1 [MTFC]) using Mplus Version 5.1. The maximum likelihood estimator with robust standard errors was used, and the complex sample analysis option adjusted standard errors for nonindependence of girls within GC or foster care sites (Muthén & Muthén, 1998–2007; Williams, 2000).

Baseline age, number of criminal referrals, trial (Trial 1 or Trial 2), and dichotomous measures of sexual activity and pregnancy history were considered as potential covariates; because the odds of detecting a low base rate phenomenon should increase with the number of informants and with repeated measurements, percentage of missingness also was considered. The Group \times Trial interaction also was examined. Although an interaction would be inconclusive, it might suggest that the effects depended on the HIV-risk reduction component of MTFC added in Trial 2 or on uncontrolled differences between trials.

Results

Baseline characteristics of participants are reported in Table 1. Within each trial, GC and MTFC participants did not differ on any baseline measure. The participants did not differ between trials on any baseline measure, except for sexual activity (Trial 1 = 90.1%; Trial 2 = 77.4%), $\chi^2(1, N = 165) = 4.89$, $p < .05$, for which measurement differed slightly by trial.

Follow-up pregnancy rates are reported in Table 1. Univariate logistic regressions supported that fewer MTFC girls reported a pregnancy (26.9%) during follow-up than did GC girls (46.9%; $n = 159$, Wald = 8.34, $p = .004$, odds ratio [OR] = 0.42, 95% confidence interval (CI) = 0.23–0.75). Groups appeared to differ by 6–12 months postbaseline and to continue to diverge; the study design, however, precluded testing these patterns formally. Baseline number of criminal referrals (OR = 1.05, 95% CI = 1.01–1.08, $p = .010$, $n = 159$), sexual activity (OR = 3.70, 95% CI = 1.17–11.67, $p = .025$, $n = 158$), and history of a prior pregnancy (OR = 3.12, 95% CI = 1.47–6.64, $p = .003$, $n = 158$) each predicted follow-up pregnancy, whereas missingness, age, trial, and the Group \times Trial interaction did not.

The final model controlled for significant covariates (see Table 2). The significant group effect supported that MTFC decreased the probability of pregnancy after baseline relative to GC. Expressed inversely, the odds for becoming pregnant during the follow-up period were 2.44 times larger for GC than for MTFC girls. Baseline pregnancy and criminal referral histories remained independently associated with increased likelihood of postbaseline pregnancy.

One exploratory analysis was aimed at elucidating mechanisms of effect. The interaction between intervention group and baseline criminal referrals was added to the primary model and was found to be significant: $B = -0.132$, $SE(B) = 0.035$, $p < .001$. Post hoc probing, controlling for final model covariates, indicated that baseline criminal referrals predicted follow-up pregnancy among girls assigned to GC (OR = 1.14, 95% CI = 1.08–1.21, $p < .001$, $n = 80$) but not among those in MTFC (OR = 1.00, 95% CI = 0.96–1.04, $p = .86$, $n = 78$).

Table 1
Values on Study Covariates and Outcomes by Group and Trial

Covariate/outcome	Trial 1		Trial 2	
	GC	MTFC	GC	MTFC
Baseline (<i>n</i>)	44	37	41	44
Age in years, <i>M (SD)</i>	15.1 (1.1)	15.4 (1.1)	15.4 (1.3)	15.3 (1.1)
Criminal referrals, <i>M (SD)</i>	11.7 (8.1)	12.4 (9.9)	12.2 (7.6)	11.4 (6.9)
Sexual activity ^a (%)	90.9	89.2	82.9	70.5
Pregnancy history (%)	29.5	27.0	22.0	22.7
6 months (<i>n</i>)			32	41
Pregnancy since baseline (%)			9.4	2.4
12 months (<i>n</i>)	41	33	39	44
Pregnancy since baseline (%)	21.2	15.2	17.9	9.1
18 months (<i>n</i>)			39	44
Pregnancy since baseline (%)			23.1	11.4
24 months (<i>n</i>)	42	34	39	44
Pregnancy since baseline (%)	52.4	32.4	38.5	22.7

Note. *ns* and pregnancy rates are based on cumulative participation at follow-up assessments, and they do not correspond to participation and pregnancy rates at individual time points. GC = group care; MTFC = Multidimensional Treatment Foster Care.

^a Sexual contact in the past 12 months (Trial 1) or past 6 months (Trial 2).

Discussion

Relative to usual community services (GC), MTFC has been shown to have positive and enduring effects on delinquency rates among girls mandated to out-of-home care—an extremely challenging clinical population (Chamberlain et al., 2007). The present findings supported the hypothesis that MTFC also decreases pregnancy rates among these girls relative to GC. Specifically, the odds of getting pregnant for girls in GC were nearly two and a half times those of girls assigned to MTFC. Findings are remarkable for several reasons. First, MTFC girls were placed in less restrictive environments (i.e., community foster homes and greater exposure to normal daily life) than GC girls. Although the MTFC girls were highly supervised, they all attended public schools and had social interactions with community peers. In contrast, the GC girls were more often segregated from male peers¹ and presumably had fewer opportunities to become pregnant during the intervention period. Second, the long-term outcomes from Trial 1 indicated that GC girls spent more time in locked settings (Chamberlain et al., 2007),

further decreasing their contact with males. Third, out-of-home care placements are among the most dramatic interventions possible for adolescents. Both GC and MTFC girls were removed from their families, schools, and peer groups, and both groups of girls showed significant reductions in delinquency over time (Chamberlain et al., 2007). Thus, the significant effects of MTFC on delinquency and pregnancy are even more impressive, given that MTFC was compared against another active treatment.

MTFC effects on pregnancy are of high clinical relevance, given the ecological validity of the study, the effect size, and the extent of the problem in this high-risk population. MTFC effects on pregnancy rates also would be expected to support overall cost-effectiveness, which—although not yet demonstrated for delinquent girls—has been estimated at a savings of \$78,000 per male juvenile relative to GC (Aos, Miller, & Drake, 2006). Findings also are important considering that few programs have demonstrated prevention of teenage pregnancy. It was not possible to identify mechanisms of the effects of treatment assignment on pregnancy, given measurement differences between trials, the lack of specificity regarding the timing of pregnancies, the lack of data collected on the reproductive services that girls at either site received, and limited statistical power. Exploratory analyses supported that the number of criminal referrals at baseline predicted pregnancy only among girls who received GC, suggesting that effects of MTFC on delinquency and pregnancy may occur through common mechanisms. Still, we can only speculate that one or more of the MTFC targeted processes (e.g., increased parental monitoring, reinforcement of positive behaviors, and support for academic achievement; see Leve & Chamberlain, 2007) impacted girls' deviant peer involvement, school engagement, and awareness of potential for different life outcomes; we can also

Table 2
Results of Final Logistic Regression Predicting Pregnancy in the 24 Months Following Baseline

Predictor	<i>B</i>	<i>SE(B)</i>	OR	95% CI
Baseline criminal referrals	0.05	0.02	1.05**	1.00–1.10
Baseline sexual activity	1.04	0.61	2.83*	0.86–9.26
Baseline pregnancy history	1.22	0.41	3.38**	1.50–7.60
Group (GC or MTFC)	−0.89	0.31	0.41**	0.23–0.75

Note. Model R^2 ($n = 158$) = .209, $p = .004$. Baseline pregnancy history, sexual activity, and the pregnancy outcome were coded as follows: 0 (negative) or 1 (positive). Group was coded as follows: 0 (group care [GC]) or 1 (Multidimensional Treatment Foster Care [MTFC]). OR = odds ratio; CI = confidence interval.

* $p < .10$. ** $p < .01$.

¹ Whether male adolescents were served in GC sites did not predict 24-month pregnancy (OR = 1.32, $p = .60$).

speculate that perhaps this sequence ultimately resulted in less, or less often unprotected, sexual intercourse.

It is notable that curriculum-based programs that directly target sexual behaviors and attitudes have generally failed to show reductions in pregnancy rates (Kirby, 2007). The underwhelming results of carefully conceived programs may be due to difficulties in detecting low base rate events across relatively short periods. Yet, consistent with the present findings, several youth prevention programs that have demonstrated effects on pregnancy rates either have not focused on sexual behavior (Lonczak et al., 2002) or have included sexual education as part of a broader youth development program (Allen, Philliber, Herrling, & Kuperminc, 1997). These effective programs included components such as parent and teacher training in behavior management; tutoring; promotion of school bonding; child social and emotional skill-building; mental, medical, and reproductive health care; and facilitation of employment and volunteerism.

These prior studies support the theory that altering general developmental pathways that lead to a host of negative outcomes might be more effective than exclusively targeting problem-specific behaviors, skills, and attitudes thought to be directly related to teen pregnancy. Framed somewhat differently, focusing prevention efforts on contexts that discourage pregnancy (e.g., those that adults monitor) may be more effective with this population than models that fully rely on adolescents' agency (e.g., sex education). In the present study, we did not directly test these important hypotheses. However, there was no evidence that the delivery of MTFC in Trials 1 and 2 (the latter of which included HIV-prevention components) differentially impacted the likelihood of pregnancy. Thus, one interpretation of these findings is that for delinquent girls, a program that targets the general behaviors and contexts that underlie an array of problem behaviors may be effective at preventing pregnancy, whereas efforts to affect more proximal causes may not yield additional impact.

The predictive effects of study covariates also deserve discussion. First, a positive baseline pregnancy history increased the odds of a subsequent pregnancy by approximately 3 times. Though not surprising, this effect is notable given that approximately one quarter of the sample had been pregnant at study entry and given that the effect was not diminished by reports of sexual activity. Thus, teen pregnancy history, in addition to being a proxy for girls' sexual activity, is itself a powerful indicator of risk. Second, girls who had more arrests at baseline were more likely to become pregnant during follow-up. This effect is consistent with multiple community-based studies of the association between risky sexual behavior and delinquency (e.g., Ary et al., 1999). Third, older girls were no more likely than younger girls to become pregnant during follow-up. This remarkable null finding is likely explained by the severity of problems among girls who enter the juvenile justice system by early adolescence.

The present study requires replication and has some limitations. First, pregnancies were not medically verified. Second, results may not generalize to urban or more ethnically diverse samples of juvenile justice girls. A third limitation is that some assessors were not blind to group assignment at the 6-month follow-up, though it seems unlikely that assessor bias impacted girl or caregiver report of a pregnancy.

In conclusion, the prevention of teenage pregnancies is a national priority, and preventive interventions based on sexual edu-

cation and abstinence have had limited success. The results of the present study indirectly support the theory that altering general problem behavior pathways that lead to delinquency may also reduce teen pregnancy among high-risk adolescent girls. Given the economic and psychosocial burdens of teen childbearing and the very limited resources that girls in the juvenile justice system tend to bring to the task of parenting, the present effects of MTFC on pregnancy rates are of high public health significance.

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