The Impact of the Fast Track Prevention Trial on Health Services Utilization by Youth At Risk for Conduct Problems

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ABSTRACT

Objective: This study tested the impact of the Fast Track conduct disorder prevention program on the use of pediatric, general health, and mental health services in adolescence.

Patients and Methods: Participants were 891 public kindergarten boys and girls screened from a population of 9,594 children and found to be at risk for conduct disorder. They were assigned randomly (by school) to intervention or control conditions and followed for 12 years. Intervention lasted 10 years and included parent training, child social-cognitive skills training, reading tutoring, peer relations enhancement, and classroom curricula and management. Service utilization was assessed through annual interviews of parents and youth.

Results: Youth assigned to preventive intervention had significantly reduced use of professional general health, pediatric and emergency department services relative to control youth, based on parent-report data. For control group youth, the odds of greater use of general health services for any reason and general health services use for mental health purposes were roughly 30% higher and 56% higher, respectively. The intervention reduced likelihood of outpatient mental health services among older adolescents where odds of services use were over 90% higher among control group youth, based on self-report data. No differences were found between intervention and control youth on use of inpatient mental health services. Statistical models controlled for key study characteristics, and potential moderation of the intervention effect was assessed.

Conclusions: Random assignment to the Fast Track prevention program is associated with reduced use of general health and outpatient mental health services in adolescence. Future studies will examine the mechanism of this impact and service use patterns as subjects reach young adulthood.

INTRODUCTION

The premise of many behavioral prevention programs is that delivery of relatively inexpensive services early in life to children at-risk can be efficacious in preventing later illness, which, in turn, translates to less need for more expensive services.[1] Conduct disorder is ripe for such efforts because once it develops it becomes resistant to treatment and is costly: empirical analyses indicate that conduct disorder leads to approximately $70,000 in increased professional mental health and general health service utilization costs across childhood alone.[2] Furthermore, longitudinal inquiry has led to consensus understanding of school entrance factors that can identify a child as being at high risk for the development of conduct disorder, which can form the empirical basis for intervention design.[3] Prevention programs that have been tested in randomized trials provide some evidence of success in interrupting the developmental course of conduct disorder.[4,5,6,7] However, no study to date has tested the success of an intervention program in preventing the need for professional pediatric or psychiatric services.

The Fast Track randomized controlled prevention trial delivered intervention services for 10 years, including group parent training in behavioral management coupled with individualized home visits; child training in social-cognitive skills, peer relations, and reading; classroom curricula in social-emotional development; and teacher consultation. After the first three years of intervention, relative to controls, children randomly assigned to receive intervention displayed greater social-cognitive and reading skills, better peer relations, and less aggressive behavior problems in classrooms.[8.9] After five years, 22% of intervention children were classified as clinical cases (with conduct-disordered behavior) in the home and community context in contrast with 29% of control children.[10] After ninth grade, intervention children reported lower rates of self-reported antisocial behavior.[11] After twelfth grade, assignment to intervention yielded

lifetime rates of diagnosed conduct disorder that were half as high as those for the control group (20% vs. 41%), but only among the initially highest-risk subgroup of the at-risk children.[12]

The focus of this study is whether assignment to intervention leads to reduced use of health services in adolescence. Because families typically seek treatment for conduct disorder symptoms through outpatient psychiatric services, outpatient pediatric/family practitioner services, or inpatient services, these outcomes were assessed in the current study.

PATIENTS AND METHODS

Participants

Public schools in four geographic sites – Durham, NC; Nashville, TN; central Pennsylvania, and Seattle, WA-- were divided into multiple paired sets matched for demographics (size, percentage free or reduced lunch, ethnic composition). Within each pair, schools were randomly assigned to intervention or control condition. Multiple-gate screening[13] was applied to all 9,594 kindergarteners across three cohorts (1991-93) in 54 schools. Children were screened initially for classroom conduct problems by teachers, using the Teacher Observation of Child Adjustment-Revised (TOCA-R) Authority Acceptance Score.[14] Those scoring in the top 40% within cohort and site were then assessed for home behavior problems using items from the Child Behavior Checklist.[15] 3,274 parents (91% of those solicited) completed the home-behavior screen. The teacher and parent scores were then standardized within site, based on screening a representative sample of approximately 100 children within each site. Children were selected for inclusion based on the combined score, moving from the highest score downward until desired sample sizes were reached within sites, cohorts, and conditions. The final sample included 891 children divided into intervention (n=445) and control groups (n=446) and equally spread among sites (Durham, n=219; Nashville, n=230; Central PA,

n=225; Washington, n=217). Across all sites, the sample was primarily comprised of African American and white participants (51% African American, 47% European American, and 2% of other ethnicity) and gender mixed (69% boys). The sample was skewed toward socioeconomic disadvantage: 58% were from single-parent families and 40% of the families were in the lowest socioeconomic class.[16] An additional stratified normative sample of 387 children was drawn from control schools to represent the population-normative range of risk scores (based on teacher ratings only). This group was followed over time to provide a population-based normative standard for students in schools from these higher-risk neighborhoods.

Written consent from parents and oral assent from children were obtained. Parents were paid for completing interviews, and intervention-group parents were paid for group attendance. All procedures were approved by the Institutional Review Boards of participating universities.

Intervention Procedures

Elementary school phase (grades 1-5). Families were offered a variety of services including parent training with home visits, academic tutoring, and child social skills training. Parent and child group interventions were conducted during a 2-hour "enrichment program," which included child social skill training "friendship groups" led by Educational Coordinators,[17] parent-training groups for parents led by Family Coordinators, and guided parent-child interaction sessions.[18] In grade 1, paraprofessionals provided three reading tutoring sessions and one peer-pairing session per week to improve friendships. Enrichment sessions were held weekly during grade 1, biweekly during grade 2, and monthly during grades 3–5. Individual support was provided through home visiting[19] to help parents generalize the skills presented in the group setting and to address individual needs. After grade 1, criterion-referenced assessments adjusted the amount of tutoring, home visiting, and peer coaching to match family

and child need. A universal intervention (a modification of the PATHS curriculum[20] plus teacher consultation) was provided in grades 1-5 to the classrooms in intervention schools to promote social and emotional competence.

Middle and early high school phase (grades 6-10). A middle school transition program was delivered in the spring and fall surrounding this transition. Adolescent developmental issues were addressed with four meetings for parents and youth during grade 6. In grades 7 and 8, eight Youth Forums based on Oyserman[21] were held to address vocational opportunities, budgeting and life skills, job interview skills, and summer employment opportunities. In grades 7-10, individualized interventions were implemented, based on tri-annual assessments of risk and protective factors.

Intervention participation. Throughout the elementary years, both parents and youth participated at high rates.[22] The proportion of families unable to participate in the intervention increased modestly across the years, primarily due to moves out of the area. By grade 6, 10% of intervention families did not participate but had still received the majority of the services in previous years. In grades 7 and 8, intervention became more individualized and adaptive and on average between 65% and 80% of families participated in the relevant interventions.[11] Intervention fidelity was promoted by the documentation of all components, regular cross-site training and communication, weekly staff training, and ongoing clinical supervision. Outside interventions were neither encouraged nor discouraged; therefore, the control condition may have received other school or family services for which they were eligible.

Measures

Baseline measures. To improve the precision of the estimated effects, 12 measures representing baseline characteristics prior to the intervention are included as covariates in

outcome analyses (including behavior problems, family demographics and social ecology, children's cognitive and social skills, and parenting characteristics). Gender and race were also included. Table 1 lists these variables and the respective means by intervention status.

Outcome measures. Following grades 9- 12, parents/primary caregivers provided information on the use of health and mental health services in the past year through the Service Assessment for Children and Adolescents (SACA),[23] an instrument with high reliability and validity.[24,25] Following grades 10-12, youth provided similar information with a different version of the SACA instrument, describing their services use in the past two years. Eight outcome variables were used: 1) parent-reported number of youth general health service visits (including general hospital, emergency department, or pediatric health); 2) parent-reported number of youth pediatric health service visits; 3) parent-reported number of youth emergency department visits; 4) parent-reported number of general hospital, emergency department, or pediatric service visits for the youth's emotional, behavioral, academic, drug or alcohol problems; 5) youth report of any outpatient visits to a mental health professional for emotional or behavioral problems; 6) youth report of any inpatient mental health service; 7) parent-reported number of youth outpatient visits to a mental health professional for emotional or behavioral problems; and 8) parent report of any youth inpatient mental health services.

Missing data. Attrition rates were typical for this type of study, ranging from 20% in grade 8 to 30% by grade 12. We addressed missing data issues using multiple imputation methods in analyses that were appropriate for the nature of the data (categorical and count-based outcomes as well as continuous predictors).[26] Missing data models included baseline characteristics (Table 1) as well as community characteristics represented by four school-level variables (student-teacher classroom ratio, percentage of white students, percent free-lunch

eligible, percent male students) and three district level characteristics (per-capita income, median home value, poverty rate). Imputations were performed separately for the intervention and control conditions to enable assessment of group-based moderation in analyses.

RESULTS

For all outcomes, we tested the effect of the intervention using 3-level multilevel models with random intercepts specified to account for clustering at the individual and school levels (the latter designated using the subjects' schools at time of group assignment). These models provide estimates of the average intervention effect across grades. Before analyses, service count outcomes were truncated for a small percentage of youth to reduce the impact of extreme cases on model estimates. Logistic regression models were used for outcomes representing whether or not services were used, while ordered logit models were used to analyze count outcomes.[27] All models controlled for grade, gender, race, site, cohort, and the 12 pre-intervention variables.

To explore whether the intervention effect differed among participants, we used separate models to assess possible moderation by gender, race, site or pre-intervention risk for aggressive behavior. We also examined whether the intervention effect varied over time by interacting intervention with the indicators for grade. Tests of moderated intervention effects were non-significant except where indicated below.

Intervention and control group means and model results are provided in Table 2. Given the nature of the statistical models, we present odds-ratios to represent effect sizes. Means from the normative sample are also presented to demonstrate typical usage rates among representative youth.

Pediatric/General Health Services

Models of pediatric and general health services indicated significant intervention effects across all four outcomes measures in this domain. Multi-level ordered logit models showed that intervention group status was significantly associated with a lower number of general health service visits for any reason (OR=.77, $p<0.01$) based on parent report. Using an inversion of the odds-ratio given in Table 2, we estimate that the odds for a large number of visits to general health providers were 30% higher (or 1/.77) for control youths than for intervention youths, conditional on other study characteristics.

A similar pattern emerged for models estimating visits to a pediatrician. Statistical models indicated a significant association between intervention group status and lower use of services. Children randomly assigned to the control group received significantly ($p < .05$) more pediatrician visits than did children assigned to the intervention. The odds of having a large number of visits to a pediatrician/family doctor for any reason were 28% higher for control youths (OR=.78, $p<0.05$) than intervention youths.

Statistical models also indicated that children assigned to the control group made significantly ($p < .05$) more visits to the emergency department than did children assigned to the intervention. The odds for greater services use were 28% higher for control youths than intervention youths ($p<0.05$).

The fourth variable focused on whether intervention status groups differ in the use of pediatric/general health services specifically for emotional or behavioral purposes based on parent reports. The results indicated that control group youths received significantly more general health service visits for emotional or behavioral needs (based on parent report of type of care provided) than did intervention youths ($p < .05$). Conditional on other study characteristics,

the odds of having a large number of visits to general health providers for mental health purposes for control group youths were 56% higher than for intervention youths (OR=.64, p<.05).

Mental Health Services

Because both parents and youths provided data on mental health services use, we were able to separately analyze potential intervention effects for each source. In the model for outpatient mental health services based on youth report, the effect of the intervention was non-significant although it showed a trend for group differences indicating a lower number of outpatient mental health visits for the intervention group than the control group (OR=.73, p=.09). Tests of moderation revealed a significant interaction effect ($p < .05$) between intervention status and time, indicating an apparently stronger intervention effect among older adolescents. To investigate this pattern further, we ran a separate model for the likelihood of outpatient mental health services use for older adolescents (grades 11 and 12) only. For this sub-sample, we found a significant effect of intervention status on the number of outpatient mental health services, where the odds of receiving outpatient mental health services were over 90% higher among control group youths than intervention youths (OR=.52, p<.01).

In models assessing the number of outpatient mental health services based on parent report, we found no significant intervention effect considering grades 9 through 12 combined (p=.23). Given the results focusing on older adolescents for youth-reported services, we next examined intervention effects for services received in grades 11 and 12 based on parent report. Results were in the same direction as those with the analyses of the youth-report data, although still non-significant (p=.11).

Finally, assessment of intervention-control group differences revealed no statistically significant differences in the likelihood of receiving inpatient mental health services based on either parent and youth report.

DISCUSSION

The findings of this randomized controlled trial are among the first to show that preventive intervention services for young at-risk children can lead to reductions in general health, pediatric, emergency department, and mental health services in adolescence. Given that the means for the intervention group were in the range of the normative sample means, this reduction in professional health service utilization can be interpreted as an intended beneficial effect of intervention.

Although we find significant differences between intervention and control groups in multiple service categories, model-derived effect sizes are relatively small, partly as a function of low base rates of services use at these ages. If group differences persist across years, however, the overall effect will grow cumulatively. These findings are also relevant if they reflect overall improvements in health status that will eventually have an impact on other aspects of behavior and health in young adulthood.

Results of our analyses indicated no moderator effects across race, gender, cohort, and site, suggesting that the intervention effect is robust across diverse groups and contexts. This pattern indicates generalization of the positive intervention effect across diverse groups of participants. Analyses did reveal differential effects across time for outpatient mental health services use, indicating that group differences emerge as youth reach older adolescence. It will be important to follow up participants into adulthood to determine whether the favorable

intervention effects will continue and grow into large savings of service utilization or will dissipate.

In considering the ultimate effectiveness of the Fast Track program for reducing use of health services, we note several issues. First, it is plausible that the positive impact on reduced mental health services is the temporary result of scaffolding by the Fast Track intervention staff. Such a hypothesis would suggest that follow-up in adulthood, after intervention is over, will lead to dissipation of the intervention effect and convergence of the intervention and control groups. The current follow up through the end of grade 12 is two years after the termination of intervention in grade 10, suggesting at least some post-intervention preventive effect. Additionally, the impact of intervention services on the reduction of overall general health services among intervention group participants is not as plausible because Fast Track staff did not deliver those professional services directly.

Second, it is also possible that the SACA is not as effective for collecting the youth report from this sample (i.e., based on a 2-year recollection). While the SACA's documented validity is based on 1-year report of services history,[24] research has shown that it is a reliable instrument for collecting service-use histories from children for both lifetime and more recent timeframes.[25]

Third, assessment was limited to the high school years, grades 9 through 12. Examination of other ages may provide further information on youth service use patterns. Given that some intervention effects were found in grade 9, it is plausible that we would find differences at younger ages as well. Such assessment is not possible with the Fast Track project because service use data were not available for younger ages. At the same time, supplemental analyses indicated that intervention effects in the use of outpatient mental health services were significant for older youth but not among younger ages; thus, one could hypothesize that

differences would be maintained or grow after high school. Follow-up analyses will assess variation in intervention group service use patterns as youth reach young adulthood.

Finally, it is conceivable that the observed reduction in services for intervention youths from general health and mental health professionals is an indirect result of higher rates of incarceration among intervention participants. Recent evaluation of court-recorded data, however, indicates that random assignment to intervention is associated with fewer, not more, juvenile arrests.[28]

CONCLUSIONS

The findings indicate that random assignment to the Fast Track program prior to first grade was associated with significantly reduced use of general health services, pediatrician services, and emergency department services, as well as reduced use of general health providers for mental health services. In addition, the results find reduced likelihood of outpatient professional mental health services among older adolescents, as reported by youth. It is not clear which aspect of assignment to preventive intervention led to reduced use of services. Future studies will examine if this effect is mediated by intervention-caused improvements in behavior that lead to reduced need for services, or rather a more direct effect independent of actual need. Our analyses indicated no difference between intervention and control groups on the reported use of inpatient mental health services. Part of this pattern may be due to low rates (lack of variation) of such services for these ages. Future analyses will also focus on the lifetime use of inpatient services by the time subjects have reached young adulthood.

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Table 1. Baseline Characteristics for Control and Intervention Samples[a]

	Control (N=446)		Intervention (N=445)	
	Mean	SD	Mean	SD
Emotional Recognition: Total Correct	10.68	2.74	10.73	2.74
Feeling Scale: Depression	14.96	4.43	13.95	8.86
Inventory of Parent Experiences: Family Satisfaction	6.54	2.11	6.32	2.32
Inventory of Parent Experiences: Friendship Satisfaction	7.12	1.69	6.89	1.90
Interaction Rating Scale: Warmth	3.54	0.84	3.62	0.00
Life Changes: Physical Punishment	0.24	0.21	0.21	0.21
Life Changes: Stress Scale	5.31	4.01	5.26	4.22
Life Changes: Verbal Punishment	0.27	0.21	0.25	0.42
Socioeconomic Status	24.17	7.39	24.58	12.87
Social Competence Parent: Total Score	2.14	0.00	2.14	0.00
Woodcock Johnson: Letter Word Identification	12.19	4.01	13.05	5.06
Initial Severity of Screen Score	125.15	11.19	125.71	11.81
African-American	0.49	0.42	0.53	0.42
Male	0.66	0.42	0.72	0.42

[a] Details on each of these measures can be obtained at www.fasttrack.org

Table 2. Intervention, Control, and Normative Group Means (95% Confidence Interval) and Tests of Intervention Main Effect

		Intervention Effect	
	Mean (95% CI)	OR[a] (95% CI)	p-value
General Health Services			
Number visits to GH provider in past year - Parent report		OR=0.77 (0.63-0.94)	0.01
Control	2.01 (1.89-2.14)		
Intervention	1.77 (1.63-1.91)		
Normative	1.85 (1.77-1.94)		
Number visits to pediatrician in past year - Parent report		OR=0.78 (0.63-0.97)	0.03
Control	1.64 (1.51-1.77)		
Intervention	1.41 (1.27-1.55)		
Normative	1.45 (1.33-1.57)		
Number visits to emergency dept. in past year - Parent report		OR=0.78 (0.61-1.00)	0.05
Control	0.33 (0.29-0.37)		
Intervention	0.28 (0.25-0.32)		
Normative	0.26 (0.22-0.30)		
Number visits to GH providers for MH purpose in past year - Parent report		OR=0.64 (0.40-1.01)	0.04
Control	0.18 (0.13-0.23)		
Intervention	0.14 (0.10-0.19)		
Normative	0.14 (0.11-0.16)		

[a]The OR (odds ratio) is calculated using a multilevel ordered logit or standard logit with random intercepts for kindergarten school and youth. Each model controls for intervention, gender, race, site, cohort, and 12 pre-intervention characteristics.

Table 2. Intervention, Control, and Normative Group Means (95% Confidence interval) and Tests of Intervention Main Effect (continued)

		Intervention Effect	
	Mean (95% CI)	OR[a] (95% CI)	p-value
Mental Health Services			
Number Outpatient MH visits in past year - Parent report		OR=0.82 (0.59-1.14)	0.24
Control	4.23 (3.43-5.03)		
Intervention	3.66 (2.87-4.45)		
Normative	3.40 (2.96-3.84)		
Any Outpatient MH visits in past two years - Child report		OR=0.73 (0.51-1.05)	0.09
Control	0.19 (0.16-0.22)		
Intervention	0.15 (0.13-0.18)		
Normative	0.16 (0.14-0.18)		
Any Inpatient MH visits in past year - Parent report		OR=1.01 (0.64-1.60)	0.96
Control	0.06 (0.05-0.08)		
Intervention	0.07 (0.06-0.08)		
Normative	0.06 (0.05-0.07)		
Any Inpatient MH visits in past two years - Child report		OR=0.84 (0.476-1.52)	0.55
Control	0.09 (0.07-0.12)		
Intervention	0.08 (0.06-0.09)		
Normative	0.07 (0.06-0.09)		
Outpatient Mental Health Services – Grades 11 and 12 only			
Number Outpatient MH visits in past year - Parent report		OR=0.70 (0.45-1.09)	0.11
Control	3.56 (2.69-4.43)		
Intervention	2.60 (1.63-3.57)		
Normative	2.74 (2.20-3.27)		
Any Outpatient MH visits in past two years - Child report		OR=0.52 (0.34-0.80)	0.00
Control	0.20 (0.18-0.24)		
Intervention	0.14 (0.11-0.16)		
Normative	0.16 (0.14-0.18)		