An evaluation of the Crossover Youth Practice Model (CYPM): Recidivism outcomes for maltreated youth involved in the juvenile justice system

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ABSTRACT

This study examined youth recidivism (reoffending) outcomes of the Crossover Youth Practice Model (CYPM) in an urban county in a Midwestern state. Crossover youth are defined as maltreated youth who have engaged in delinquency. Decreased recidivism is one of the primary outcomes targeted by the CYPM. Previous internal, exploratory research on recidivism indicates positive outcomes for CYPM youth. In the current study, we used a quasi-experimental, post-test only design with independent historical and contemporaneous comparison samples. We linked state-level data from the State Court Information System with the Child Protection Administrative Data and the Automated Report Student System. Youth receiving CYPM services were less likely to recidivate than propensity score matched youth receiving "services as usual" even when controlling for location, time and other key covariates. Study limitations and implications are discussed.

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1. Introduction

This study examines youth recidivism outcomes of the Crossover Youth Practice Model (CYPM). For the purpose of this paper, "crossover youth," sometimes referred to as "dually involved" or "multisystem" youth, are defined as maltreated youth who have engaged in delinquency (Stewart, Lutz, & Herz, 2010). Most crossover youth (92%) are first involved in the child welfare system and then the juvenile justice system (Huang, Ryan, & Herz, 2012). Overall, maltreated youth are at a 47% greater risk for becoming involved in delinquency than youth from the general population (Ryan & Testa, 2005). The dual involvement of youth in the child welfare and juvenile justice systems can compound vulnerable youth's risks for problematic developmental outcomes (e.g., Morris & Freundlich, 2004; Ross, 2009). The CYPM is a conceptual model and guide to systems change intended to prevent or minimize the involvement of maltreated youth in the juvenile justice system through strengthened professional collaborations, especially between child welfare and juvenile justice system professionals, increased youth and family engagement, and individually targeted interventions (Stewart et al., 2010).

1.1. Overview of the problem

Crossover youth are of concern to child welfare, juvenile justice and other professionals because of their multiple risks for problematic developmental outcomes. Involvement in the child welfare system can place vulnerable youth at additional risk for mental health, educational and vocational problems (Dworsky & Courtney, 2010; Goerge et al., 2002; Halemba, Siegel, Lord, & Zawacki, 2004). Involvement in the juvenile justice system can further compound youth's risks for poor developmental outcomes including through exposure to delinquent peers and stigmatization (Chapin & Griffin, 2005; Redding, Lexcen, & Ryan, 2005). In addition, youth involved in the child welfare system generally receive harsher treatment within the juvenile justice system. For example, they are less likely to receive probation and more likely to be placed in group homes or correctional facilities than delinquent youth without maltreatment histories (Ryan, Herz, Hernandez, & Marshall, 2007). Given their multiple risks, it is not surprising that an estimated 56% of crossover youth have mental health problems (Herz, Ryan, & Bilchik, 2010). In addition, crossover youth are at greater risk for reoffending and being re-referred for maltreatment than juvenile offenders without maltreatment histories (Herz et al., 2010; Huang et al., 2012; Ryan et al., 2007).

Research increasingly points to the importance of designing comprehensive, integrated approaches for improving the outcomes of crossover youth (e.g., Cusick, Goerge, & Bell, 2009; Munson & Freundlich, 2005). Such approaches typically involve multisystem collaborations, minimally between child welfare and juvenile justice professionals, but also law enforcement, education, behavioral health, and court personnel. Such collaborations can reduce unnecessary detention of foster youth who are arrested for misdemeanors and less serious felonies (e.g., Conger & Ross, 2006); and more comprehensively address their needs, for example, through coordinated case planning and supervision

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(e.g., Herz & Ryan, 2008; Nash & Bilchik, 2009; Siegel & Lord, 2005; Wiig & Tuell, 2013). Yet services to crossover youth and their families typically are provided in a divided manner by multiple child-serving systems, each with its own complexities, language, expectations and sometimes conflicting responses to youth (Stewart et al., 2010).

1.2. Overview of the Crossover Youth Practice Model (CYPM)

The designers of the CYPM were guided by systems change and strengths perspectives (e.g., Kotter, 1996; Patterson & Grenny, 2007) and empirical research on best practices within the child welfare and juvenile justice systems (e.g., Wiig & Tuell, 2013). The resulting practice model is intended to minimize the involvement of maltreated youth in the juvenile justice system, primarily through improved communication and coordination between professionals in child welfare and juvenile justice systems, earlier and more individualized intervention, and increased family engagement. Despite the absence of external evaluations published in peer reviewed journals, at the time of this writing, the CYPM had been implemented in 88 counties in 20 states (Center for Juvenile Justice Reform, 2014).

The CYPM is implemented in three phases (Stewart et al., 2010). Phase I focuses on arrest, identification of crossover youth, and decisions regarding detention and charges. Primary goals include the early identification of crossover youth and, when appropriate, their diversion from juvenile justice system involvement. Practices at this phase may include the development of Memoranda of Understanding (MOUs) and information sharing protocols to specify how client information data bases can be shared between child welfare and juvenile justice systems to identify child welfare-involved youth as soon as they have contact with the juvenile justice system. They also may include diversion meetings with youth, family members, juvenile justice and child welfare professionals.

Phase II focuses on dual-system case assessment and planning after a youth is formally involved in both systems. Practices at this phase include joint case assessment and planning by a multi-disciplinary team minimally including a child welfare social worker and juvenile justice professional, and preferably the youth and family members. Practices also may include consolidated court processing to handle delinquency and dependency hearings together, joint referrals to community service providers, and placement decisions which reduce the use of out-of-home placement, especially group care.

Phase III focuses on on-going case management and planning for case closure. Practices at this phase include regular information sharing between the child welfare and juvenile justice professionals. Practices also focus on planning for permanency including the partnering of child welfare and juvenile justice systems professionals around securing any necessary ongoing mental health, employment, housing, health care, and education support.

Youth and family engagement is fundamental to the CYPM. Families who are engaged early in the intervention process are more likely to participate in services, stay in contact with their workers and achieve their goals (Christensen & Antle, 2004). In order to facilitate family engagement, child welfare and juvenile justice system workers meet together with family members to explore how to work together, and support family participation in all phases of the CYPM (Stewart et al., 2010). Note that "family members" may include adult friends, foster parents, members of community groups or other collateral family partners.

Thorough training and support of professionals also is fundamental to the CYPM. Professionals from Oak County (pseudonym), the site of the current study, received training from representatives from the Center for Juvenile Justice Research (CJJR) at Georgetown University over a two year period overlapping with the current study. For one year prior to implementation, they met every 1–2 months at Oak County for training on CYPM model components and implementation. These regular training sessions continued through the first year of implementation

and included discussion of progress and any challenges with implementation. (Haight, Bidwell, Marshall, & Khatiwoda, 2014).

1.3. Evaluations of the CYPM

Data-driven decision making is a central feature of the CYPM (Stewart et al., 2010). Professionals at each implementation site are supported by the CJJR representatives in the collection and analysis of outcome data. A number of internal reports suggest positive trends related to the CYPM (Herz et al., 2012). Herz and Fontaine (2012)compiled data collected by professionals from 11 sites for the purposes of internal program monitoring and evaluation. A total of 334 CYPM youth along with an historical comparison group of 170 maltreated youth who crossed over to the juvenile justice system prior to the implementation of the CYPM were followed for six months. Among the findings reported were that 32% of CYPM in contrast to 43% of comparison youth had a new arrest for which 15% and 31%, respectively, were sustained. These data were intended to provide feedback to participating jurisdictions and must be interpreted with caution due to the absence of statistical testing of significance or effect size, and the use of a non-equivalent comparison group. Prior to the current study, external outcome evaluations of the CYPM by groups not involved in the development or implementation of the model have not been published in peer reviewed journals.

In a recent ethnographic study of the implementation of the CYPM in Oak County (Haight et al., 2014), child welfare, legal and juvenile justice professionals consistently described structural changes they believed had improved services to youth and families, and procedures and legal mandates for sharing information across departments. Professionals also discussed their own psychosocial changes including improved professional support, strengthened relationships with other professionals and positive shifts in their thinking and feeling about youth and their families. Participants also described challenges to implementation of the CYPM including supporting and training of front line workers, and some issues with engaging families and key community stakeholders. Overall, however, many believed that implementation of the CYPM was improving youth outcomes.

1.4. Theoretical perspective

This study is informed by an integration of systems change and sociocultural perspectives. Both systems change (e.g., Stewart et al., 2010) and sociocultural scholars (e.g., Rogoff, 2003; Vygotsky, 1962; Wertsch, 1991) are broadly concerned with understanding the processes through which systems are maintained and changed. We view child welfare and juvenile justice systems as cultural systems with structural processes involving change and stability of official hierarchies, administrative structures, and formal policies. These systems are received from those who have come before us, for example, previous organizational leaders, policy makers, and practitioners; but can be dynamic, shaped and elaborated by the current generation of leaders, workers and clients.

The effort required to introduce substantial change to complex cultural systems including through the CYPM, however, can be complex and protracted. For example, there may be well entrenched or politically powerful defenders of particular ways of thinking, feeling and practicing (Stewart et al., 2010). Enacting systems change which simultaneously involves multiple cultural systems as does the CYPM introduces additional challenges (e.g., Chuang & Wells, 2010; Darlington, Feeney, & Rixon, 2005; Glisson & Hemmelgarn, 1998). Change may not occur smoothly or simultaneously across all parts of any individual system, let alone across multiple evolving systems. Thus, change efforts can require the coordination of complex patterns of change and response to resistance across interacting systems. Furthermore, the systems involved in change may have differing mandates and reflect diverse underlying perspectives. Juvenile justice and child welfare systems, for

instance, embody somewhat different views of youth and whose interests they serve (Stewart et al., 2010). Within the juvenile justice system, youth may be seen as perpetrators and services are intended to reduce delinquent behaviors, in part, to protect public safety and respond to the needs of victims. In the child welfare system, youth typically are seen as victims in need of protection and nurturing. These differing perspectives can result in tensions between systems in how youth and families are engaged and how services are provided (Haight et al., 2014).

1.5. Current study

In the current study, we linked administrative data bases to examine recidivism outcomes for crossover youth between the ages of 10 and 17 years following the first year of implementation of the CYPM. If the CYPM is successful in providing earlier, more coordinated and individualized services, then we hypothesize that relative to youth not receiving CYPM services, CYPM youth will be less likely to recidivate, i.e., be found guilty of subsequent offenses.

2. Methods

2.1. Data source

Data were obtained through the Minn-LInK Project at the Center for Advanced Studies in Child Welfare in the School of Social Work at the University of Minnesota. Minn-LInK holds statewide administrative datasets received from state departments of Health, Education, and Human Services. De-identified data were provided under data sharing agreements with each of the state departments. For the purpose of this study, we linked state-level datasets from the State Court Information System (MNCIS) with the Child Protection Administrative Data (The Social Service Information System, or SSIS) and the Automated Report Student System (MARSS) of the State Department of Education. Link Plus, a program developed by the Center for Disease Control and Prevention, was used to match each child's MARSS record with his/her MNCIS and SSIS records by date of birth; and first, middle and last names. After linking the three data bases, all records were de-identified.

2.2. Design

We used a quasi-experimental, posttest-only design with independent historical and contemporaneous comparison samples (Shadish, Cook, & Campbell, 2002) (see Table 1). Youth from all groups were between the ages of 10 and 17 and had an open child protection case at the time they were charged with a delinquent offense other than a juvenile petty (status) or traffic offense. All youth were tracked for 12 months after their target offense dates. Each group was comprised of 57 youth.

2.3. Samples

2.3.1. Oak County CYPM treatment group

The *Oak County CYPM treatment group* (*T* in Table 1) was comprised of 57 crossover youth from Oak County (pseudonym) who received CYPM services between October 2012 and August 2013. To ensure

Table 1
Study design: a quasi-experimental, posttest-only design with independent historical and contemporaneous comparison samples.

	Historical comparison groups (2008–2010)	Contemporaneous comparison groups (2011−2013)
Oak county	C_1	T
Neighboring counties	C_2	C_3

Note. *C* stands for control group with subscript 1–3 numbers of comparison groups and *T* for the CYPM treatment group.

that youth in the treatment group received all phases of the CYPM, only youth whose offense dates were <100 days prior to their enrollment in CYPM and who received the CYPM services for >15 days were included.

Fifty-four percent of youth were male, 75% were African American, and 74% were eligible for special education services (i.e., had an Individualized Education Plan or IEP). The mean age of youth at the time of the target offense was 14.8 years ranging from 10.4 to 16.9 years. Eighty-eight percent of youth were from families with low incomes. Sixty-one percent had been neglected (see Table 2).

2.3.2. Comparison groups

Comparison groups were created using propensity-score matching (PSM) to minimize selection bias. PSM is a statistical technique used to better equate treatment and comparison groups by matching on a composite of participant characteristics. It is often difficult to find individuals who are similar across a variety of key covariates even when there are only a few background covariates of interest (Rosenbaum & Rubin, 1985). Propensity score matching addresses this issue by using logistic regression to control for several background covariates simultaneously by matching participants on a single scalar score variable, i.e., each participant's propensity score (D'Agostino, 1998). The optimal matching method was used as a matching algorithm to minimize the distance within each pair (Ho, Imai, King, & Stuart, 2013). The PSM was conducted using 'MatchIt version 2.4–21' in software R (Ho et al., 2013). Note that any youth identified within the "historical Oak County comparison" group who subsequently received CYPM services was excluded during the PSM matching process through a "hand matching" process, i.e., we eliminated any youth who was already identified in the preceding matching procedure.

Selection of the comparison groups began with the identification of youth who were born between 1994 and 2004 and who were present in all three of the data bases used in this study: MNCIS (court data), SSIS (child protection only) and MARSS (education). The sampling frame was limited to youth whose offenses occurred between June 2008 and December 2010 for the historical comparison groups and January 2011 through August 2013 for the contemporaneous comparison group. Then it was limited based on location, i.e., Oak County for the historical CYPM comparison group and 6 surrounding counties bordering Oak County for historical and contemporaneous comparison groups. Next, youth were selected along a set of dimensions possibly related to recidivism: gender, race/ethnicity, socioeconomic status, special education eligibility, age at the time of the target offense, degree/severity of the target offense, number of adjudications prior to the target offense date, out-of-home care status at the time of the offense, type of child protection allegations, and age at first involvement with child protection services.

To assess the balance of matching covariates after matching, the differences in means were reviewed. The mean differences of most variables in the matched samples were closer than in the potential groups when 1:1 matching was used (see Table 2). We also reviewed the difference in means divided by the treatment group standard deviation, histogram for distribution of propensity scores, summaries based on the quantile-quantile plot, and percent improvement in balance (details available upon request). Results showed that the balance, i.e., how close the distributions of matching covariates were in the two groups (Ho et al., 2013, p. 4), was improved after matching. For example, the percent improvement in balance was 92.02% for the historical Oak County comparison group when 100% implies the distance was reduced to zero. For the matched groups in the historical neighboring counties and the contemporaneous neighboring counties, the mean difference in distance was improved by 90.36% and 98.34%, respectively (see Table 2).

2.3.2.1. Oak County historical comparison group. Youth for the *historical Oak County comparison group* were selected from a total of 1195 crossover youth in Oak County who crossed over and received "services as

Table 2
Characteristics of the Oak County CYPM treatment and the matched comparison groups (percentages).

Characteristics of crossover youth (%)	Treatment	Potential			Matched		
	Oak County CYPM (N = 57)	Oak County Historical (N = 1195)	Neighbor counties historical (N = 1391)	Neighbor counties contemp. (N = 2261)	Treatment Oak county historical (N = 57)	Neighbor counties historical (N = 57)	Neighbor counties contemp. (N = 57)
Gender: male	54	64	68	69	**60**	**47**	**44**
Degree of target offense							
Felony	25	7	12	11	**32**	**30**	**25**
Gross-misdemeanor	16	03	7	6	**16**	**21**	**16**
Misdemeanor	47	25	47	54	**42**	42	**47**
Petty misdemeanor	12	65	34	29	**10**	7	**12**
Mean age at target offense[a]	14.81 (1.48)	14.30 (1.33)	14.23 (1.34)	15.01(1.40)	**15.00** (1.12)	**14.75** (1.14)	**15.00** (1.30)
Race/ethnicity							
Native American	9	13	6	4	4	**6**	**5**
Asian American	0	1	2	2	**0**	**0**	**0**
African American	75	70	40	46	63	**72**	**70**
Hispanic American	4	4	9	7	7	**4**	**2**
White	12	12	43	41	26	**18**	**23**
Socioeconomic status: low	88	84	78	78	70	**79**	74
Special education status: yes	74	49	53	54	**61**	**79**	**63**
Child welfare allegations							
Neglect	61	73	63	64	**51**	51	47
Physical abuse	33	29	33	34	40	47	39
Sexual abuse	18	8	9	8	**18**	**19**	**25**
Other	0	0	0	0	**0**	**0**	**0**
Mean age at the first involvement in CPS[a]	9.29 (4.64)	10.01 (4.04)	10.62 (3.87)	9.65 (4.16)	11.77 (4.01)	11.18 (3.49)	11.93 (3.60)
Mean age at first ever offense[a]	13.51(1.61)	12.94 (1.95)	13.19 (1.98)	13.63 (2.02)	14.19 (1.38)	14.31 (4.41)	14.03 (1.56)
Mean of the number of juvenile justice cases prior to the target offense date[a]	5.37 (8.26)	3.86 (5.20)	2.55 (4.09)	3.56 (4.95)	2.84 (3.78)	2.51 (3.17)	**4.39** (8.79)
Type of target offense[b]							
Physical violence	35	–	–	–	39	21	39
Property offenses	32	–	–	–	33	27	28
Substances	0	–	–	–	5	11	9
Other	33	–	–	–	23	41	24
Mean of the number of child protection service cases prior to the target offense date[a,b]	2.49 (1.66)	–	–	–	1.51 (0.87)	1.72 (1.19)	1.46 (0.89)
Percent balance improvement in mean difference of distance					92.02	90.36	98.34
All	57	–	–	–	3056	2832	5041
Matched	57	–	–	–	57	57	57
Unmatched	0	–	–	–	2999	2775	4984
Discarded	0	–	–	–	0	0	0

Note: Bold cells indicate that (treatment–potential) is not bigger in absolute value than (matched–potential), which could imply that the difference from the treatment group was decreased after PSM.

[a] Indicating Mean and standard deviation (SD) in parentheses.

[b] Not considered in the propensity score matching.

usual" between June 2008 and December 2010, i.e. prior to the implementation of the CYPM. In summary, 60% were male, 63% were African American, and 61% were eligible for special education services (IEP). The mean age at the target offense was 15 years. Seventy percent were from families with low incomes. Fifty-one percent had been neglected (see Table 2).

2.3.2.2. Neighboring county historical comparison group. The *neighboring county historical comparison group* of youth ($n = 57$) was created based on a total of 1391 crossover youth from 6 neighboring counties that shared geographic borders with the Oak county. They received "services as usual" between June 2008 and December 2010. In summary, 47% were male, 72% were African American, and 79% were eligible for special education. The mean age at the target offense was 14.7 years. Seventy-nine percent were from families with low incomes. Fifty-one percent had been neglected (see Table 2).

2.3.2.3. Neighboring county contemporaneous comparison group. Fifty-seven crossover youth were selected for the *neighboring county contemporaneous comparison group* from 2261 youth in 6 neighboring counties

who crossed over and received "services as usual" between January 2011 and August 2013. In summary, 44% were male, 70% were African American, and 63% were eligible for special education. The mean age at the target offense was 15. Seventy-four percent were from families with low incomes. Forty-seven percent had been neglected (see Table 2).

2.4. Sites

The CYPM treatment group was drawn from Oak County. Oak County is a large urban county in a Midwestern state. It is home to over one million residents with a population density of over 2000 per square mile. >12% of residents live below the poverty line. Nearly 29% of residents are ethnic minorities (U.S. Census Bureau, 2015).

Neighboring county comparison groups were drawn from six counties sharing borders with Oak County. These counties ranged in population from 20,944 to 527,667 with population density ranging from 80 to 3342 per square mile. Residents living below the poverty line ranged from 5% to 16%. Residents who were ethnic minorities ranged from 7% to 48% (U.S. Census Bureau, 2015). Although the

demographics of these counties within the same geographical region were diverse, all were included to accomplish our primary goal of obtaining a sufficiently large pool of potential participants for the PSM matching.

2.5. Measures

2.5.1. Youth and family characteristics

Youth and their family characteristics were identified from the State Automated Report Student System (MARSS). Youth *Gender* was coded as (0) Female or (1) Male. *Race/ethnicity* was coded into five primary groups: (1) Native American, (2) African American, (3) Asian American, (4) Hispanic American, and (5) White. *Special education status* was coded into two groups: students who were identified as (0) ineligible or (1) eligible for an Individualized Education Plan (IEP) at the time of the target offense. *Family's socioeconomic status* was coded into two groups using youth' eligibility for free or reduced school lunch as a proxy: Students who were identified as (0) ineligible or (1) eligible for free or reduced lunch at the time of the target offense.

2.5.2. Target offense and criminal history

A *target offense* was identified for each youth. For youth in the CYPM treatment group, the most recent offense prior to receiving services under the CYPM was chosen as the target offense. For youth in the three comparison groups, target offenses were determined using the PSM algorithm (described in the previous section) to be most similar to the target offenses of the youth in the CYPM treatment group with respect to type of offense and degree/severity of offense. The *type of target offense* was categorized as: (1) Physical violence, i.e., the intentional use of physical force to cause, or threaten, injury, harm, or death to another person, (2) Property offenses, i.e., crimes against property involving the taking of property without force or threat of force against another person, (3) Violations related to illegal or controlled substances, and (4) Other offenses, e.g., stalking. The *degree (or severity) of the target offense* was coded into four categories, ranked in descending severity: (1) Felony, (2) Gross-misdemeanor, (3) Misdemeanor, and (4) petty misdemeanor other than juvenile petty (status) offense or traffic offense. When a given youth received multiple charges on the same offense date, the most serious charge was coded, e.g., a felony was coded over a gross-misdemeanor.

Age at the first ever offense was defined as the youth's age at the time of his/her first offense recorded in the State Court Information System (MNSIS). *Number of juvenile justice cases prior to the target offense date* was the number of times a given youth was adjudicated before the target offense.

2.5.3. Child welfare services history

Child Welfare Allegations were coded as (0) if not present or (1) if present for Neglect, Physical abuse, Sexual abuse, and Other (e.g., mental injury and emotional harm), respectively. Note that we coded maltreatment types as mutually exclusive. If a given youth had multiple types of maltreatment, the maltreatment type with the highest level of severity was coded. *Age at first involvement in child protection* was calculated based on date of birth and date of first involvement with child protection, as captured in the Social Service Information System (SSIS). *Number of child protection service cases prior to the target offense date* indicated how many times a case of maltreatment was opened for a given youth before the target offense date. *Out-of-home placement status at the time of the target offense* was coded as dichotomous: (1) Home care (no record of any out-of-home placements) and (2) Out-of-home care (any type of out-of-home placement).

2.5.4. Youth outcome variable

Recidivism indicated that the youth was adjudicated (found guilty) for one or more offenses within one year following the date of the target offense. A dichotomous variable was used to indicate one of the two statuses: (0) no recidivism or (1) recidivated.

2.6. Analysis plan

Descriptive analyses (means, standard deviation, and proportions) were used to determine demographic characteristics among crossover youth across groups. The hypothesis examining the risk for recidivism among crossover youth was examined using logistic regression analyses comparing: (1) Oak County CYPM treatment group vs. Oak County historical comparison group, (2) Oak County CYPM treatment group vs. neighboring counties contemporaneous comparison group, (3) neighboring counties historical vs. contemporaneous comparison group, and (4) Oak County CYPM treatment group vs. the three comparison groups.

3. Results

During the year following the target offense, 31.6% of the Oak County CYPM treatment group youth, and an average of 48% of comparison group youth were adjudicated for one or more additional criminal charges (see Table 3). Logistic regression analyses indicated significant differences between treatment and comparison groups after considering the effects of time, locale, and other covariates (see Note 2, Table 4). Compared to the Oak County historical comparison group, the log odds of recidivism versus no recidivism significantly decreased for the Oak County CYPM treatment group (see comparison (1) in Table 4, $b = -1.65$, S.E. $= 0.56$, $p < 0.01$, Exp (b) $= 0.19$). Compared to the neighboring counties contemporaneous comparison group, the log odds of recidivism were also significantly lower for the CYPM treatment group (see comparison (2) in Table 4, $b = -1.35$, S.E. $= 0.58$, $p < 0.05$, Exp (b) $= 0.26$). In contrast, there were no significant differences in the log odds of recidivism between the neighboring counties historical and contemporaneous comparison groups (see comparison (3) in Table 4, $b = 0.24$, S.E. $= 0.46$, $p > 0.05$, Exp (b) $= 1.27$). Finally, after controlling for time (historical and contemporaneous) and location (Oak County and neighboring counties) as well as the other covariates (see Note 2 in Table 4), the log odds of recidivism were significantly lower for the Oak County CYPM treatment group compared with the combined comparison groups (see comparison (4) in Table 4, $b = -1.74$, S.E. $= 0.65$, $p < 0.01$, Exp (b) $= 0.18$) (see Appendix A for details).

4. Discussion

Involvement of maltreated youth in the juvenile justice system places already vulnerable children at additional risk for problematic developmental outcomes. Such crossover youth receive harsher treatment than their non-maltreated counterparts within the juvenile justice system (e.g., see Ryan et al., 2007) and are more likely to reoffend (Herz et al., 2010). The CYPM is an ambitious effort to change policy and practice across multiple systems to interrupt the negative developmental trajectories of many crossover youth. A primary goal of the CYPM is to reduce any subsequent delinquent behavior of maltreated youth by

Table 3
Frequency of recidivism of CYPM treatment and independent comparison groups (numbers and percentages).

	Recidivism	
	N	%
CYPM: Oak	18	(31.6%)
Non-CYPM[a]	82	(48.0%)
Oak-historical	31	(54.4%)
Neighbor-contemp.	26	(45.6%)
Neighbor-historical	25	(43.9%)

[a] 'Non-CYPM' is the sum of the three comparison groups: Oak County historical, neighboring counties historical and contemporaneous comparison groups.

Table 4
Logistic regression analysis for the effect of CYPM on recidivism.

Comparison	b[a]	S.E.	Exp (b)	95% CI
(1) Treatment vs. Oak historical	−1.65**	0.56	0.19	[0.06, 0.55]
(2) Treatment vs. neighbor counties contemp.	−1.35*	0.58	0.26	[0.08, 0.78]
(3) Neighbor counties historical vs. contemp.	0.24	0.46	1.27	[0.51, 3.18]
(4) Treatment vs. The Others	−1.74**	0.65	0.18	[0.05, 0.61]

Note 1. Dependent variable, recidivism, is dichotomous: (0) did not recidivate or (1) recidivated.
Note 2. The regression models included control variables: type of offense, number of the child protection service cases prior to the target offense date, out of home placement status at the offense date, degree of offense, gender, age at the offense date, race/ethnicity, economic status, special education eligibility, allegation in child protection service –neglect, physical abuse, and sexual abuse, age at the first offense date, number of the previous juvenile justice cases, age at the first involvement in child protection service. As well as those control variables, the regression model for comparison (4), Oak County CYPM treatment vs. The Others, also include time and locale effects terms. For coefficients for those variables, see Appendix A.
  * $p < 0.05$.
  ** $p < 0.01$.
  [a] In comparison (1), (2), and (4), the estimates are the coefficient for the variable of 'CYPM' whereas in comparison (3), the estimate is the coefficient for the 'Time: Contemporaneous'.

providing early, coordinated and more individualized services. We conducted an external, outcome evaluation of the implementation of the CYPM in Oak County. We were not involved in the design of the CYPM, or its implementation. In contrast to exploratory, internal evaluations, we used statistical significance testing and PSM comparison groups. Consistent with internal evaluations (Herz & Fontaine, 2012), as well as the perceptions of administrators and practitioners involved in the implementation of the CYPM in Oak County (Haight et al., 2014), we found that involvement in the CYPM reduced youth's risks of recidivism.

There are two possible reasons why we see a reduced risk of recidivism in CYPM youth. First, fewer youth involved with the CYPM may be committing subsequent offenses in comparison to their counterparts receiving services as usual. This interpretation is consistent with the perceptions of professionals working within Oak County. In a series of qualitative interviews, professionals reported their perspectives that as a result of the CYPM, youth and their families were more promptly receiving more appropriate services which were improving youth's functioning (Haight et al., 2014).

Alternatively, it is possible that CYPM youth are as likely as their counterparts receiving services as usual to commit subsequent offenses, but because they are targeted in the juvenile justice system as "crossover youth," they are being diverted from juvenile justice to social services. The state in which this study was conducted does not track such diversions, and thus there was no way to determine how many youth were diverted after initial contact with law enforcement officers. In either case, if CYPM practices result in less involvement of maltreated youth in the juvenile justice system, and hence less exposure to associated risk factors such as stigmatization and exposure to delinquent peers (see Chapin & Griffin, 2005; Redding et al., 2005), then maltreated youth's subsequent delinquent behavior should be reduced.

Before discussing implications, it is important to consider study limitations. First, this study was limited to the existing administrative data. As we described in the Methods, we obtained specific information for individual youth by linking currently available administrative records. Future research should consider other important youth outcomes variables targeted by the CYPM not available to us such as youth's school behavior (e.g., discipline) and achievement, and mental and physical health; as well as family and system level outcomes such as improved communication and less harsh treatment of crossover youth in the juvenile justice system. Second, we did not have access to data that would have allowed us to evaluate a primary goal of the CYPM: the immediate diversion of youth from juvenile justice involvement to social services. Our use of the courts data base meant that we only had access to youth who had already "touched" both systems. Thus our evaluation is relevant to the CYPM as an early intervention for maltreated youth already involved in the juvenile justice system, and not as prevention of their initial involvement. Subsequent research would be enhanced by access to police as well as courts data.

Given the challenges of system change, especially coordination of change across multiple systems (e.g., Chuang & Wells, 2010; Darlington

et al., 2005; Glisson & Hemmelgarn, 1998), it is noteworthy that measureable change occurred in youth outcomes during the first year of CYPM implementation. This study suggests that the CYPM is an effective approach to lowering maltreated youth's risks for recidivism. In other words, CYPM may be effective in disrupting negative developmental trajectories that could eventually lead to involvement in the adult criminal justice system. Additional research on this promising model is warranted including research focused on when, for whom and under what conditions CYPM is most effective.

Acknowledgements

Appendix A. Results of regression analyses on recidivism

(1) Logistic regression on recidivism between the Oak County CYPM Treatment and Historical Comparison Groups.

	b	S.E.	Exp (b)	95% CI
(Intercept)	2.17	3.25	8.80	[0.01, 5657.98]
CYPM	−1.65**	0.56	0.19	[0.06, 0.55]
Type of offense[a]				
Property	0.57	0.60	1.78	[0.55, 5.84]
Substance	−0.70	1.56	0.50	[0.01, 9.14]
Other	−0.07	0.69	0.93	[0.23, 3.63]
Number of previous CPS cases	−0.07	0.23	0.93	[0.58, 1.45]
OHP at offense	−0.40	0.68	0.67	[0.17, 2.51]
Degree of offense[b]				
Gross misdemeanor	0.44	0.76	1.55	[0.34, 7.05]
Misdemeanor	0.05	0.64	1.05	[0.30, 3.76]
Petty misdemeanor	−0.71	1.09	0.49	[0.05, 4.05]
Gender — male	−0.35	0.50	0.70	[0.26, 1.86]
Age at offense	0.22	0.32	1.25	[0.64, 2.32]
Race[c]				
American Indian or Alaskan Native	0.64	1.22	1.90	[0.18, 22.97]
Black	−0.29	0.71	0.75	[0.18, 3.07]
Hispanic	−2.41	1.38	0.09	[0.00, 1.03]
Socioeconomic status	1.31	0.72	3.69	[0.96, 16.34]
Special education status (IEP)	−0.57	0.65	0.57	[0.15, 2.03]

(continued on next page)

Appendix A (*continued*)

	b	S.E.	Exp (b)	95% CI
Maltreatment — neglect	−1.18	0.93	0.31	[0.04, 1.73]
Maltreatment — physical abuse	−1.26	0.99	0.28	[0.03, 1.76]
Maltreatment — sexual abuse	−0.32	1.03	0.72	[0.08, 4.89]
Age at the first offense	−0.32	0.30	0.73	[0.41, 1.34]
Number of previous offense	0.08	0.06	1.08	[0.98, 1.25]
Age at the first CPS	0.02	0.07	1.02	[0.88, 1.18]

Null deviance: 155.78 on 113 degrees of freedom
Residual deviance: 119.07 on 91 degrees of freedom
AIC: 165.07

[a] Reference group is Violence.
[b] Reference group is Felony.
[c] Reference group is White.
* $p < 0.05$.
** $p < 0.01$.
*** $p < .001$.

(2) Logistic regression on recidivism between Oak County CYPM treatment and neighboring counties contemporaneous comparison groups.

	b	S.E.	Exp (b)	95% CI
(Intercept)	3.31	3.52	27.30	[0.03, 3.25e + 04]
CYPM	−1.35*	0.58	0.26	[0.08, 0.78]
Type of offense[a]				
Property	−0.44	0.64	0.65	[0.18, 2.27]
Substance	−0.90	1.77	0.41	[0.01, 14.20]
Other	−0.15	0.76	0.86	[0.19, 3.78]
Number of previous CPS cases	0.18	0.26	1.20	[0.72, 2.00]
OHP at offense	−0.58	0.65	0.56	[0.15, 1.96]
Degree of offense[b]				
Gross misdemeanor	−1.25	0.84	0.29	[0.05, 1.43]
Misdemeanor	−2.16**	0.73	0.12	[0.02, 0.45]
Petty Misdemeanor	−1.28	1.01	0.28	[0.03, 1.93]
Gender - male	0.61	0.55	1.85	[0.63, 5.66]
Age at offense	−0.58	0.37	0.56	[0.26, 5.66]
Race[c]				
American Indian or Alaskan Native	1.42	1.30	4.14	[0.33, 58.04]
Black	0.74	0.81	2.10	[0.43, 11.17]
Hispanic	3.05	1.69	21.10	[0.89, 909.88]
Socioeconomic status	2.07*	0.94	7.91	[1.43, 60.92]
Special education status (IEP)	−0.91	0.65	0.40	[0.11, 1.41]
Maltreatment — Neglect	0.31	0.93	1.36	[0.21, 8.33]
Maltreatment — Physical abuse	0.74	1.05	2.10	[0.25, 15.94]
Maltreatment — Sexual abuse	0.49	0.86	1.63	[0.28, 8.69]
Age at the first offense	0.15	0.35	1.16	[0.06, 2.34]
Number of previous offense	0.20*	0.09	1.22	[1.06, 1.47]
Age at the first CPS	0.11	0.10	1.12	[0.93, 1.37]

Null deviance: 152.06 on 113 degrees of freedom
Residual deviance: 107.67 on 91 degrees of freedom
AIC: 153.67

[a] Reference group is Violence.
[b] Reference group is Felony.
[c] Reference group is White.
* $p < 0.05$.
** $p < 0.01$.
*** $p < .001$.

(3) Logistic regression on recidivism between the neighboring counties historical and contemporaneous comparison groups.

	b	S.E.	Exp (b)	95% CI
(Intercept)	−4.51	3.46	0.01	[0.00, 8.39]
Time: Post	0.24	0.46	1.27	[0.51, 3.18]
Type of offense[a]				
Property	−0.20	0.61	0.82	[0.24, 2.74]
Substance	−0.21	1.48	0.81	[0.03, 12.80]

Appendix A (*continued*)

	b	S.E.	Exp (b)	95% CI
Other	−0.13	0.69	0.88	[0.22, 3.47]
Number of previous CPS cases	0.31	0.27	1.37	[0.81, 2.38]
OHP at offense	−0.43	0.83	0.65	[0.12, 3.30]
Degree of offense[b]				
Gross misdemeanor	0.02	0.70	1.02	[0.25, 4.06]
Misdemeanor	0.13	0.63	1.14	[0.33, 3.98]
Petty Misdemeanor	0.12	1.18	1.12	[0.11, 11.80]
Gender — male	−0.35	0.53	0.70	[0.24, 2.00]
Age at offense	−0.06	0.22	0.94	[0.59, 1.44]
Race[c]				
American Indian or Alaskan Native	−0.02	1.20	0.98	[0.08, 9.52]
Black	0.71	0.71	2.04	[0.52, 8.79]
Hispanic	1.54	1.62	4.66	[0.24, 5.78]
Socioeconomic status	1.03	0.69	2.80	[0.74, 11.50]
Special education status (IEP)	−0.28	0.62	0.76	[0.22, 2.61]
Maltreatment — neglect	1.61*	0.78	4.98	[1.15, 25.50]
Maltreatment — physical abuse	2.13*	0.88	8.38	[1.60, 52.90]
Maltreatment — sexual abuse	0.81	0.80	2.24	[0.47, 11.30]
Age at the first offense	0.08	0.11	1.08	[0.92, 1.55]
Number of previous offense	0.12	0.06	1.13	[1.02, 1.31]
Age at the first CPS	0.02	0.08	1.02	[0.87, 1.20]

Null deviance: 156.77 on 113 degrees of freedom
Residual deviance: 128.82 on 91 degrees of freedom
AIC: 174.82

[a] Reference group is Violence.
[b] Reference group is Felony.
[c] Reference group is White.
* $p < 0.05$.
** $p < 0.01$.
*** $p < .001$.

(4) Logistic regression on recidivism between Oak County CYPM treatment group and the other comparison groups.

	b	S.E.	Exp (b)	95% CI
(Intercept)	−0.96	2.13	0.38	[0.01, 24.01]
Time: Post	0.14	0.42	1.16	[0.50, 2.65]
Local: Oak County	0.73	0.43	2.07	[0.91, 4.83]
CYPM	−1.74**	0.65	0.18	[0.05, 0.61]
Type of offense[a]				
Property	0.32	0.38	1.37	[0.65, 2.92]
Substance	−0.14	0.99	0.87	[0.10, 5.61]
Other	0.24	0.44	1.27	[0.53, 3.04]
Number of previous CPS cases	0.05	0.15	1.05	[0.78, 1.41]
OHP at offense	−0.20	0.46	0.81	[0.32, 1.99]
Degree of offense[b]				
Gross misdemeanor	0.04	0.47	1.05	[0.41, 2.62]
Misdemeanor	−0.14	0.40	0.87	[0.38, 1.92]
Petty Misdemeanor	−0.52	0.70	0.60	[0.14, 2.35]
Gender — male	−0.39	0.33	0.68	[0.35, 1.29]
Age at offense	−0.13	0.15	0.88	[0.64, 1.16]
Race[c]				
American Indian/Alaskan Native	0.49	0.75	1.62	[0.36, 7.07]
Black	0.15	0.45	1.17	[0.48, 2.83]
Hispanic	−0.14	0.87	0.87	[0.14, 4.57]
Socioeconomic status	1.04*	0.44	2.84	[1.23, 6.86]
Special education status (IEP)	−0.14	0.38	0.87	[0.41, 1.83]
Maltreatment – Neglect	0.35	0.49	1.42	[0.54, 3.73]
Maltreatment – Physical abuse	0.63	0.54	1.87	[0.64, 5.40]
Maltreatment – Sexual abuse	0.27	0.54	1.31	[0.45, 3.76]
Age at the first offense	0.06	0.08	1.06	[0.93, 1.36]
Number of previous offense	0.14***	0.04	1.15	[1.07, 1.25]
Age at the first CPS	0.00	0.05	1.00	[0.91, 1.11]

Null deviance: 312.63 on 227 degrees of freedom
Residual deviance: 269.89 on 203 degrees of freedom
AIC: 319.89

[a] Reference group is Violence.
[b] Reference group is Felony.
[c] Reference group is White.
* $p < 0.05$.
** $p < 0.01$.
*** $p < .001$.

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