

Information on Operation Safe Kids

Background

“, provided that \$650,000 of this appropriation to expand Operation Safe kids may not be expended until the Department of Juvenile Services, in conjunction with the Baltimore City Health Department, submits:

- (1) an independent evaluation to the budget committees detailing the efficacy of the program;
- (2) a statement as to how the department intends to maintain program fidelity should the program be replicated beyond its current location; and
- (3) recidivism data for Operation Safe Kids (for 1, 2, and 3 years after program completion including detail on the extent of penetration into the juvenile and criminal justice systems) relative to comparable programming.

The budget committees shall have 45 days to review and comment on the submitted material.” *Report on the State Operating Budget (SB 90) and the State Capital Budget (SB 150) and Related Recommendations, Page 186*

Description:

Operation Safe Kids (OSK) is a youth violence prevention program that provides community-based case management and increased monitoring to juvenile offenders who are at high risk of becoming victims or perpetrators of violence. Baltimore City Health Department (BCHD) Youth Development Technicians (YDT’s) work closely with Department of Juvenile Services (DJS) case managers and other state agencies to provide comprehensive services and increased accountability to participating youth. The program’s primary goal is to reduce youth violence in the City by ensuring these young people have the tools they need to become productive adults.

Program Structure:

OSK targets its services to the highest risk youth living in Baltimore City who match the profile of juvenile homicide and shooting victims. DJS refers juvenile offenders to OSK if they:

- Live in Baltimore City
- Are under community-based DJS supervision; AND have
- History of involvement in drug trade as indicated by one or more arrests for CDS distribution or possession with intent to distribute of any illegal drug AND/OR simple possession of a controlled dangerous substance.
- One or more arrests for a crime of violence
- One or more arrests for any crime involving possession of use of a firearm
- Victim of shooting

OSK employs YDT's to provide intensive case management to juvenile offenders. Each carries a caseload of approximately 12 youth. Under the supervision of one of three licensed clinical coordinators (CC's), YDT's provide informal counseling, monitoring and intensive case management to youth on their caseload. OSK Clinical Coordinators provide direct oversight, clinical supervision of cases, participate in assessments, ISP development/reviews, and support of service delivery interventions.

Once admitted into the program, youth are matched with an OSK YDT and a DJS case manager, who work together to ensure that the needs identified in each youth's Individual Service Plan (ISP) are met, monitor compliance, and respond immediately to positive and negative behaviors.

OSK and DJS staff meet weekly at Kidstat meetings with representatives of participating state agencies (State's Attorney, Public Defender, Balto. City Public Schools, and others) to ensure that the needs of the individual youth are met in a timely manner and that program progress is closely monitored. The participation of the partner agencies is to assist in expediting necessary resources to assist youth and families with acute needs.

Services Offered:

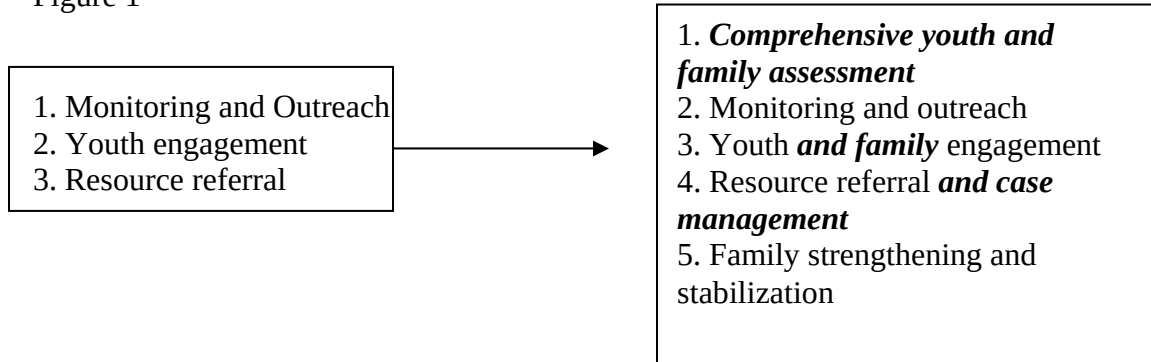
- Intensive case management & monitoring
- Referral and linkage to psychosocial resources/services
- Job Readiness (JRT) and Job Placement: OSK is contracted with the Mayor's Office of Employment Development (MOED) to provide JRT and job placement to OSK youth. Two employment counselors from MOED work with OSK staff to identify youth for the JRT programs and subsequent job placement. The employment counselors also provide ongoing support to the youth during their time of employment to help the youth to maintain their employment.
- Educational Support: The OSK Education Coordinator works with local schools to help keep OSK youth involved in education. Staff visits youth at their schools, work with school staffs to address identified educational issues, provide advocacy, and assist with enrollment into alternative placements if necessary.
- Clinical Supervision: OSK employs Licensed Social Workers who provide clinical oversight, assist in completion of assessments, develop treatment plans for youth, and assist staff with linkage to resources.

2006 Programmatic Evolution:

In 2006, the OSK program underwent a transformation of its model in order to evolve from a monitoring program to a more clinically-oriented program. As a result of the modifications, the OSK Director and Clinical Coordinators are required to have licensure as a clinical social worker (LCSW-C). Other changes include the implementation of a comprehensive initial assessment for all new enrollments and a revision of the treatment service planning documentation.

Changes in Program Services: Pre-2006 versus Current Model

Figure 1



Evaluation of Operation Safe Kids

The Maryland Department of Juvenile Services has been an active participant in the evaluation of the Operation Safe Kids program, which was conducted by Baltimore City Health Department-in collaboration with Johns Hopkins University, Public Health. A quasi-experimental design was used to analyze the impact of Operation Safe Kids. Although the results of the study are somewhat limited, the Department feels that the methodology is sound and that the outcomes indicated by the study are positive.

Project summary

Dr. Caroline Fichtenberg was the principal analyst for this research. The goal of the evaluation was to assess the impact of OSK participation on juvenile recidivism relative to the DJS services youth would otherwise receive. Kids who had participated in OSK at any point in time were compared to “similarly-situated” kids who were under the supervision of DJS during the same time period. Measures of juvenile recidivism included: (a) any re-offense; (b) any re-offense involving guns and/or violence; (c) any facts sustained re-offense; and (d) any facts-sustained re-offense involving guns and/or violence.

The DJS Research and Evaluation Unit provided a large part of the data used in this study. Information about youths’ histories of DJS intake, probation, aftercare and placement was provided for both the experimental and the comparison groups, for which DJS also assisted in the identification and selection of youth.

Sample

The OSK was implemented by the Baltimore City Health Department in November, 2002. Since that time, the eligibility criteria for the program changed four times. Changes to the eligibility criteria included, for example: a slight increase in the age range for program participation; the imposition of a gender restriction excluding females from participation; and revisions to the criminal history profile. The largest change occurred in January, 2006 from a focus on surveillance to a focus on providing clinical services.

As a result, the OSK researchers present findings on two samples: (a) the Total OSK Sample; and (b) the Post-2006 OSK Sample (see Table below).

OSK Eligibility Criteria	Dates Effective	Total OSK Sample N=185	Post-2006 OSK Sample N=97
Version I	11/02-9/03	N=15	-
Version II	9/03 – 2/04	N=3	-
Version III	2/04 – 11/04	N=14	-
Version IV	11/04 - 1/06	N=56	-
Version V	1/06 – 9/07	N=97	N=97

One of the challenges in a quasi-experimental design is selecting the comparison sample. Using data provided by DJS, and using Propensity Score Matching methodology, they were able to identify youth who were eligible for the OSK program at similar times (using the eligibility criteria in effect at the time), who had similar arrest records, and resided in the same zip codes. Comparison of the OSK Sample to the Comparison Sample revealed that they were in fact very similar on measured characteristics.

Results

Models estimating the impact of OSK participation on juvenile recidivism using the Total OSK Sample (controlling for age-at-1st-arrest, number of prior offenses, number of prior drug offenses) did reveal a statistically significant difference between the OSK sample and the comparison sample. OSK participants were found to be significantly less likely to have committed an offense that resulted in a facts-sustained ruling.

Analysis of the Post-2006 OSK Sample revealed that while OSK youth were less likely to re-offend and less likely to commit an offense involving guns or violence, these differences were not statistically significant. Thus, while the direction of the difference is positive, the results are not statistically significant which may be a function of the small sample size.

Looking Ahead

DJS will continue to work with BCHC to expand and refine this study. Expanding the study time-frame beyond August 2007 will include more youth in the sample and increase the validity of the findings. An analysis of time to failure will also enhance the recidivism analysis. Documentation of the types of surveillance activities, i.e., face-to-face contacts, phone contacts, curfew monitoring, etc. as well as the types of clinical services, treatment programs, has been greatly enhanced since the study began. Analysis of these will allow for a stronger study of the activities that impact the outcomes.

**Evaluation of the Effects of Operation Safe Kids on
Re-Offending by Juveniles in Baltimore**

**Interim Report Prepared by
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June 17, 2008

Background

Between 1999 and 2002, youth violence increased dramatically in Baltimore. A total of 464 youth under the age of 18 were shot and 90 were murdered in Baltimore City in the four year period between 1999 and 2002. The annual number of juvenile homicides nearly doubled between 2001 and 2002, from 18 to 33. This alarming increase in youth violence occurred even as Baltimore's overall violent crime rate was decreasing at record rates, highlighting the urgent need for new, targeted strategies to prevent violence among juveniles.

This epidemic of youth homicide disproportionately affected young African American males living in some of the most economically disadvantaged neighborhoods in the city. A 2001 Baltimore City Health Department (BCHD) study of 34 shooting victims revealed that the victims were, on average, 16 years old and disproportionately African American and male. Of male victims, 93% had criminal records. On average, they had been arrested for the first time when they were 12.5 years old and were arrested more than 5 times prior to being shot approximately 4 years after the initial arrest. More than half had been arrested for drug-related charges. BCHD recognized this extended involvement with the criminal justice system as a lost opportunity for intervention.

In response, BCHD established the Operation Safe Kids (OSK) program in November 2002. The program was designed to target high risk youth, ages 13 –17, under the formal supervision of the Department of Juvenile Services (DJS) and provide them with monitoring and outreach, engaging youth and providing them with referrals to service providers. The goals of OSK were to reduce recidivism, increase pro-social behaviors, support positive peer relationships and improve family interactions. Youth workers worked closely with DJS case managers to develop treatment plans and coordinate responses to problems and crises. OSK and DJS collaborated in an attempt to both enforce the terms of probation and to encourage compliance with rehabilitative services. Through partnerships with City agencies and local providers, the program has the capacity to provide multiple specialized services, including employment, mental health, substance abuse and educational services.

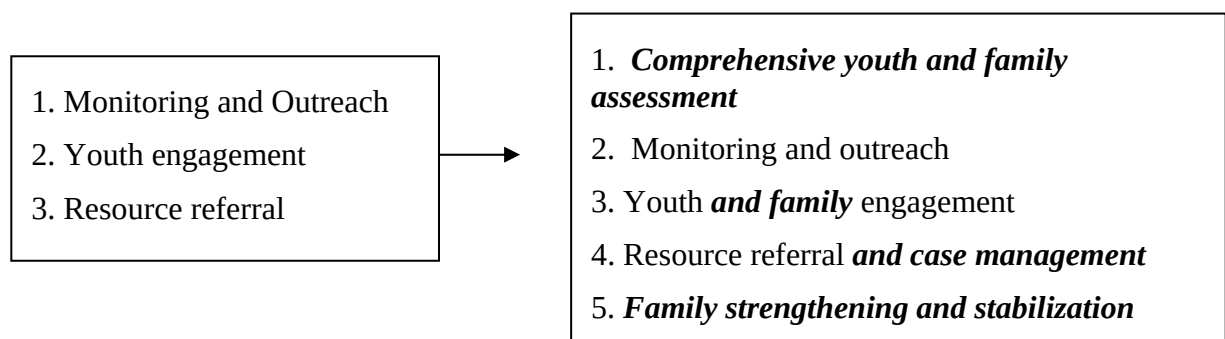
BCHD employs ten youth workers to provide intensive case management to juvenile offenders. Each carries a caseload of up to twelve youth. Under the supervision of one of three clinical coordinators, youth workers provide informal counseling, work to improve school attendance and compliance with other terms of probation, assist youth to access mental health and substance abuse treatment services, and assist families in accessing other services such as housing and mental health treatment.

A key component of the OSK program is the KidStat process, which brings together decision-making staff from a range of city and state agencies to discuss program progress and coordinate services for youth and their families on a weekly basis. This process fosters communication between responsible agencies, provides oversight of case progress, and encourages accountability among all partners. Partner agencies include the Department of Juvenile Services, the Baltimore City Public School System, the Baltimore City Department of Social Services, the Office of the State's Attorney for Baltimore City, the Office of the Public Defender, Baltimore City Police Department, the Mayor's Office of Employment

Development, Baltimore City Department of Housing and Community Development, the Juvenile Court, and others. No other violence prevention program in the city brings together this range of agencies to provide case planning and coordination.

In 2006, the OSK program underwent a transformation of its model in order to evolve from a monitoring program to a more clinically-oriented program. As a result of the modifications, the OSK Director and Clinical Coordinators are required to have licensure as a clinical social worker (LCSW-C). Other changes include the implementation of a comprehensive initial assessment for all new enrollments and a revision of the treatment service planning documentation.

Figure 1
Changes in Program Services: Pre-2006 versus Current Model



Since its inception, the program has completed two quantitative evaluations. In the CY 2005 analysis, data was compiled for 59 youth served in 2005 who had been in the program for at least one year; whereas, the CY 2006 analysis was limited to 89 participants who were enrolled for at least six months with at least a one-year period post-enrollment follow-up period. In both of these analyses, the primary outcome measure was the rate of rearrest. CY 2005 and CY2006 data showed that OSK participants in 2005 and 2006 had 33 – 43% fewer arrests in the year following program entry than in the year prior to program entry (Table 1).

Table 1
Comparison of arrests one year pre- and post-enrollment

	CY 2005	CY2006
Total arrests	-32.9%	-43.2%
Violent crime arrests	-44.0%	-57.9%
Drug crime arrests	-41.2%	-44.4%
Facts sustained adjudications	-32.2%	NA

While these results were encouraging, they could not address the question of how the OSK program compared to the alternatives offered by the Department of Juvenile Services for the category of youth served by OSK. This study was designed to do that and thereby obtain a more valid estimate of program impact. The following sections explain the methodology

and initial findings from this evaluation. A more comprehensive evaluation of OSK will be completed later in calendar year 2008.

Study Methodology

Study Design

A quasi-experimental study design was used to estimate the effects of OSK on criminal recidivism. Juvenile offense records for youth who participated in OSK on or after January 1, 2006 were compared with a matched set of youth who were not enrolled in OSK but met the OSK enrollment criteria during the same time period as their OSK counterpart. This comparison enables the estimation of the effect of OSK participation on criminal recidivism among youth eligible for OSK. January 1, 2006 was selected as the cut-off date for evaluation because of the significant changes in program content that occurred prior to that date. For example, the ability of BCHD to provide clinical services to OSK youth and their family was expanded in 2006 and 2007.

Study Population

The primary treatment group consisted of 185 youth served by the regular OSK program between January 1, 2006 and September 26, 2007 who met enrollment criteria¹. In order to allow for an appropriate post enrollment period, the evaluation was limited to those served until September 26, 2007. During OSK's evolution, the enrollment criteria have been modified four times, resulting in five different sets of enrollment criteria. See Table 2 for details.

In June 2007, OSK implemented a second program, OSK Court. OSK Court is a problem-solving court model targeting juvenile justice system youth who are on probation and at-risk of out-of-home placement. Due to the differences in enrollment criteria and program components, it was determined that the six youth served by OSK Court during the evaluation period would not be included in this study.

OSK participants were compared to youth who would have been eligible for OSK but were not referred. Generally, there were many OSK-eligible youth at any given time that were not referred. The reasons for referral decisions are not clear. Since there are five versions of OSK's enrollment criteria included in this study, the parameters supplied to DJS to query potential control subjects were constructed so that youth from all versions would be captured.

¹ One regular OSK client served during the evaluation period was excluded because he did not meet enrollment criteria and had been admitted as an exception to the criteria.

Table 2
Changes in OSK enrollment criteria²

Criteria version	I	II	III	IV	V
Clients included in Evaluation	15	3	14	56	97
Referral Period	11/25/02 - 09/08/03	09/09/03 - 02/08/04	02/09/04 - 11/15/04	11/16/04 - 01/19/06	1/20/06 - present
Age Range (years)	13 – 17	13 – 17.25	13 – 17.25	13 – 17	13 – 17.5
Gender	No restrictions	No restrictions	No restrictions	Male only	Male only
Criminal History must include at least one of following	* Three or more arrests for a COV (Murder, Manslaughter, robbery, robbery w/ deadly weapon, carjacking, carjacking w/ deadly weapon, assault 1st degree, any attempts at aforementioned crimes) * Two or more facts sustained for a COV * Any CDS arrest except for Distribution of Marijuana	* Two or more arrests for a COV (Murder, Manslaughter, robbery, robbery w/ deadly weapon, carjacking, carjacking w/ deadly weapon, assault 1st degree, any attempts at aforementioned crimes) * One or more facts sustained for a COV * Any CDS arrest * Arrest for any crime involving possession or use of a firearm	* Two or more arrests for a COV (Murder, Manslaughter, robbery, robbery w/ deadly weapon, carjacking, carjacking w/ deadly weapon, assault 1st degree, assault 2nd degree, any attempts at aforementioned crimes) * One or more facts sustained for a COV * Any CDS arrest * Arrest for any crime involving possession or use of a firearm	* One or more arrests for a COV (Murder, Manslaughter, robbery, robbery w/ deadly weapon, carjacking, carjacking w/ deadly weapon, assault 1st degree, assault 2nd degree, any attempts at aforementioned crimes) * Any CDS arrest * Arrest for any crime involving possession or use of a firearm	* One or more arrests for a COV (Murder, Manslaughter, robbery, robbery w/ deadly weapon, carjacking, carjacking w/ deadly weapon, assault 1st degree, any attempts at aforementioned crimes excludes assault 2nd degree) * Any CDS arrest * Arrest for any crime involving possession or use of a firearm
Criminal History CANNOT include any of the following	N/A	N/A	* Arrest for a sex offense	* Arrest for a sex offense	* Arrest/adjudication for a sex offense * Arrest/adjudication for arson or other fire setting offense * Youth has been diagnosed with a psychotic disorder or has shown a history of psychotic symptoms

² For all criteria versions, at the time of referral, youth must be under the formal supervision of DJS; cannot have an open warrant; cannot be receiving inpatient substance abuse or mental health treatment; and cannot be enrolled in a similar program such as Choice, CSAFE, Progressive Life or Intensive Aftercare. For versions I, II and III, the program was restricted to certain neighborhoods. For the purpose of this evaluation, matching of controls will be restricted by home zip code.

Non-OSK comparison subjects were selected from a pool of all youth who met the following criteria:

- DOB range: 11/18/84 - 02/01/95 AND
- Criminal History must include at least one of the following:
 - o One or more arrests for a Controlled Dangerous Substance
 - o OR one or more arrests for any crime involving possession or use of a firearm
 - o OR one or more arrests for a crime of violence (COV) (murder, manslaughter, robbery, robbery w/ deadly weapon, carjacking, carjacking w/ deadly weapon, assault 1st degree, assault 2nd degree, any attempts at aforementioned crimes)
 - o OR one or more facts sustained for a COV (same COV definition as above)
- Zip Code: Either current or former home zip code. Must include one of the following: 21201, 21202, 21205, 21206, 21207, 21211, 21212, 21213, 21214, 21215, 21216, 21217, 21218, 21220, 21223, 21224, 21225, 21229, 21230, 21231, 21239.
- Under some form of formal DJS supervision between November 25, 2002 and April 18, 2008 where Baltimore City is the jurisdiction.

Propensity score matching was used to match every OSK participant with a youth who was eligible for, but not referred to, OSK in the same quarter as the OSK participant, and who was similar with respect to age, neighborhood (ZIP code of residence), and arrest record prior to being eligible for OSK. The method for matching is described below under *Data Analysis*.

Data Collection

OSK client referral, enrollment and discharge dates, in addition to zip code at time of referral, were obtained through OSK's ETO Software database. All other data were provided by the Department of Juvenile Services (DJS) from their ASSIST database. Using the criteria discussed in the "Selection of Control Subjects," data on 7,366 youth was provided by DJS. The results included the 185 OSK clients included in the study in addition to another 132 OSK clients who were not part of this study. Youth who participated in OSK prior to January 1 2006 or after September 26 2007, but did not participate between those dates were excluded from this analysis. In addition, since all of the OSK clients included in the study were male, 953 females were removed from the control sample leaving 6,096 potential control subjects.³

The following information was provided by DJS for each youth:

- Zip Codes: Zip codes of youth's current and former residences
- Offense History: Complete juvenile arrest histories for all formal and informal arrests. Information provided included DJS's intake decision of whether or not

³ OSK has only served 2 females since its inception. In 2005, the decision was made that the program would only serve males.

formal charges should be filed, the alleged offense, arrest date, complaint date and offense date.

- Adjudication History: Court outcome (whether or not the charge was found facts sustained) of all juvenile charges forwarded to the Office of the State's Attorney for formal charging. Data included the court decision and the adjudicated offense where applicable.
- Disposition History: Court dispositions, or sentences, for juvenile charges found facts sustained in addition to the dates of disposition were provided.
- Placement History: Provides start and end dates for placements that would affect a youth's ability to be enrolled in OSK, served by OSK and/or their ability to recidivate. Placements include, but are not limited to, juvenile detention; shelter care; inpatient mental health or substance abuse treatment; community based programs; out of home long term placements such as group homes or residential treatment facilities; and Community Detention.
- Warrant History: Provides start and end dates for each time a youth was on warrant. A warrant is issued if a youth's DJS Caseworker has been unable to contact them for an extended period of time or the youth fails to attend a juvenile court hearing.
- Formal Supervision: For each period of time the youth was formally supervised by DJS, data such as the county of jurisdiction, type of formal supervision (probation or aftercare) and the start and end dates for each record was provided.

Measures

For most of our analyses, our measure of treatment status (OSK vs. no OSK) was simply whether the youth had ever been enrolled in OSK. This measure of treatment does not allow for an examination of a dose-response relationship (i.e., whether outcomes improved with the amount of time the youth participated in OSK), yet we felt that it was the most policy-relevant measure and was not subject to selection bias. Youth left the OSK program for a variety of reasons, but leaving was clearly connected to the youth-reoffending. A youth who committed offenses while being in the program might be transferred out and possibly placed in a more restrictive setting. We also recognized a priori that the OSK program changed over the course of the study. In particular, after January 2006, the program began to offer more clinical services that were believed to provide greater benefit to youth than what had been the case. Thus, although we recognized that we will have reduced power to detect statistically significant differences between treatment groups, we conducted a separate set of analyses with youth who entered the program in the years 2006 and 2007.

Using the data described above, offense history and incidence were measured for each quarter of 19 quarters in the study for each youth.⁴ For each quarter for each youth, we determined their eligibility for OSK and the total number of offenses prior to OSK referral or eligibility, the total number of offenses involving violence and/or guns prior to OSK referral/eligibility, and the total number of offenses involving drugs prior to OSK

⁴ This enabled us to match each OSK youth with similar comparison youth at the time the OSK youth was referred to the program as described in the sub-section below.

referral/eligibility. Similar measures of recidivism for the quarters following OSK referral/eligibility were used.

Offense data were limited to DJS records, and therefore includes only juvenile arrests. Outcomes considered were whether individuals were arrested again, the number of arrests, and the type of arrests (firearms or violence, drugs, other). Subsequent analyses will include adult arrests as well juvenile arrests. Other limitations of the data were that there was no easy and reliable way to link adjudications to arrest data and some arrest data did not have dates of the offense. Offenses for which the date of the offense was missing were dropped from the analyses. This is one reason why we were able to count more post-OSK “facts sustained” adjudications than there were offenses. Dates for adjudications were rarely missing.

Data Analysis

It is difficult to make correct causal inferences in non-experimental studies in which the treatment is not assigned randomly, particularly if treatment assignment is determined largely on the basis of an individual’s high-risk status. Such is the case with the selection of youth under DJS supervision into OSK. Regression analyses address this problem by including covariates in the statistical model designed to control for baseline differences in risk and protective factors between the treatment and comparison groups. Including both treatment status and these other predictors of youth offending in the model can result in high degrees of collinearity that, at a minimum, reduce the precision of the estimate and can lead to inappropriate inferences about the differences between the treatment groups’ outcomes. In addition, estimates of program effect can be highly dependent on model specification – something that is easy to get wrong and not always easily recognized.

Random assignment usually produces study groups that are relatively balanced with respect to baseline factors associated with the outcomes of interest, and therefore allow for more precise estimates of treatment effects. When two study groups are very similar at baseline with respect to factors associated with the outcomes being studied, it is less likely that the groups will vary with respect to unmeasured conditions that could confound estimates of program effect. An excellent way to achieve balance at baseline for treatment groups when random assignment is not possible is to use propensity score matching (Rosenbaum & Rubin, 1983). In this study, propensity score matching (PSM) involved the estimation of a logistic regression model to predict treatment assignment (OSK vs. standard DJS services) using baseline factors associated with youth involvement in serious acts of violence such as homicides and nonfatal shootings. The predicted probabilities for treatment assignment from this model are the propensity scores later used to match OSK youth with non-OSK youth. The specific propensity model used to predict treatment assignment included the following predictors: age, age at first offense, number of offenses prior to OSK eligibility/referral, number of offenses involving guns and/or violence prior to OSK eligibility/referral, number of drug offenses prior to OSK eligibility/referral, and ZIP code of residence.

For each OSK youth we identified a non-OSK comparison that became OSK eligible (based on offense history and the eligibility criteria being used by OSK during that period) in the same quarter as the OSK youth entered the program and whose propensity score was approximately the same. We used nearest-neighbor matching which selects the non-treatment comparison with the propensity score closest to that of the OSK being matched.

After verifying that the OSK and their non-OSK comparisons were similar with respect to baseline predictors of offending, we examined bi-variate associations between treatment status and each of the outcome measures. For dichotomous outcomes such as whether the youth had a subsequent offense or any crime involving violence or guns, we tested this association based on Pearson chi-square tests of independence and calculated a crude odds ratio with 95% confidence intervals. Measures of the number of offenses committed were skewed with a relatively large number of zero values and some outliers with a very large number of offenses. Therefore, in addition to comparing mean values on these measures between OSK and non-OSK youth with traditional t-tests, we used Mann-Whitney's U statistic, a non-parametric test comparing the ranked sums in the number of post-OSK referral/eligibility offenses committed between two study groups. For these tests, we also examined whether the findings were dependent upon the exclusion of an outlier observation (3 standard deviation units greater than the mean).

These bivariate analyses are useful because they compare OSK youth with non-OSK youth who were similar at the time the OSK youth entered the program. Nevertheless, the treatment groups may differ somewhat on risk factors for re-offending and those differences could bias estimates of program effect if adjustments are not made. We used regression analysis to control for other risk factors for re-offending. A dichotomous variable indicating OSK treatment assignment (0=no, 1= yes) was included in the regression models along with other baseline predictors (e.g., age of first arrest, number of prior offenses).

When modeling the probability that a youth would reoffend following OSK enrollment or becoming eligible for OSK, we used logistic regression. The exponentiated coefficients from these models can be interpreted as adjusted odds ratios for youth in OSK versus in other DJS services. Because the outcome variables measuring the number of offenses or the number of facts sustained offenses were skewed toward zero and therefore not normally distributed, we estimated negative binomial regression models appropriate for analyses of count data.

Results

Table 3 compares the 185 OSK youth and the 185 non-OSK youth (selected from 2,561 juveniles who met OSK eligibility requirements) that were matched based on their propensity scores and the quarter in which they either entered OSK or committed an offense that made them eligible for OSK. The non-OSK comparison was, on average, 19 days older than the OSK youth and 171 of the pairs (92.4%) matched on their exact residential ZIP code. The OSK group had slightly more prior offenses than their non-OSK comparisons (mean of 4.6 for OSK versus 4.3 for non-OSK). The differences in the total number of prior offenses involving guns or violence (each have about 1 such offense) and in the total number of drug offenses were not statistically significant. Thus, the propensity score matching appeared to be generally successful as the two groups were balanced with respect to baseline risk factors for re-offense with the exception of the OSK youth have slightly more prior offenses.

Table 3. Baseline predictors for recidivism for OSK youth and non-OSK comparisons.

	OSK (n = 185) Mean (SD)	Non-OSK (n = 185) Mean (SD)	signif.*
age at first arrest	13.9 (1.6)	14.0 (1.83)	.246
number of prior offenses	4.6 (2.7)	4.3 (3.1)	.049
number of prior offenses involving guns and/or violence	0.9 (1.2)	0.9 (1.2)	.581
number of prior offenses involving drugs	1.7 (1.7)	1.4 (1.3)	.110
propensity score	.09 (.04)	.09 (.04)	.853

* None of the variables were normally distributed. The equivalence of the summed rank values were compared using the Mann-Whitney U non-parametric test and asymptotic significance levels calculated.

Table 4 compares the two study groups with respect to our outcome measures of recidivism and presents bivariate tests of independence between the two groups. There is no pattern of clear difference between the study groups; however, OSK youth have a somewhat lower rate of facts-sustained total offense. Sixty-two percent of OSK youth had a facts-sustained offense following enrollment compared with 71% of non-OSK comparisons (OR = 0.66, $p = .06$) and fewer total facts-sustained offenses (Mann-Whitney test of ranked sums $p = .06$). The majority of both groups had at least one offense subsequent to entering OSK or becoming OSK eligible (57.8% among OSK youth vs. 63.8% among non-OSK youth), and nearly three in ten (27.6% among OSK vs. 28.6% among non-OSK comparisons) were arrested for at least one crime involving violence

and/or guns. The mean number of offenses in the quarters following OSK enrollment or becoming OSK eligible was 1.7 for OSK youth and 1.9 for non-OSK youth. The mean number of re-offenses involving guns and/or violence was 0.43 for OSK youth and 0.41 for non-OSK comparisons.

Table 4. Re-offenses for OSK youth and non-OSK comparisons.

	185 OSK % (n)	185 Non-OSK % (n)	Odds Ratio	OR 95% CI
any re-offense	57.8 (107)	63.8 (118)	0.78	0.51 to 1.18
any re-offense involving guns and/or violence	27.6 (51)	28.6 (53)	0.95	0.60 to 1.49
any facts-sustained re-offense	62.1 (115)	71.4 (132)	0.66	0.43 to 1.02
any facts sustained re-offense involving guns and/or violence	21.1 (39)	17.8 (33)	1.23	0.73 to 2.06
	OSK mean (SD)	non-OSK mean (SD)	t (signif.)	Signif. of Mann-Whitney test ranked sums
total re-offenses	1.72 (2.44)	1.88 (2.37)	0.65 (.516)	.356
re-offenses involving guns and/or violence	0.43 (0.89)	0.41 (0.74)	0.19 (.849)	.807
facts-sustained re-offenses	1.94 (2.63)	2.24 (2.47)	1.16 (.246)	.062
facts sustained re-offenses involving guns and/or violence	0.38 (0.99)	0.38 (1.05)	0.00 (1.00)	.503

The bivariate findings are of interest, but should not be considered conclusive. While the treatment groups were relatively balanced on baseline predictors, there were some differences (notably the OSK group having more prior offenses). The findings from the logistic regressions for predicting binary outcomes (e.g., any re-offense) that statistically control for such differences are presented in Table 5. OSK was associated with a 43% reduced likelihood of committing an offense that was ruled “facts sustained.” Otherwise, OSK was not associated with the other outcomes. Table 6 provides the findings from the negative binomial models of the number of re-offenses committed, and reveal no evidence of OSK effects.

Table 5. Logistic regression results.

Y = any re-offense (yes/no)	Adj. Odds Ratio	Signif.	95% CI for OR
OSK	0.718	0.136	0.46, 1.11
age at first arrest	0.797	0.004	0.68, 0.93
prior # offenses	1.072	0.228	0.96, 1.20
prior drug offenses	1.034	0.723	0.86, 1.24
Quarter first eligible	0.957	0.082	0.91, 1.01
LR chi-square (5) = 27.06. Prob > chi square .0001			BIC = 503.83
Y = any facts-sustained re-offense (yes/no)	Adj. Odds Ratio	Signif.	95% CI for OR
OSK	0.574	0.018	0.36, 0.91
age at first arrest	0.846	0.043	0.72, 0.99
prior # offenses	1.164	0.024	1.02, 1.33
prior drug offenses	1.098	0.376	0.89, 1.35
Quarter first eligible	0.965	0.186	0.92, 1.02
LR chi-square (5) = 35.08. Prob > chi square .0001			BIC = 470.96
Y = any offense involving violence or guns (yes/no)	Adj. Odds Ratio	Signif.	95% CI for OR
OSK	0.935	0.793	0.57, 1.54
age at first arrest	0.811	0.007	0.70, 0.94
prior # offenses involving violence or guns	1.857	< 0.001	1.46, 2.37
prior drug offenses	0.944	0.483	0.80, 1.11
Quarter first eligible	0.940	0.023	0.89, 0.99
LR chi-square (5) = 60.50. Prob > chi square .0001			BIC = 414.52
Y = any facts-sustained offense involving violence or guns (yes/no)	Adj. Odds Ratio	Signif.	95% CI for OR
OSK	1.19	0.520	0.69, 2.05
age at first arrest	0.773	0.002	0.66, 0.91
prior # offenses involving violence or guns	1.257	0.044	1.01, 1.57
prior drug offenses	1.061	0.477	0.90, 1.25
Quarter first eligible	0.977	0.434	0.92, 1.03
LR chi-square (5) = 24.80. Prob > chi-square 0.0002			BIC = 375.37

Table 6. Negative binomial regression results.

Y = # re-offenses	<i>IRR*</i>	<i>Signif.</i>	<i>95% CI for OR</i>
OSK	0.928	0.571	0.72, 1.20
age at first arrest	0.810	>0.001	0.68, 0.93
# prior offenses	1.030	0.349	0.96, 1.20
prior drug offenses	0.961	0.436	0.87, 1.06
Quarter first eligible	0.963	0.015	0.93, 0.99
LR chi-square (5) = 43.02 Prob > chi square .0001			BIC = 1346.42
Y = # facts-sustained re-offenses	<i>IRR*</i>	<i>Signif.</i>	<i>95% CI for OR</i>
OSK	0.845	0.170	0.66, 1.07
age at first arrest	0.868	0.001	0.80, 0.94
# prior offenses	1.068	0.026	1.01, 1.13
prior drug offenses	0.973	0.572	0.88, 1.07
Quarter first eligible	0.966	0.016	0.94, 0.99
LR chi-square (5) = 41.35. Prob > chi square .0001			BIC = 1439.3
Y = # re-offenses involving violence or guns	<i>IRR*</i>	<i>Signif.</i>	<i>95% CI for OR</i>
OSK	1.130	0.585	0.76, 1.63
age at first arrest	0.835	0.003	0.74, 0.94
# prior offenses involving violence or guns	1.341	0.009	1.09, 1.77
prior drug offenses	0.893	0.075	0.78, 1.01
Quarter first eligible	0.943	0.005	0.91, 0.98
LR chi-square (5) = 46.28. Prob > chi square .0001			BIC = 631.0
Y = # facts-sustained offenses involving violence or guns	<i>IRR*</i>	<i>Signif.</i>	<i>95% CI for OR</i>
OSK	1.192	0.526	0.69, 2.05
age at first arrest	0.728	0.001	0.60, 0.88
prior # offenses involving violence or guns	1.385	0.009	1.09, 1.77
prior drug offenses	0.916	0.335	0.77, 1.10
Quarter first eligible	0.991	0.768	0.93, 1.05
LR chi-square (5) = 28.81. Prob > chi-square 0.0001			BIC = 570.8

* IRR: Incidence rate ratio (multiplicative change in outcome attributed to participation in OSK.)

Ideally, when testing OSK effects we would want to control for differences between OSK youth and non-OSK youth with respect to their exposure to other DJS programs and services; however, disentangling the causal direction of any associations is problematic. For example, youth who re-offend at a high rate are more likely to be assigned to juvenile detention, but placing high-risk youth in a more secure setting should, at least in the short term, reduce criminal recidivism. Including these programmatic variables that are most likely to be employed when youth recidivate could introduce endogeneity bias. Therefore, in Table 7, we simply present a summary of the nature of the types of programs the two study groups experienced or received. Enrollment in programs such as functional family therapy, multi-systemic therapy (MST), and drug court – all shown to reduce recidivism – were rarely offered and therefore not included in the table.

Table 7. Monitoring and detention services for OSK youth and non-OSK youth following OSK referral or eligibility.

	185 OSK youth	185 non-OSK youth	
	% (n)	% (n)	signif.
Juvenile detention	60.0 (111)	49.7 (92)	.047
Shelter	16.2 (30)	20.0 (37)	.345
Community detention	36.2 (67)	28.6 (53)	.120
Electronic monitoring	40.0 (74)	35.7 (66)	.391

Compared with non-OSK youth, OSK youth were more likely to be assigned to juvenile detention (60% vs. 50%, $p=.047$) and spent, on average, more than a month longer in juvenile detention (mean number of days = 98 vs. 64 for non-OSK). This difference in juvenile detention may be due to the pre-existing differences in the number of prior offenses between the study groups. Another possibility is that juvenile judges may be more inclined to establish higher levels of restrictiveness in residential settings for OSK youth compared to their non-OSK counterparts because they were selected into the program due to their high-risk status.

Restricting the Analyses to OSK Youth and their Matched non-OSK Youth Who Experienced the More Clinical Version of OSK

Because OSK evolved into a more clinical model since early 2006 from its prior focus on heightened supervision and case management, we examined the association between OSK and recidivism among 97 OSK youth who entered the program after January 16, 2006 and 97 matched non-OSK youth who became OSK eligible in the same quarter as their OSK counterpart. Table 8 presents the baseline descriptors and predictors of recidivism for these 194 youth. The two groups are very similar with respect to baseline predictors.

Table 8. Baseline predictors for recidivism for OSK youth and non-OSK comparisons.

	OSK (n = 97) Mean (SD)	Non-OSK (n = 97) Mean (SD)	signif.*
age at first arrest	14.0 (1.6)	14.1 (1.9)	.553
number of prior offenses	4.6 (2.6)	4.4 (3.0)	.180
number of prior offenses involving guns and/or violence	0.8 (1.1)	0.8 (0.9)	.450
number of prior offenses involving drugs	1.6 (1.7)	1.2 (1.3)	.206
propensity score	.09 (.04)	.09 (.04)	.853

* None of the variables were normally distributed. The equivalence of the summed rank values were compared using the Mann-Whitney U non-parametric test and asymptotic significance levels calculated.

Bivariate relationships between OSK enrollment and our measures of recidivism are shown in Table 9. Re-offending is generally lower among OSK youth than their comparison group; however, the relatively small sample size does not provide sufficient statistical power to determine whether these differences are statistically significant and not due to chance. For example, the probability of having any re-offense involving guns or violence was 38% lower among OSK youth relative to their matched comparisons and the average number of such offenses was 0.26 among OSK youth versus 0.35 among non-OSK comparisons. Despite the relatively large difference, we cannot easily rule out that the difference might be due to chance. The average number of facts-sustained offenses was nearly 0.5 lower among OSK youth relative to their comparisons.

Regression analyses are presented in Tables 10 and 11. The adjusted odds of OSK youth re-offending was lower relative to their non-OSK comparisons (Table 10) and likelihood of experiencing any offense involving violence or a gun was nearly 40% lower among the OSK group than in their comparisons; however none of the estimates are statistically significant. Thus, we cannot rule out the possibility that the lower rate of offending among OSK youth was due to chance variation. Similarly, the data in Table 11 show that the point estimates for the effects of OSK are in the expected direction indicating lower levels of offending relative to their non-OSK comparisons, yet none of the estimates is statistically significant. The incidence rate ratio (IRR) estimate for OSK's effects on the total number of facts-sustained offenses is 0.77, indicating a 23% lower level of offending. The significance level of this estimate is .09. Thus, there is a 9% likelihood that you would observe this differential in re-offending by the two study

groups if the difference was due to chance. Other noteworthy findings from the regression analysis is that prior offenses involving violence and/or guns were far better predictors of re-offenses of this type and the number of prior offenses involving drugs was either unrelated to recidivism rates or, in some cases, negatively associated with re-offending.

Table 9. Re-offenses for OSK youth and non-OSK comparisons.

	97 OSK % (n)	97 Non-OSK % (n)	Odds Ratio	OR 95% CI
any re-offense	54.6 (53)	59.8 (58)	0.81	0.46 to 1.43
any re-offense involving guns and/or violence	18.6 (18)	26.8 (26)	0.62	0.31 to 1.23
any facts-sustained re-offense	59.8 (58)	68.0 (66)	0.70	0.39 to 1.26
any facts sustained re-offense involving guns and/or violence	19.6 (19)	19.6 (19)	1.00	0.49 to 2.03
	OSK mean (SD)	non-OSK mean (SD)	t (signif.)	Signif. of Mann-Whitney test ranked sums
total re-offenses	1.33 (1.72)	1.53 (1.94)	0.75 (.457)	.496
re-offenses involving guns and/or violence	0.26 (0.63)	0.35 (0.66)	1.00 (.320)	.185
facts-sustained re-offenses	1.56 (1.91)	2.00 (2.20)	1.50 (.136)	.123
facts sustained re-offenses involving guns and/or violence	0.35 (1.07)	0.45 (1.21)	0.63 (.530)	.864

Table 10. Logistic regression results for youth enrolled in or eligible for OSK in 2006 and 2007.

Y = any re-offense (yes/no)	<i>Adj. Odds Ratio</i>	<i>Signif.</i>	<i>95% CI for OR</i>
OSK	0.761	0.378	0.41, 1.40
age at first arrest	0.837	0.085	0.68, 1.02
# prior offenses	1.108	0.184	0.95, 1.29
prior drug offenses	1.030	0.813	0.81, 1.31
quarter first eligible	0.768	0.002	0.65, 0.91
LR chi-square (5) = 23.48. Prob > chi square .0003			BIC = 273.0
Y = any facts-sustained re-offense (yes/no)	<i>Adj. Odds Ratio</i>	<i>Signif.</i>	<i>95% CI for OR</i>
OSK	0.615	0.138	0.32, 1.17
age at first arrest	0.841	0.115	0.68, 1.04
# prior offenses	1.205	0.045	1.00, 1.45
prior drug offenses	1.091	0.548	0.82, 1.45
quarter first eligible	0.761	0.002	0.64, 0.90
LR chi-square (5) = 32.24. Prob > chi square .0001			BIC = 258.1
Y = any offense involving violence or guns (yes/no)	<i>Adj. Odds Ratio</i>	<i>Signif.</i>	<i>95% CI for OR</i>
OSK	0.594	0.180	0.28, 1.27
age at first arrest	0.788	0.038	0.64, 0.90
# prior offenses involving violence or guns	1.414	0.065	0.98, 2.04
prior drug offenses	0.796	0.095	0.61, 1.04
quarter first eligible	0.641	0.001	0.50, 0.83
LR chi-square (5) = 35.54. Prob > chi square .0001			BIC = 203.8
Y = any facts-sustained offense involving violence or guns (yes/no)	<i>Adj. Odds Ratio</i>	<i>Signif.</i>	<i>95% CI for OR</i>
OSK	0.979	0.956	0.46, 2.08
age at first arrest	0.855	0.198	0.67, 1.08
# prior offenses	1.090	0.280	0.93, 1.28
prior drug offenses	0.916	0.518	0.70, 1.20
quarter first eligible	0.684	0.002	0.54, 0.87
LR chi-square (5) = 17.04. Prob > chi-square 0.0044			BIC = 206.5

Table 11. Negative binomial regression results for youth enrolled in or eligible for OSK in 2006 and 2007.

Y = # re-offenses	IRR	Signif.	95% CI for OR
OSK	0.851	0.356	0.60, 1.20
age at first arrest	0.848	0.005	0.76, 0.95
# prior offenses	1.018	0.653	0.94, 1.10
prior drug offenses	1.008	0.892	0.89, 1.14
Quarter first eligible	0.770	>0.001	0.70, 0.85
LR chi-square (5) = 38.22 Prob > chi square .0001			BIC = 636.8
Y = # facts-sustained re-offenses	IRR	Signif.	95% CI for OR
OSK	0.768	0.094	0.56, 1.05
age at first arrest	0.893	0.032	0.80, 0.99
# prior offenses	1.057	0.126	0.98, 1.13
prior drug offenses	0.989	0.847	0.88, 1.07
Quarter first eligible	0.777	>0.001	0.71, 0.85
LR chi-square (5) = 44.91. Prob > chi square .0001			BIC = 696.1
Y = # re-offenses involving violence or guns	IRR	Signif.	95% CI for OR
OSK	0.776	0.375	0.44, 1.36
age at first arrest	0.870	0.115	0.73, 1.03
# prior offenses involving violence or guns	1.286	0.041	1.01, 1.64
prior drug offenses	0.812	0.055	0.66, 1.00
Quarter first eligible	0.693	>0.001	0.57, 0.85
LR chi-square (5) = 34.03. Prob > chi square .0001			BIC = 277.5
Y = # facts-sustained offenses involving violence or guns	IRR	Signif.	95% CI for OR
OSK	0.841	0.649	0.40, 1.77
age at first arrest	0.784	0.047	0.62, 0.99
prior # offenses involving violence or guns	1.468	0.042	1.01, 2.12
prior drug offenses	0.917	0.528	0.70, 1.20
Quarter first eligible	0.686	0.002	0.54, 0.87
LR chi-square (5) = 24.01. Prob > chi-square 0.0001			BIC = 311.5

Discussion

The only statistically significant estimate of OSK effect was a 43% lower odds of having a facts-sustained re-offense following OSK enrollment or eligibility ($p=.018$). Unfortunately, there was no evidence of an overall program effect on reducing new offenses involving violence and/or guns. An important weakness of this study is that the program that was being evaluated changed significantly over time from one that was primarily about youth monitoring and some case management services and now involves more clinical services for youth and their families.

Beginning in January 2006, the OSK treatment model began to include more formal assessments of youth and parents, and more direct assistance is given to families to strengthen their ability to keep their sons out of trouble. When we examined the 97 youth who entered OSK during 2006 and 2007, OSK youth offended at a lower rate than their matched counterparts and were 39% less likely than non-OSK youth to commit a new offense involving violence and/or guns. However, relatively low statistical power due to the small sample size (97 in each study group) limits our ability to make reliable inferences about this difference. Added to the uncertainty around this finding is the fact that there was no difference between these most-recent OSK enrollees and non-OSK youth in the likelihood of committing a new facts-sustained crime involving violence and/or guns. Further research is needed on the effects of “the new OSK” with a larger sample of youth.

This research also suggests that OSK might want to reconsider its eligibility requirements if they intend to serve youth at greatest risk of committing serious acts of violence. Prior offenses involving drugs were either not predictive of committing crimes involving violence and/or guns or were actually negatively associated with re-offending involving violence. A prior history of violence and early age of first arrest were far better predictors of subsequent offending involving violence and/or guns.

The challenge of most quasi-experimental studies is to find non-treated comparisons who are very similar to those receiving the intervention being tested. We were able to find, based on available measures, non-detained DJS youth who were very similar to OSK youth with respect to their offense histories, when they became eligible for OSK, and ZIP code. The all-male sample was racially homogeneous, with 96% being black. Although assignment to OSK at random would have been a stronger design to make causal inferences, we believe our propensity score matching technique and regression analyses enhanced our ability to make causal inferences.

Nevertheless, the questions of how and why some youth who were OSK eligible were referred to OSK and many others were not were left largely unanswered. We don’t know whether youth were referred to the program because DJS thought the youth posed special challenges and that traditional DJS services were inadequate, or alternatively, whether they viewed them as a lower risk that could be managed in a program such as OSK. One bit of evidence that the OSK youth posed greater risks than their matched comparisons is that when OSK youth did re-offend, they were more likely

to go to juvenile detention and to spend much more time in detention than did their counterparts despite the fact that OSK youth re-offended at somewhat lower rates than did non-OSK youth. If, indeed, the OSK youth did represent higher risk than did juveniles under the supervision of DJS with similar offense histories, our methodology would have underestimated program impact.

Another important limitation of this study is that we did not have records of offenses in which juveniles were charged as adults. The program was created to reduce the risk of high-risk youth becoming involved in homicides and non-fatal shootings. Juveniles charged with murder or assault with a deadly weapon often are tried as adults. We plan to obtain data from the Baltimore Police Department to identify offenses involving juveniles who were charged as adults. In the coming months, we will also gather data on costs associated with OSK as compared with the costs of managing the youth by the Department of Juvenile Services. This will enable policymakers to consider the most cost-effective way to reduce re-offending by juveniles.

References

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