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A MICRO AND MACRO-LEVEL ASSESSMENT OF JUVENILE JUSTICE PLACEMENT REFORM IN OHIO: FINAL TECHNICAL REPORT

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EXECUTIVE SUMMARY

A MICRO AND MACRO-LEVEL ASSESSMENT OF JUVENILE JUSTICE PLACEMENT REFORM IN OHIO

Background

Recent reports from the Office of Juvenile Justice and Delinquency Prevention find that the number of youths confined in residential placement facilities is the lowest it has been in decades. On a given day, more than 100,000 juvenile offenders were confined in residential placement facilities in 2000. That same number decreased to approximately 45,000 juveniles in 2016. A state-level comparison reveals that 44 states reduced their incarcerated minor populations by more than half from 2006 to 2015. Recent reports point to multiple reasons for the decline in residential placement, some of which may be due to broader shifts in juvenile crime trends. Nonetheless, deliberate efforts and policy decisions enacted to reduce the number of incarcerated youth have undoubtedly contributed to these shifts as well. This includes an increased awareness of the detrimental effects of institutional placement that has led states to pursue alternatives.

Much of the analysis of juvenile justice reform to date has focused on assessing particular programs and their impacts on subgroups of cases at a particular point in time. While this is instructive as to the effects of those initiatives, it is essential to evaluate the impact of policy across multiple levels and with multiple stakeholders in mind. Ohio has implemented a series of initiatives in its juvenile justice system designed to reduce reliance on state custody of youth in favor of local alternatives. In doing so, they have focused on multiple segments of the population of justice involved-youths throughout the state. The main vehicle for these shifts has been the state's Reasoned and Equitable Community and Local Alternatives to the Incarceration of Minors (RECLAIM) legislation and a series of initiatives that have followed from its inception. Other steps were followed and programming modifications were made during the study period as well. This approach is unique in that it seeks to use both realignment and reinvestment to alter patterns of youth placement and outcomes across the state (Butts & Evans, 2011).

This research project focused on these initiatives as a case study of juvenile justice reform initiatives in order to provide insights about the impact of those recent reforms across multiple dimensions that were viewed as relevant to the discussion of juvenile justice reform. This study of Ohio's juvenile justice initiatives is unique in that it covers several years of implementation; focuses attention on the degree to which placement shifts followed expectations; incorporates a larger number and additional types of covariates in comparisons of recidivism among different placement groups; considers county-level trends and variation in juvenile justice inputs/outputs during the time frame under study; assesses the degree to which the initiatives undertaken in Ohio's juvenile justice systems may have had an unintended impact on crime rates (as feared by some stakeholders); and assesses some financial implications of large-scale juvenile justice reform.

Research Objectives and Study Overview

We pursued four main research objectives. The first two objectives assessed case processing and resultant recidivism rates, respectively. This helped to identify the possible impact

of these changes on processing of individual cases in Ohio's juvenile courts and corrections system. The data set that we analyzed included the records of more than 5,000 cases sampled from cases processed from 2008 to 2015. We assessed the presumed reductions in the number of youth committed to state residential correctional facilities in favor of community-based alternatives, which consisted of community-based services and sanctions and localized residential placements, and identified the factors influencing the shift in placements. We then assessed the relative effectiveness of residential facilities and community-based alternatives in terms of youth recidivism with a subsample of 2,855 case records from randomly-selected counties.

To further expand the scope of analysis of juvenile justice reforms—both within Ohio and elsewhere—our third research objective focused on county-level trends and variation. Specifically, we formally modeled the longitudinal trends in key juvenile justice inputs and official juvenile crime rates across Ohio's 88 counties using data from public reports, data collection with counties, and official juvenile arrest data archived by the FBI. Our fourth objective used elements of the previous analyses (especially comparative recidivism rates) and cost data collected from existing sources and public reports to quantify the potential return on investment that accrued from Ohio's investment in these juvenile justice initiatives.

Results

Key Findings: Objectives 1 and 2

We found that the effect of youth risk level on placements varied (e.g., state Department of Youth Services (DYS) custody vs. community-based alternatives) over time toward placing youth in better alignment with their risk. There was a sustained trend in diverting youth from incarceration which also resulted in the shift of profile of youth in the available placements. The initiative was effective in diverting youth across multiple levels of risk, but the impact was most conspicuous among low risk youth. The composition of low risk youth in DYS facilities decreased gradually over time to the point where it was very rare. The relative composition of moderate and high risk youth did not change as much, but still changed sufficiently to reflect the intent of the initiative. The DYS population decrease among moderate and high risk groups was largely absorbed by Targeted RECLAIM, which emerged in the middle of the study period and was aimed at providing more intensive community-based alternatives for youths.

The analysis of Research Objective 2 began from the foundation that there was a significant redistribution of youth cases during the time of interest to this study. Objective 2 sought to determine whether the reforms contributed to reductions in recidivism on a case level as well. We also assessed whether there were time trends in that effectiveness. After adjusting for several key covariates (e.g., risk level, seriousness of offense) to make the groups as comparable as possible, a doubly-robust weighted regression analysis indicated that the diverted population would have fared worse if they had been committed to state residential facilities. The group difference of 0.25 in the proportion of cases (re)committed to DYS was moderate in size. Analysis of time by placement interactions suggest that these relationships were generally consistent across the time window studied here. The treatment and intervention types experienced by the community-based groups, especially RECLAIM and Targeted RECLAIM youths, suggest that their positive results are likely attributable to several different types of approaches and modalities.

Pairing the Objective 1 and Objective 2 findings reveals that recent initiatives in Ohio were effective in reducing the use of residential facilities in effect moving youth to various community-based interventions and/or community corrections centers. This shifted the risk-placement profile for youths in the state. The analysis of outcomes in our random sample of cases reveals that also had an impact on recidivism rates. So, not only were youth diverted, but the alternatives used during this time period were generally effective.

Key Findings: Objective 3

The analysis of county-level juvenile justice inputs/outputs and juvenile arrests revealed a few key findings. The aggregate shifts that would be anticipated in the juvenile justice processing and decision measures appear at the state and county-level and are frequently statistically significant. This shows the potential system-level impact of the findings on placement trends observed in the Objective 1 results. It also helps to formally test those differences over time. There is significant between county variation in those trends that may drive differential experience of the dividends from juvenile justice reform, however. These shifts in youth placements, including those for moderate and high risk youth (see Objective 1 above), have not induced dramatic changes in general juvenile arrest rates or violent crime rates—in either direction. Clearly, based on these analyses, changes in juvenile justice practices have generally not (even unintentionally) affected broader community safety where youth populations are concerned.

Key Findings: Objective 4

Juvenile justice reform initiatives are implemented in a broader political and financial context and therefore monetary inputs and outputs invariably affect the discussion of their usefulness and, by extension, their sustainability. Given that, we undertook some analysis of the potential return on investment realized across the several years covered by this study of Ohio's juvenile justice initiatives. The longitudinal description in trends shows that—after some initial uncoupling—the expenditures on community-based relative to institutionally-based spending shifted along with patterns of youth placement and referral. Conservatively, based on the effect sizes calculated in Objective 2 analysis, the estimated net savings of community based alternatives for marginal, per-youth juvenile justice costs totaled several million dollars over the time period studied here. The estimated savings-to-cost ratios ranged from \$2.70 (Probation) to \$3.48 (RECLAIM) per dollar spent in the several years of data captured here.

Lessons for Federal, State, and Local Agencies

Following the flow of cases and assessing county-level patterns offers insight into what has occurred in juvenile justice in Ohio in recent years and its implications for juvenile justice more broadly. These key findings inform several lessons for federal, state, and local agencies involved in implementing system-wide change in juvenile justice or just desirous of improving their current practice in less extensive ways. Generally, these apply to both what is done in the juvenile justice system (e.g., state vs. community-based placement) as well as how it is done (e.g., leveraging financial incentives, gradually introducing different layers). The seven lessons

effectively blend the bigger picture of juvenile justice with conclusions relevant to necessary practical elements of the key initiatives studied here:

1. State and local agencies can drastically reconfigure their approach to juvenile justice over a relatively short time window if they are strategic about it.
2. Juvenile justice initiatives like those in Ohio require partnership among personnel and agencies inside and outside of the juvenile justice system.
3. Robust assessment and intervention resources are necessary components of these initiatives to both guide effective decision-making and provide effective services and sanctions.
4. Juvenile justice systems, agencies (and partners), and personnel must utilize information on their cases and outcomes to ensure continuous quality improvement and strategic adaptation—no matter the existing state of the system.
5. Full coverage of juvenile justice populations and those agencies that provide juvenile justice services is necessary for effective and sustainable system-level reforms.
6. Agencies should minimize the degree to which positive shifts are not disproportionately experienced by certain agencies, communities, and subgroups of youths.
7. Federal, state, and local officials (and researchers) must stay mindful of the broader policy context at work in making impactful shifts in the juvenile justice system.

Conclusion

Many juvenile justice systems across the U.S. have undergone transformations over the last 20 years. This includes integration of evidence on treatment and sanctions, returning to a more developmental framework, and shifting the distribution of adjudicated cases from locked facilities to community-based alternatives. There is a great deal of complexity in fully assessing the processes that lead to change and the subsequent outcomes from those shifts. These impacts can feasibly be measured in individual youth success, changes in agency practices, and cost savings. So using multiple points of view in evaluation of policy reform that is intended to affect practice is advisable. Using Ohio's juvenile justice systems as a focal case, this study helps to identify some of the past impacts of reform efforts and potential future implications while also identifying leverage points where effects at the case, agency, and state level might be maximized. Although limited in certain ways (e.g., data availability, cost assumptions), this study sought to offer insight on future research and practice in the juvenile justice system using these recent initiatives as an object of study. In doing so, we provide further support for the viability of realignment, reinvestment, and refining intervention strategies as approaches for enhancing youth and system outcomes to make the system function more effectively and fairly to improve youths' lives while maintaining community safety and controlling public costs.

REPORT

A MICRO AND MACRO-LEVEL ASSESSMENT OF JUVENILE JUSTICE PLACEMENT REFORM IN OHIO

BACKGROUND

Introduction and Overview

The number of young offenders confined in secure facilities is the lowest it has been in decades. Nationally, the total number of youths in juvenile residential placement facilities decreased by over fifty-five percent between 2000 and 2016. On a given day, more than 100,000 juvenile offenders were confined in residential placement facilities in 2000. That same number decreased to approximately 45,000 juveniles in 2016 (Office of Juvenile Justice and Delinquency Prevention, 2018). A state-level comparison reveals that 44 states reduced their incarcerated minor populations by more than half from 2006 to 2015. The population drop was found among committed youth as well as detained youth (Hockenberry, 2018a). Collectively, the evidence suggests that the declining number of juveniles in residential placement is a genuine, continual, and potentially impactful trend across numerous U.S. states.

Recent reports point to multiple reasons for the decline in residential placement, some of which may be due to broader shifts in juvenile crime trends. Violent crime rates have declined among all age groups, and the delinquency caseload in juvenile courts recently reached its lowest point since the mid-1970s (Hyland, 2018). Nonetheless, deliberate efforts and policy decisions enacted to reduce the number of incarcerated youth have likely contributed to these shifts as well. There has been an increased awareness of the detrimental effects of institutional placement, and states have implemented several different mechanisms to reduce the number of youth in secure confinement (Butts & Evans, 2011; Schwalbe, Gearing, MacKenzie, Brewer, & Ibrahim, 2012).

Therefore, the continued drop in the institutionalization of youth in some jurisdictions may be accelerated and sustained by policy decisions that followed the reassessment of the effectiveness, impact, and cost-effectiveness of incarceration.

The purpose of this project was to investigate state and local juvenile justice policies and practices regarding residential placement. Policy and practice decisions made by legislators, law enforcement officials, and court actors influence youth system outcomes, their development, and the efficiency/effectiveness of the system as a whole. These concerted efforts collectively determine the type and number of offenders that are sent to residential placement (or not). This has potential downstream impacts on the system's ability to effectively treat and sanction delinquent youths as well as developmental outcomes that may be impacted by those system decisions (National Research Council, 2013). These efforts also have implications for county and state budgets and—potentially—broader questions of community safety. This study focused on state- and local-level initiatives to promote and support alternative placement in Ohio, which has been particularly active in juvenile justice reform since the mid-1990s. In turn, this comprehensive assessment provides insights about the impact of those recent reforms across multiple levels and stakeholders in order to assess processes and impacts as well as to inform juvenile justice change efforts across the United States.

Residential Placement of Youth: Past and Present

Residential correctional facilities have been a popular strategy for responding to juvenile delinquency since the House of Refuge was first established in the 19th century and the juvenile court was established in the 1890s (Tanenhaus, 2004). The U.S. juvenile system has relied on various forms of residential facilities, including detention/retention centers, training schools, and ranches. The common features of these facilities are frequently cells or locked-rooms, separated

by walls, located in places that are often distant from the juvenile's home community. Operated by a private or public entity, these facilities are frequently heavily structured and guarded. There is little doubt that confinement is the most intrusive and serious form of punishment that is allowed to be imposed on minors, as it essentially removes an individual from their home and places them in a restricted environment (Mendel, 2011; Sedlak & McPherson, 2010).

In the 1960s and 1970s, there was a de-incarceration movement in juvenile justice. Earlier efforts, through the Juvenile Justice and Delinquency Prevention Act of 1974, focused on the negative effects of institutionalization and encouraged reductions in residential placement and informal processing of non-serious young offenders (Klein, 1979). Reforms during this period often resulted in the closing of secure facilities. Despite good intentions and federally-orchestrated efforts, not all attempts to achieve diversion and public safety were successful. For example, in the Massachusetts experiment, reoffending was higher for youth sent to alternative facilities after closing down traditional institutions (Gottfredson & Barton, 1993; Ohlin, Miller, & Coates, 1977). Researchers point to inappropriate service delivery, lack of quality control, and inadequate financial support in the alternative settings, as possible explanations to the results in Massachusetts (Klein, 1979). For example, Miller (1998) noted that release protocols were inconsistent across youths and many of alternative community programs were not sustained past their time-limited duration of funding.

Some scholars have suggested that deinstitutionalization was never properly enacted (Bernard & Kurlychek, 2010) and therefore would qualify as a "failure of implementation" (Berman & Fox, 2010). However, deinstitutionalization efforts are interdependent efforts across multiple layers of policy and practice that require necessary resources and engagement of multiple groups of stakeholders. This inherently leads to complexity in implementation and evaluation

efforts. Regardless of the precise source of these shortcomings, youth commitment rates started to rebound in the 1980s and 1990s before dropping again in recent years. In 2015, based on one-day census numbers, the juvenile justice system housed 48,043 youth in public or private residential facilities, including 15,816 detained youth, 31,487 committed youth, and the remainder admitted as part of a diversion agreement (Hockenberry, 2018b). Youths' experiences in either setting have implications for effective treatment and their future development (Development Services Group, 2014; Development Services Group, 2017).

Despite continued reliance on residential correctional facilities, their effectiveness is still debated. Reductions in recidivism or crime rates is the most frequently examined outcome in research on youth residential facilities. A substantial amount of evidence seems to indicate that residential placement does not significantly reduce crime, and if it does only exerts a minimal impact. Lipsey (2009) reviewed the characteristics of effective intervention programs and found the level of supervision/custody did not matter in reducing recidivism. Some studies included in the meta-analysis by MacKenzie, Wilson, and Kider (2001) found lower recidivism among correctional boot camp subjects, but the overall effect size was not statistically significant. A more recent empirical analysis with a longitudinal design also indicated that out-of-community placement had a null effect on reoffending (Loughran et al., 2009).

In the meta-analysis by MacKenzie (2006), several studies reported higher recidivism rates among residential placement groups, whereas other studies reported lower levels of recidivism. Evidence of a counterproductive effect was found in studies that separated the subgroups by risk levels. Residential programs increased recidivism for low and moderate risk offenders relative to the high risk group (Latessa, Listwan, & Koetzle, 2014; Lowenkamp & Latessa, 2004). Still,

Lipsey (1999) found that some evidence-based programs for serious youth offenders in residential facilities yielded better outcomes relative to comparison groups.

MacKenzie and Freeland (2012) argued that the conditions associated with confinement, not incarceration itself, are responsible for the difference in outcome. Relatedly, the programs that adequately emphasize constructive change and promote therapeutic components are the most effective in reducing recidivism, and intervention works best when they address the specific needs of the juvenile (Borum, 2003; Dowden & Andrews, 1999; Lipsey, 2009). Residential programs are associated with various conditions that can run counter to those that facilitate effective intervention, however. For example, only 65 percent of residential facilities routinely evaluated all residents for mental health needs where licensed professionals perform the assessment (Hockenberry & Sladky, 2018). Incarcerated juveniles are exposed to higher levels of violence, abuse, and maltreatment. The risk of victimization, injury, and disruption of development are other negative consequences of confinement (Mendel, 2011; Mulvey & Schubert, 2012; Scott & Steinberg, 2008). The effectiveness of confinement in reducing later criminal behavior has not been definitively demonstrated at present (Lowenkamp & Latessa, 2004; Mendel, 2011), which makes it difficult to counterbalance those potential downsides.

Overall, the impact of incarceration on delinquent youth outcomes is highly variable and trends toward being ineffective for most youth. At a minimum, it is apparent that residential placement should be the last resort within the juvenile justice system and used sparingly (Mulvey & Schubert, 2012). Delinquent youth—regardless of the seriousness of their offenses—will eventually leave these facilities, and it is essential that those subjected to the negative conditions of incarceration are limited only to cases where incarceration is necessary to ensure public safety. It is equally important that (a) effective treatment and sanctions are delivered in those residential

environments and (b) that states and local agencies have effective and safe community-based alternatives to ensure broad buy-in for a “disposition of last resort” philosophy.

Deinstitutionalization and Community-Based Alternatives

The move and rationale to deinstitutionalize

The movement to divert youth from residential facilities is one of the most remarkable parts of the recent reforms in the juvenile justice system. Efforts have been made to move away from punitive practices while strengthening treatment and rehabilitation (Mears, 2002). The idea was developed based, in part, on the belief that excessive reliance on residential placement could potentially disrupt the youth’s development and therefore should be discouraged when possible (Klein, 1979; Schwalbe et al., 2012). Deinstitutionalization and diversion refer to the strategies that divert youth from the harm of formal justice processing and locked facilities. The purpose is to keep youths in the community, where they can avoid negative consequences, such as violence and maltreatment in secure settings, and maintain linkages to their families and communities (Celeste, 2015; Mendel, 2011).

Successful deinstitutionalization requires effective alternatives in the community; however, community safety and resource use efficiency may be impacted if youths are diverted from institutions only to come back later or cause greater harm. Deinstitutionalization relies on the belief that community alternatives can preserve public safety at least as effectively as the traditional solutions that involve greater use of residential facilities. The deinstitutionalization movement therefore also requires expanding the range of disposition options from one focused on a probation or residential facility dichotomy to one that offers a range of alternatives that could be delivered effectively and efficiently in the community (Garcia, 2015).

Description of community-based programs

The continuum of community-based alternatives allows the juvenile justice system to cater to the diverse risks and needs of youth. The spectrum could include the least intrusive measure, such as counsel and release, intermediate forms like day reporting or informal supervision, or residential facilities located in the community. Among these, diversion options that specifically aim to limit excessive front-end involvement with the system are relevant as are dispositional alternatives to state facilities for youth who have been adjudicated for relatively serious offenses. These alternatives range from those present early in the juvenile court's history, like probation (Mack, 1909), to graduated sanction systems that have emerged more recently (Griffin, 1999).

Probation is perhaps the oldest form of community-based sanction and is the most commonly-used disposition for justice-involved youths. Juvenile probation first began in the 19th century to prevent low-risk youth from being incarcerated and instead provide adequate care. Its earlier form involved helping runaway children stay at safe shelters or making sure they stayed away from harmful contact on the street (Ray & Childs, 2015). Contemporary probation provides a more systemized and controlled type of supervision. Probation often takes on the form of a contract between the youth and a juvenile court with the probation officer serving as an overseer of that arrangement (Maloney, Romig, & Armstrong, 1988). The youth is placed in the community on the condition of fulfilling the agreed-upon requirements. The probation officer performs a case management service and monitors the juvenile. The proportion of adjudicated youth placed on probation from court has maintained at approximately sixty percent since 1985 (Office of Juvenile Justice and Delinquency Prevention, 2012). Probation primarily targets low to moderate risk youth. Youth on probation tend to have less serious offenses. Only 29 percent of youth on formal probation had current person-related offenses in a 2012 probation census (Puzzanchera, 2018a).

Community-based programs are newer alternatives to secure detention or commitment. Youth who are likely to need structured monitoring can be placed on supervised release instead of outright release or incarceration. The programs vary in the extent to which youth are allowed to spend time in the community setting, but all can be contrasted with the more institutionalized element of state residential facilities. Examples of these less restrictive programs are home detention, day/evening reporting centers, medication-assisted treatment, and mentoring. Some programs aim to address specific needs and skills, including life skills programs, substance abuse treatment, or cognitive-behavioral interventions (Austin, Dedel Johnson, & Weitzer, 2005; Development Services Group, 2014). In Ohio, this array of programs is delivered within the context of the Reasoned and Equitable Community and Local Alternatives to the Incarceration of Minors (RECLAIM) initiative, which is a justice reinvestment infrastructure incentivizing county's usage of these alternatives. Ohio RECLAIM-funded programs can vary substantially based on youth risk and needs and county setting and include alternative schools, day treatment, restitution/community service, or substance abuse treatment/education (Latessa, Lovins, & Lux, 2014).

While many of these alternatives to residential placement are most appropriate for low-to-moderate risk youths, there are also alternatives for youths at moderate or high risk youths, or those who have committed relatively serious delinquent acts. These youths may be placed in local residential supervision services. Community residential centers maintain similar levels of supervision as traditional residential facilities while keeping youth closer to their home environment and providing useful training (Austin et al., 2005; Garcia, 2015). These facilities may also offer settings more conducive to effective treatment of adjudicated youths on treatments. Unlike state-level residential facilities, these institutions are operated locally, often privately, and

cater to educational and programming needs in the communities. Presumably community residential facilities keep youth closer to their homes and communities while providing a moderate level of security. This greater proximity to youth's family and smaller size can also help successful reentry. The state of Ohio engaged in a conversion project to expand these facilities, and reduce the number of state-level institutions (Lux, Schweitzer, & Chouhy, 2015).

Evidence for community-based alternatives in reducing recidivism

In general, existing empirical studies and systematic reviews of those studies do not provide definitive conclusions with respect to the effectiveness and cost-efficiency of these alternatives. Lipsey (2009) analyzed the effectiveness of various juvenile justice interventions on reducing the recidivism of 548 samples included in 361 studies. The results revealed that diversion strategies did not produce statistically significant differences in reducing reoffending over non-supervision, probation/parole, or incarceration. Similarly, in Schwalbe et al. (2012), the effect sizes, when comparing interventions on 19,301 youths in 28 studies, were not statistically significant. The authors did, however, find significant heterogeneity across those study effects. Petrosino, Guckenburg, and Turpin-Petrosino (2013), found that formally processing juvenile offenders significantly increased recidivism compared to diversion with or without additional services. Their study included 7,304 youths from 29 reports published between 1973 and 2008. Overall, the prevalence of youth who engaged in reoffending was greater by five to six percent when comparing court-involved and diverted cases. Wilson and Hoge (2013) found that diversion was associated with a statistically significant reduction in recidivism, whether the format was cautionary (only cautions or warnings issued) or involved certain types of interventions.

In sum, the evidence on the effectiveness of community-based alternatives to juvenile incarceration is mixed; however, this inconsistency may be due to the discrepancy in the

operationalization of various types of diversion and placements. It is possible that specific aspects of diversion programs lead to better responses in certain populations. For example, Schwalbe et al. (2012) found that family treatment and researcher-assisted restorative justice programs reduced recidivism. Also, in Wilson and Hoge (2013), the effectiveness differed based on the risk level of the service recipients. Greater reductions were achieved, on average, among moderate/high risk youth compared to low risk youth.

Programs that focus on cognitive-behavioral interventions have produced positive results. The nature of CBT includes cognitive restructuring to facilitate behavioral change, and such reorientation of thinking processes have been shown to be effective in curbing risk-prone choices among youths (Landenberger & Lipsey, 2005; Lipsey, 2009; MacKenzie & Freeland, 2012). Community-based settings can potentially enhance the effectiveness as youths can put the restructured thinking process into real-life situations they face in the community under the supervision of trained staff.

Other community-based interventions which have produced positive results are functional family therapy, multisystemic therapy, and skill-building programs. These specific programs aim to rebuild healthy relationships between families and youths, address multiple factors related to peer, school, and interpersonal problems, and to build necessary social skills. Such programs have shown greater effectiveness in reducing recidivism than incarceration or outright release (Austin, et al., 2005; Ray & Childs, 2015). Youth who require greater supervision could receive more intensive care within the community at local residential facilities. This offers a mid-way intervention where necessary training and supervision are provided in a less detrimental setting. Compared to traditional incarceration options, local residential facilities have shown higher completion rates and greater reduction in recidivism for program participants at a number of sites

(Austin et al., 2005). The initiative to expand local residential facilities in Ohio led to steady decreases in the number of state-run facilities and commitment rates especially among high-risk level youths.

Despite some evidence suggesting that specific diversion and community-based programs can successfully prevent future delinquency (Myers et al., 2000; Pogrebin, Poole, & Regoli, 1984; Sullivan, Dollard, Sellers, & Mayo, 2010; Sullivan, Veysey, Hamilton, & Grillo, 2007), there are several limitations and criticisms of diversion. For example, less restrictive institutions provided as alternatives to residential facilities in Maryland were not effective due to the lack of treatment availability (Gottfredson & Barton, 1993). Diversion programs also have the potential to “widen the net” of the system. Greater numbers of youth may come into contact with the system under the extended social control of diversion programs. Net widening can also increase the potential inconsistencies in the screening process. Thus, it is important to carefully examine whether shifting case dispositions accompanying deinstitutionalization and diversion efforts reflect the initial intention of creating a graduated set of alternatives to residential placement.

Public Safety, Public Perception, and Public Costs

Just as earlier bouts of juvenile justice deinstitutionalization did not occur without impact on various stakeholders (Gottfredson & Barton, 1993; Ohlin et al., 1977), the justice reform initiatives undertaken in recent decades also have not occurred in a vacuum. The development and implementation of new initiatives are frequently evaluated not only on their effectiveness, but also on their other counterweights and the perceptions of important stakeholders, including perceptions of those in the community. There are many factors that influence the perceptions and resultant decisions of policymakers and practitioners (Sullivan, 2013). Therefore, to be sustainable, successful juvenile justice reform must ensure that diversion and deinstitutionalization do not

compromise public safety, that the benefits of diversion are thoroughly understood by the public, and that these efforts not incur greater costs than incarceration without improvements in effectiveness. It is important to consider the unintended impacts of deinstitutionalization and alternatives on public safety, perception, and potential costs.

Public safety concerns inevitably come into play when considering the loosening of restrictiveness in the responses to crime and delinquency. The “get-tough” movement in the late 1990s originated from the perception that public safety was seriously endangered by youth and young adult violence. Politicians and the public demanded tougher punishment based on the belief that a lenient justice system was responsible for the increase in crime. The perception of a national epidemic in juvenile violence in the 1980s and 1990s was particularly impactful in shifts in juvenile justice system operations and in how its boundary with the criminal justice system was drawn (Cook & Laub, 2002; Fagan & Zimring, 2000). Comprehensive evaluations of efforts to divert juvenile offenders from secure confinement must also consider whether safety is compromised and such concerns are frequently included in the evaluation of justice policy (Bishop, 2006; Schwartz, Kerbs, Hogston, & Guillean, 1992).

With that, public perception has a part to play in how well-publicized reforms play out at the state and, in particular, local levels. There is general support for alternatives to incarceration and other more severe sanctions, but it is conditioned on the nature of the youth’s case, history, and other factors (Nagin, Piquero, Scott, & Steinberg, 2006; Piquero & Steinberg, 2010). Still, while the public’s appetite for “child saving” has continued over time there are exceptions based on the types of cases under consideration (i.e., more serious cases may be less apt to get the benefit of the doubt) (Applegate, Davis, & Cullen, 2008; Bishop, 2006). Therefore, it is necessary to

consider the differential effects of justice reforms on varying populations when evaluating the effectiveness of a given policy.

Public finance should also be taken into consideration in policy discussions. The relative costs of the reform may affect the decision to embrace evidence-based policies and to sustain the reform (Drake, Aos, & Miller, 2009). At the micro level, diversion strategies could potentially save costs by reducing the court caseloads, contact with staff, and formal processing of juvenile offenders. Increased use of deinstitutionalization and diversion strategies led to substantial decreases in costs at the state level in Washington State (Aos, Lieb, Mayfield, Miller, & Pennucci, 2004). In fact, the cost-effectiveness of community-based alternatives can act as an important element that reinforces the reform (Mendel, 2011). In light of the recent movement to facilitate the reform through reinvestment in numerous states (Butts & Evans, 2011), cost-effectiveness is expected to play a significant role in long-term support for juvenile justice reform, affecting its sustainability. Though some views of the broader trends are inherently based on subjective interpretations of limited data points (e.g., sensational cases of delinquent behavior, inappropriate use of public resources by juvenile justice officials), shifting trends in juvenile crime are one marker worth looking at in analyzing potential unintended consequences of change in policy and practice. The costs of juvenile justice processes are another potential benchmark. Being able to show a lack of impact—or even improvement on these trends—is a valuable step in implementing sustainable changes to juvenile justice policy and practice.

Reports from some U.S. states demonstrate such impacts in changing the placement profile of justice-involved youths. In Texas, for example, prior to changes in practice and policy, the state spent \$69,455 per incarcerated youth per year on average (Fabelo, Arrigona, Thompson, Clemens, & Marchbanks, 2015). During the period following changes, the state reduced its funding

for operations of state secure youth facilities by about \$150 million dollars, while increasing funding for local juvenile probation by approximately 38 percent. Still, that funding was not necessarily tied to a particular type of intervention and no clear distinction was made by policymakers between the use of county secure and non-secure residential facilities versus community-based programs. In turn, the largest expenditures were in expanding the use of local residential facilities. Overall, it is clear that placing juveniles in locked facilities may not be optimal in terms of its general effectiveness or cost-benefit. In turn this necessitates thoughtful state and local level strategies to ensure that such placements are used sparingly, but in a way that is not detrimental to public safety or youth development.

Overview of Ohio's Juvenile Placement Reform

Diverting youth from residential placement can be beneficial if supported through multiple segments of the juvenile justice system. Previous efforts tended to be more successful when state and local governments collaborated (e.g. Texas) (Fabelo et al., 2015). Presumably, these reforms will be more effective when deliberately planned and reinforced, systematically supported by adequate alternatives and resources, and responsive to up-to-date empirical evidence. Due to RECLAIM legislation as well as a legal settlement agreement in 2008 (*S.H. v. Stickrath*), the state of Ohio has carried out a series of reforms to relieve overcrowding of youth in its facilities and attempt to realign the juvenile justice system to become more evidence-based (see also Owen & Larson, 2017). With this, various measures were taken to increase community-based options, to assess youth's risk and needs, and to restructure the treatment system with evidence-based strategies (Lux et al., 2015).

RECLAIM Ohio Initiative

The Reasoned and Equitable Community and Local Alternatives to the Incarceration of Minors (RECLAIM) initiative was established with the approval of an Ohio House Bill in 1993. The program was designed to divert youth from confinement facilities by improving the targeting of placements and expanding community-based options (Lowenkamp & Latessa, 2005b). It is essentially a funding initiative which promotes the reliance of community-based options by reallocation of responsibility and financial incentives to counties in the state. Traditionally, the state was responsible for the cost associated with confined youth. RECLAIM Ohio relocated the responsibility to the county level, and let the counties reinvest the financial incentives in enhancing evidence-based and cost-effective alternatives (Butts & Evans, 2011).

Prior to reform, state-run juvenile institutions in Ohio were at 150 percent capacity. After the initial implementation in nine selected counties, the rates of commitment to Department of Youth Services (DYS) facilities decreased significantly in the following year (Moon, Applegate, & Latessa, 1997). RECLAIM Ohio produced promising results in terms of recidivism after statewide application. The reform was effective in decreasing the commitment rate, and above all, RECLAIM programs performed better in reducing recidivism compared to other out-of-home placements. Low and moderate risk youths had higher completion rates and lower recidivism rates when placed in RECLAIM programs (Lowenkamp & Latessa, 2005b). The most recent report reached a similar conclusion, RECLAIM Ohio is a cost-effective strategy that effectively reduced recidivism while maintaining public safety (Latessa et al., 2014).

Targeted RECLAIM

Another notable conclusion in the recent evaluation of the RECLAIM program was that the effectiveness of RECLAIM programming was enhanced when evidence-based treatment

strategies were used (Latessa et al., 2014). The state and DYS launched the Targeted RECLAIM (TR) initiative to further ensure the quality of treatment provided in the community. To be eligible for the TR incentive, county courts should refer felony youth to community-based programs that meet quality assurance standards and utilize evidence-based models thereby maintaining or reducing DYS commitments (Department of Youth Services, 2018b). Multiple evaluations of Targeted RECLAIM revealed that the effort was effective in diverting youth from secure confinement and reducing recidivism (Labreque & Schweitzer, 2012, 2013; Schweitzer, 2016). As in previous studies of RECLAIM, these evaluations have largely focused on individual cases as units of analysis within fixed time ranges—with binary Diverted/Not categorizations—and varying degrees of control for possible confounds.

Community Corrections Facilities and Treatment Development

In addition to creating community-based alternatives more focused on diversion, Ohio DYS also made efforts to decrease the capacity of its residential facilities. To reduce commitments without endangering public safety, community corrections facilities (CCF) were introduced throughout the state. These institutions are operated at the local level, smaller than DYS facilities, and provide programs that can serve greater range of needs (Lux et al., 2015). They frequently overlap with TR resources since these community-based facilities are intended to embrace evidence-based programming while also holding felony-level youths who previously may have been placed in state residential facilities. They also generally meet the objective of keeping youth closer to their communities. As the population who would normally be handled in DYS facilities were diverted to CCF and other alternatives, the number of DYS institutions went down from seven in 2008 to three in 2018 (Department of Youth Services, 2018a). DYS has also expanded the use of evidence-based treatment programs. This effort was made to promote treatment

programs that were found to be effective in empirical assessments. Examples include cognitive behavioral therapy (CBT) treatments, multisystemic therapy, and functional family therapy (Gendreau, Little, & Goggin, 1996; Lowenkamp & Latessa, 2005a). These strategies focus on building skills that will restructure their thinking, positively affect their later social interactions, and reduce negative outcomes. These are increasingly emphasized in DYS facilities as well as CCFs and other institutions, and have become the central component of juvenile justice reform.

Summary

Several initiatives have been undertaken to change the footprint—and effectiveness—of juvenile justice in the state of Ohio. Notably, the chronology of Ohio’s reforms begins with the development and use of a wide range of community-based alternatives (with RECLAIM) and then begins to more formally draw in community-based facilities as a vehicle for deinstitutionalization with higher risk youths. In that way it was more comprehensive than some accounts of placement realignment mentioned above. The belief underlying these initiatives in Ohio and other states is that properly implemented, reforms can lead to reductions in both juvenile recidivism and cost, without affecting public safety (or even improving it in the long term).

Multidimensional Assessment of Changing Juvenile Justice

The study results presented here focuses on these initiatives at the state and local levels in Ohio, and examine the impact on placement decisions, treatment practice, recidivism rate, and cost. In doing so this study attempts to address multiple research questions that are essential in analysis of comprehensive changes in policy and practice—including the potential for heterogeneity of effects both within and across levels of analysis of its impact (i.e., micro and macro-level implications). Though Ohio is the immediate focus of this study, our findings have implications for other U.S. states and local counties seeking to make alterations to their policies

and practices in handling delinquency cases. This work is underway in several other states and the relative impact of those efforts is instructive in framing this study.

Much of the analysis of juvenile justice reform to date has focused on assessing particular dimensions of policy and practice and their impacts on sets of cases at a particular point in time (perhaps with some updates). While this is instructive as to the effects of those initiatives, it is essential to evaluate the impact of policy across multiple levels and with multiple stakeholders in mind (Majchrzak, 1984). For example, Howell (2003) and Howell, Kelly, Palmer, and Mangum (2003) identify a number of youth-serving agencies that must come together to effectively implement new policies and practices. This need for multifaceted participation in the process of implementing reform requires parallel evaluation efforts; especially when considering programs meant to have a broad, system-wide impact. For example, aggregate trends are important but it is equally important to consider potential variation in effectiveness as policy change can have heterogeneous effects across settings (e.g., Kravitz et al., 2004; Sampson et al., 2013) depending on a number of factors—including differences in implementation across settings and over time. Collectively these questions are important in specifying the mechanisms by which aspects of policies work and other conditions where it may not be as effective (e.g., Pawson & Tilley, 1997)

Likewise, we seek to consider results of the initiative across multiple vantage points given the wider scope of impact that may come with system-level reform—as opposed to implementation of a single program in single settings. In that way the various stakeholders that might be affected and think about this type of initiative in multiple levels, from multiple perspectives—both inside and out of the juvenile justice system. That includes potential impacts on broader public concerns such as juvenile crime and violence trends and public expenditures on juvenile justice initiatives relative to other priorities.

The study was meant to cover multiple dimensions that might be relevant in understanding these initiatives and do so in a way that offers insight relevant to multiple aspects of understanding and assessing these policies and practices (see Majchrzak, 1984). It answers some relevant questions that inform and offer context for juvenile justice reform efforts. We assess the full scope of reform, by integrating data from individual youth, system, and public expenditure as interdependent parts of the initiative. Therefore, the results inherently apply to multiple stakeholders within the system and different levels of government. Likewise, we also include the full range of the juvenile justice population in terms of its diverse risk and need levels and seriousness of offenses. This variability ultimately dictates the implementation context for any changes in policy and practice and therefore it is necessary to cover that in an analysis of shifts in the system (Sullivan, 2019). This study incorporates some longitudinal elements to consider the degree to which trends have followed those initially anticipated and identify what happens as they progress over time. This is important in light of the challenges in implementing and sustaining any evidence-based policy (Laub, 2016). It also helps to formalize the analysis of tendencies over time, which is sometimes based on impressionistic descriptive trends that do not necessarily offer benchmarks or context in assessing the size or statistical significance of observed trends.

Finally, we also consider the broader policy context traditionally surrounding juvenile and criminal justice efforts by integrating data on county-level juvenile arrest trends, which have been used as fodder for political and policy discussion around juvenile crime in recent decades (see, e.g., Cook & Laub, 2002). In covering this full scope of policy and practice in Ohio during a time of great activity in the system and one that in part is designed to learn from policies in the previous era of juvenile justice, we build on some of the approaches to existing evaluations of juvenile

justice policy and practice in Ohio to answer questions relevant to further implementation efforts in the state and U.S. more generally.

This study of Ohio's juvenile justice initiatives is unique in that it covers several years of implementation; focuses attention on the degree to which placement shifts followed expectations; incorporates a larger number and additional types of covariates in comparisons of recidivism among different placement groups; considers county-level trends and variation in juvenile justice inputs/outputs during the time frame under study; assesses the degree to which the initiatives undertaken in Ohio's juvenile justice systems may have had an unintended impact on crime rates (as feared by some stakeholders); and also takes a slightly different vantage point in cost analysis that offers additional insights into the over-time impact of the initiatives under study .

RESEARCH OBJECTIVES

Given this background and the state of research on these initiatives in Ohio and elsewhere, this study had four main objectives. First, we sought to *identify and assess the impact of an initiative to reduce rates of institutional placement on individual youth across multiple levels of risk, focusing specifically on placement and appropriate treatment services*. This generated one main research question: are youth being placed/treated appropriately relative to their risk level and does this change as the initiatives matured?

Research Objective 2 *sought to evaluate the relative effectiveness of the community-based placements and treatments to which youth are referred as alternatives to institutional placement*. Specifically, controlling for risk and other baseline difference, do youths who have been exposed to evidence-based treatment after reform have lower recidivism rates than those placed prior to those enhancement or those not placed in evidence-based programming? Again, we also consider the temporal nature of this process in assessing these effects.

The third study objective considered the potential side effects of the reforms on broader juvenile crime rates. In particular, we sought to *assess the impact of the initiative to reduce institutional placement with respect to community-level juvenile crime rates at both state and local levels*. The relevant research question was: has there been a shift in aggregate juvenile crime rates (esp. increases) coinciding with the changes to placement of the state's juvenile justice population?

Finally, after establishing the relative effectiveness of the initiatives to reduce institutional placement and the specific alternatives at hand, the fourth objective was to *evaluate the relative cost and potential benefit of those changes for the juvenile justice system at the state and local level*.

STUDY METHODS

Overview

Consistent with its objectives, the study methods and data used cut across multiple levels of observation and analysis. The proposal focused on the use of existing, publicly-available data and agency records and so we describe the process of gathering that information in the sections that follow. We also describe the ways in which the study measured important aspects of juvenile justice reform and its outcomes at the case, county, and state level. Likewise we identify the different analytic approaches used in conjunction with each of the project objectives so that the linkage between our research framework, methods and analyses, and results are apparent.

Research Objective 1: Impact on Placement

Sampling Frame

The sampling frame for non-residential youth cases was constructed from the Ohio Youth Assessment System (OYAS) database. The database provided a broad range of information on over 280,000 cases who were referred to juvenile courts in Ohio and received OYAS assessments

from 2008 to 2015. This study frame was appropriate for carrying out the objective for two reasons. First, the majority of recent juvenile justice reforms in Ohio initiated during this period. The OYAS was implemented in 2008 and consequently expanded in 2009. Targeted RECLAIM was also developed in 2009, followed by Competitive RECLAIM in 2013. Second, the DYS has gone through changes during this period due to a legal agreement in 2008 (*S.H. v. Stickrath*). The DYS implemented internal changes to improve conditions, and participated in external actions to reduce the population of youths in its custody. Therefore the impact of these initiatives can be best examined with the data collected during the time frame studied here as it both aligns with the action in the initiatives of interest and offers an appropriate length of time to see potential variation in effects.

Several rules were used to construct the community-based sampling frame. To be eligible, a case must have been placed on probation or admitted to RECLAIM-eligible programs between January 1, 2008 to December 31, 2015. In addition to this filter, we made sure that youths were only included once to avoid duplicate cases. Some youths were entered into the system multiple times. These duplicate admissions were identified and excluded from the final sampling frame by randomly selecting one entry per youth during that year-long window. The final sampling frame for probation and RECLAIM groups included 104,703 youths (probation = 25,024 or 23.9%; RECLAIM = 79,679 or 76.1%). Cases subsequent or prior to the focal, selected case were retained as either follow-up (recidivism) or history (prior record) cases. We eventually randomly selected a sample of 20 of the 88 Ohio Counties for further data collection.

A database of youth enrolled in Targeted RECLAIM programs was obtained separately from the University of Cincinnati Corrections Institute. Among the 20 selected counties, Cuyahoga, Franklin, Hamilton, Mahoning, Stark, and Trumbull, participated in the Targeted

RECLAIM initiative during the study period. We have data for two of those six in the current sample. The same rationale was used to screen out duplicate admissions and ineligible cases from the sampling frame. The final sampling frame for the Targeted RECLAIM group was 1,931 youth admitted to the aforementioned six counties from 2010 to 2015.

The sampling process for the cases that went through the state institutional facilities included obtaining the admission extract databases from the Ohio Department of Youth Services (DYS). These databases included individual record data on over 6,000 youths who were placed in DYS facilities from January 3, 2008 to December 31, 2015. Some youths were admitted multiple times and were excluded from the sampling frame to ensure that sampled cases were independent for the purpose of statistical inference.¹ After screening for duplicate admissions, the final sampling frame was 6,058.

Sampling Process

The data extraction process associated with Objectives 1 and 2 required identification of random samples of cases that went through state institutional facilities (DYS; $n = 2,000$), diversion program or community residential facility (RECLAIM; $n = 2,000$),² and community-based supervision ($n = 1,000$) over the eight years of interest (2008-2015). Consequently, it was necessary to stratify the sampling frame by type of placement, year, and location (facility or county), then randomly select cases proportionate to the placement usage level. The goal of

¹Subsequent unique admissions could be treated as recidivism for relevant cases in the Objective 2 analysis.

²Initially, Targeted RECLAIM and CCF cases were intended to be part of a separate category in the sampling design, but that initiative emerged relatively late in the study window, making it difficult to obtain sufficient follow-up data and statistical power necessary to make direct comparisons with those cases. We address this point in supplementary analysis and discussion of limitations below.

sampling was to obtain the total sample size of 5,000 youths that would provide sufficient power to conduct analysis across the different years of study among the groups of interest.

Ohio's 88 counties tend to differ on crime rates, population size, and placement rates. The first step was to estimate county-level placement rates. After determining the degree of contribution to the total probation and RECLAIM cases processed in Ohio, each county was sorted in descending order. The counties were then separated into three groups based on the degree of contribution. The cutoff between groups was roughly set at every cumulative 33 percent. Six counties were responsible for approximately 37 percent of all cases placed on probation in Ohio. These top six counties were categorized as "high" usage. Twelve counties took up next 33 percent of the total probation cases – "moderate" group. The remaining seventy counties were labeled as "low" usage.

The final sample contained cases from county courts and DYS, for a total of 5,478 cases. The former sample consisted of cases on probation, those referred to RECLAIM programs, and cases referred through Targeted RECLAIM. The total number of cases slightly exceeds the original sampling goal of 5,000 due to oversampling that considered potential case losses based on potential response rate, data entry error, and/or missing data. Information necessary for the first objective was largely extracted from an internal UC database (i.e. OYAS database), and we were able to use the total number of cases selected. Analysis for the second research objective relied on external data sources as well, so we used a reduced sample due to limited responses from county courts.

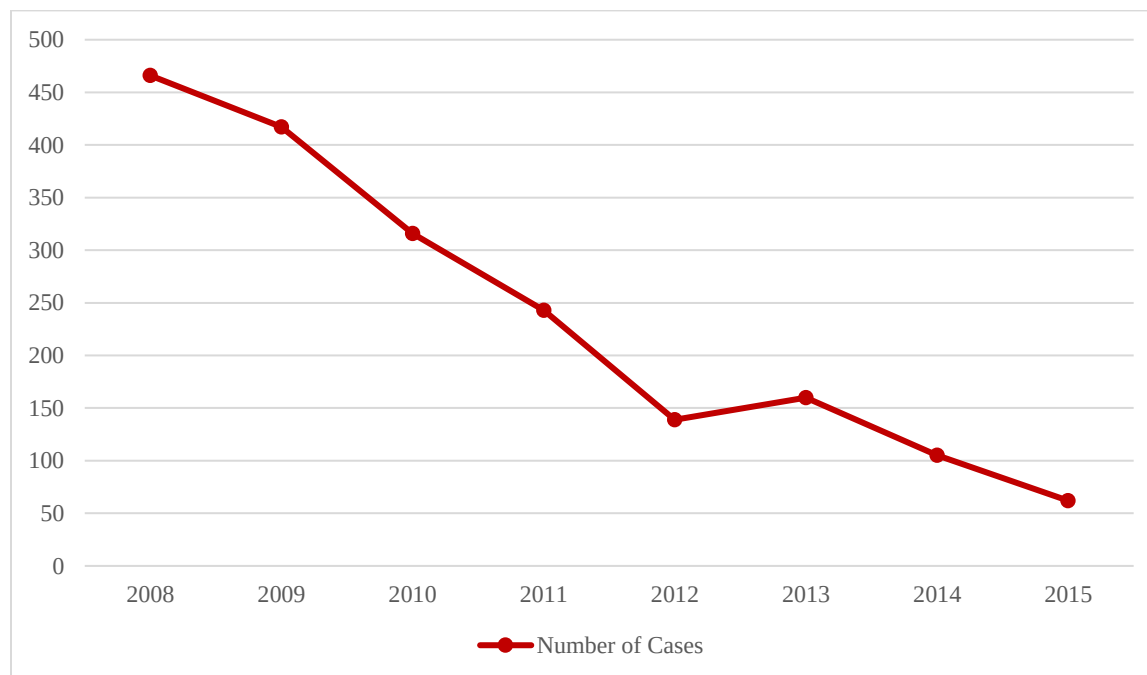
Data Collection Procedures

The research team collected and analyzed data from multiple sources including existing agency records, public information, and direct requests with juvenile courts. The majority of the individual record data were available to the research team through the Ohio Youth Assessment

System (OYAS) and an agreement with Ohio DYS. Research team members accessed the OYAS database and extracted the list of youth who were referred to juvenile courts and went through the OYAS assessment from 2008 to 2015. Information from the OYAS database was useful in multiple respects. It was used to create the sampling frame for the juvenile court sample just described, sort out case processing outcomes, and obtain risk assessment outcomes. Demographic characteristics of the youths included in the final sample were also obtained from the OYAS database.

The DYS is the state-run corrections system for juveniles in Ohio and oversees funding to local juvenile courts and corrections agencies in the state. Some youths who are adjudicated in county juvenile courts are committed to DYS facilities. Our research staff contacted the DYS office to obtain the extract of admission register for the study period. Each youth in the register was assigned an unique identifier that replaced private information in the main data collection files. This ensured confidentiality and security of the study data. At the same time, the use of newly assigned individual identifiers helped guarantee an individual was included in the final sample only once. As outlined in the proposal, we generated a stratified, random sample of 2,000 cases from the admission extract based on the overall distribution of cases across the years of interest. We then requested additional data on those cases from DYS. The final sample of cases is broken down in Figure 1 below. It reflects both the sampling strategy in that proportionally fewer cases were available to draw into the study and also the overall trend in DYS placements described above.

Figure 1. Summary of Sample: Ohio DYS Cases, 2008-2015.



As mentioned in the previous section, 20 out of 88 Ohio counties were randomly selected and approached with additional data requests. Early in the study period, Ohio DYS officials distributed a letter of support to court administrators and judges at each of the county sites. This included a letter from the researchers that described the study objectives, the nature of the data request, general data security procedures, and offering to follow up and answer any further questions that they might have. From there, the process involved identifying a contact person for each selected court, providing them with the study description and a specific data request file, and receiving the records in a secured format. We provided the minimal amount of information necessary to identify a youth processed in each court in the data request file. All files containing personal information were password protected and transferred through secure exchanges from the agencies to the research team.

The data request file contained basic identifiers and a list of requested fields. Requested data included information on a focal court referral and disposition for each youth; associated treatment referrals and placements; and new contacts with the court after release. The research team developed a uniform template that could be used by data managers to fill in necessary data directly. We also provided short instruction forms for each requested field to reduce ambiguity and facilitate data entry. The sample size for each court varied from approximately 100 to 200 cases depending on their respective caseloads relative to our sampling scheme.

The research team used various strategies to enhance response rate. In cases where the selected county declined to participate, we identified another county of similar characteristics for replacement. Efforts to facilitate responses also included regularly sending email reminders and making phone calls to respective court staff. As a result, we received data from seven counties in Ohio (Belmont, Butler, Cuyahoga, Fairfield, Mahoning, Miami, and Scioto). The data comprised additional court records on 1,054 youths and come from small, moderate, and large-size courts.³ Three “high” usage counties (Butler, Cuyahoga, and Miami) each contributed more than 200 cases, two “moderate” counties (Fairfield and Scioto) provided 124 cases, and finally, two “low” counties (Belmont and Mahoning) supplied 141 cases. Cuyahoga and Mahoning data also included 83 Targeted RECLAIM cases.

Measures

The individual case-level data contain various pieces of information about the youths processed in these juvenile courts, including sociodemographics, risk assessment scores, referral offenses, court dispositions and treatment referrals, and recidivism indicators. The data set was

³This sample size was reduced somewhat (i.e., from n=1217) as some counties could not find recidivism information on sampled cases. See below for attrition/missing data analysis.

constructed by combining variables from the initial OYAS database with different external agency records.

Court processing. This study set out to assess the state-wide impact of the initiative over time. Accordingly, we noted the *county* of the court where the youth was processed and received his/her case disposition. Twenty-one Ohio counties are included in the main data file; fifteen counties are in the RECLAIM sample only and six counties were included in both RECLAIM and Targeted RECLAIM samples. The original data involved the name of facilities or treatment as a result of court processing. We categorized *case disposition outcome* into four categories for our main analyses (probation, RECLAIM, Targeted RECLAIM, and DYS facilities) given our interest in assessing trends in residential and non-residential placement. RECLAIM and Targeted RECLAIM programs share a common purpose - providing services at facilities closer to youth's home. The latter primarily covers relatively higher risk youth and felony offenders and often rely on out-of-home facilities within communities. Various Cognitive-Behavioral Therapy (CBT) programs are provided through these initiatives. Frequently used programs include Thinking for a Change (Bush, Glick, & Taymans, 1997), Effective Practices in Community Supervision (Smith & Lowenkamp, 2008), and Multi-Systemic Therapy (Henggeler, Schoenwald, Borduin, Rowland, & Cunningham, 2009). The date of admission was used to establish a *year* variable (2008 to 2015). This measure is important in establishing the case's temporal fit in the course of state and local reform efforts across the period of interest.

Seven county courts (noted above) and DYS provided us with additional referral information. Specifically, we obtained the type and seriousness level of the offense. If a youth was processed for multiple offenses, we coded the most serious charge in their record for that case. The *offense level* varied across probation violation, unruly/status, misdemeanor (MM – M1), felony

(F5 – G1), and murder offenses. *Offense type* also varied greatly, and was categorized into violent, property, drug/alcohol, status/unruly, sex offense, and other. Serious offenses were designated as those that fell into the violent or sex offense categories.

Youth sociodemographics. Youth *race* was initially collected on five categories: White, Black, Asian, Native American, and other. Given findings about disproportionate minority contact in the juvenile justice system, the effect of being non-White or Black in disposition outcome is controlled for in our analyses. We also calculated the *age at admission* by subtracting the youth's date of birth and the date of admission. Youth's *sex* was also incorporated in the analysis as a binary measure (male or female).

Risk assessment measures. Youth's risk for reoffending functions as an important factor in placement and treatment decisions. We use risk and needs data from the Ohio Youth Assessment System (OYAS) in order to capture the results of that information-gathering process for each case. The tool was developed by the University of Cincinnati in 2009 to provide a standardized system of risk assessment that could be utilized statewide in Ohio (Latessa, Lovins, & Ostrowski, 2009). This assessment evaluates youth on their psychosocial factors and determines whether a youth is at low, moderate, or high risk for recidivism. We generally rely on these *three levels of risk* in our analyses. In addition to the overall level of risk, the tool produces scores for specific criminogenic needs domains. *Domain scores* for juvenile justice history, family, peers, education/employment, prosocial skills, substance abuse/mental health/personality are available for a subset of the sample and are utilized where applicable. The OYAS was developed to provide guidance throughout the juvenile justice process, and thus include five specific *types of assessment* modified to guide diversion, detention, disposition, residential, and reentry. Given our interest in placement decisions, the results of the disposition tool are generally the most relevant to our research and

were prioritized in constructing our data set. Other types of assessments were included when disposition assessment was not available (e.g., residential tool).

Analytic Process for Objective 1

We evaluate the impact of juvenile justice reform on case and youth-level placement trends through a few key steps. First, descriptive statistics and analytic graphs are used to illustrate the sample characteristics and summarize overall placement trends and case outcomes. These results provide the context and baseline for subsequent analyses. Second, relative trends in placement outcome are compared across year using cross-tabulation and Chi-Square analysis. We also formally test these trends and provide a test of statistical significance and strength of each relationship.

Next, the focal analyses use multinomial logistic regression models to assess the impact of youth's characteristics on placement outcomes. The main dependent variable is placement decision – a categorical indicator of RECLAIM, probation, or DYS facilities given youths' background information. Factors that are empirically associated with juvenile court outcomes include age (Fader, Kurlychek, & Morgan, 2014; Leiber, Peck, & Rodriguez, 2016; Mears et al., 2014; Wordes, Bynum, & Corley, 1994), race (Cochran & Mears, 2015; Wordes et al., 1994), sex (Peck, Leiber, & Brubaker, 2014), and risk of future offending (Maloney & Miller, 2015), and we control for their potential effects in our multivariate models. The primary independent variable is youth risk as the OYAS system was a central informational effort meant to guide the use of community-based alternatives to DYS placement (Gies, 2015). The year of disposition is included both as an independent covariate as well as part of interaction variables to determine whether certain covariates had more or less impact on placement decisions over time. The main moderation effect anticipated here concerns risk level as the expectation with a reform of this nature is that the

expansion of community-based alternatives—and greater incentives for their use—should increase across the span of time observed in this study. In this case, the effect of risk on placement outcome should strengthen over time depending on whether we are considering a state-level placement or community-based alternative.

Several measures were taken to ensure robust estimation during this process. Sampling weights were applied in the multivariate tests (Valliant & Dever, 2018; Valliant, Dever, & Kreuter, 2013; Winship & Radbill, 1994). Sampling weights were necessary to account for the difference in the probabilities of being selected for the sample across placement groups due to our stratification process (which was necessary to ensure sufficient sample sizes and statistical power for key comparisons). The weights were calculated by taking the inverse of the probability of selection associated with each group. Those results were then normalized and applied to the analysis for a more accurate generalization of estimates to the population. We took the inverse of the probability associated with the stratification scheme and normalized the results to construct appropriate sampling weights. Weights were then applied to relevant analyses using the survey set (`svyset`) function in Stata 14.0. Variables included in the Objective 1 analysis had seven percent missing data, and missing values in the multivariate models were about twelve percent. Missing values were handled with listwise deletion given their relatively low prevalence and the nature of the missingness, which was mostly on covariates as opposed to the outcome measures. This limited our ability to engage in multiple imputation (given the lack of auxiliary information) or fully take advantage of full information maximum likelihood estimation (given the weight toward missingness on covariate) (see Graham, 2009; Ray, Sullivan, Loughran, & Jones, 2018). Where there were differences, they suggested that the analytic sample tended to be more likely to be high

rather than low risk (there was no significant difference for moderate vs. high risk), older at admission, and male rather than female.

Research Objective 2: Relative Effectiveness of Alternative Placements

Data and Sample

Research objective 2 evaluates the effectiveness of the community-based placements and treatments compared against institutional confinement. This part of the study still emphasizes the effect of justice-based reforms on individual youths, but focuses more on outcomes. Therefore, the analysis relies on the same sample from the previous section, which was a stratified, random sample of youth placed on probation, RECLAIM, Targeted RECLAIM, or DYS from juvenile courts in Ohio (n = 5,478). The relevant questions in Objective 2 were analyzed using a subsample from the total sample (n = 2,855). This was due to limited availability of recidivism information among the non-residential sample based on the responses of individual juvenile courts. Recidivism information was available for approximately 33.5 percent of the probation and RECLAIM sample.

Data Collection

As described above, 20 out of 88 counties were selected for sampling purposes. We then contacted the county courts for additional information on selected youths (n = 3,244) in the probation and RECLAIM sample. We obtained fully valid responses on 1,054 youths from juvenile courts in seven counties. This involved gathering information not available in the OYAS database including referral offense, treatment program, and reoffending. The same information for youths committed to residential facilities was obtained directly from DYS on 1,908 youth. Although uniform templates and data entry instructions were provided, the courts used their preferred methods of transferring files. Therefore, it was necessary to recode the data in the most compatible manner to ensure maximum compatibility across the various sources (see e.g., Curran & Hussong,

2009). For example, some counties used a descriptive category in reporting referral offense type while others provided the Ohio Revised Code numbers for each offense. We created multiple variables to preserve raw data and construct composite measures.

Measures

Risk level. The main variables of interest are risk assessment results, placement type, and recidivism. As with the Objective 1 analysis, we rely on the OYAS risk level in accounting for baseline differences in the likelihood of recidivism. Youth are categorized into low, moderate, or high-risk groups based on cutoffs from the total risk score. There are seven types of assessment tools and each tool comprises a different number of questions. These were used to varying degrees in the analyses for Objectives 1, 2, and 3 (e.g., Disposition was 24% and Residential was 28% of the analytic sample). The range of risk scores can also vary across tools. For example, the disposition tool consists of 32 questions and the total score can range from 0 to 33. A low level is assigned to the total score up to 11 for males and 12 for females. Moderate risk ranges from 11/12 to 18. Summed scores greater than 18 belong to high risk category. Each youth was assigned a risk level using the appropriate cutoffs specified for respective assessment tools. Therefore, risk level was a more appropriate indicator than the raw score as we needed to pool the measure of risk across various assessment types in this study. As many cases were RECLAIM or diversion-level referrals, agencies relied on a basic “risk/needs” tool, which simply identifies a risk level based on limited information about the youth’s juvenile justice history. This made up about 36 percent of assessments and was heavily used early in the study period before OYAS became more common (2008 and 2009). We introduce an admission year variable in all key analyses in order to account for such trends as well as possible.

Treatment and program referral indicators. Limited treatment data were obtained from the county juvenile courts and Ohio DYS. The court data collection generally mentioned only one type of treatment. It is, however, likely that some youth may have been referred to multiple forms of treatment. The DYS files mentioned all of the programs in which a given youth participated. These data were not available prior to 2013, however. Cognitive Behavioral Therapy, Mental Health/Counseling, Substance Abuse Treatment, and Community Service/Restitution were among the key referrals mentioned in the youth cases files. Patterns of referral and treatment availability were linked in part to the county courts and the DYS facility, so they vary across sites. The different program designations were coded in a few different ways. Cognitive Behavioral Therapy was maintained as its own category as it generally was coded clearly as such in case records. “Needs based-programs” included mental health treatment, counseling, substance abuse treatment, and life-skills programs. “Supervision” comprised probation and prevention supervision and “Diversion” consisted of those programs coded as such in records along with alternative schools and day reporting centers. These indicators are generally used in supplementary analysis for Objective 2.

Recidivism. The initial data request covered different operationalizations of recidivism including new arrest, referral to juvenile court, subsequent adjudication/conviction, and commitment to DYS. Requests were made with respect to whether a youth was referred to the juvenile court for a new offense, date/level/type of new offense, and subsequent adjudication/conviction/state commitment for the new offense. As mentioned in the data collection section, we received youth records directly from DYS as well. Recidivism was captured as a new commitment to DYS or an adult facility. Restructuring the entries per youth yielded the indicator of re-commitment or no return to DYS. It was necessary to measure recidivism in the most

compatible manner for both residential and non-residential youth. Therefore, we use *new or re-commitment to DYS/Adult facilities* through 2017 as our recidivism measure when the analysis involves comparison across residential and community-alternatives samples.

Control variables. We controlled for a number of pre-treatment characteristics that might influence the risk of reoffending. For example, offenders adjudicated for a violent offense might be more likely to recidivate compared to non-violent offenders. In our sample, age, minority status, male, and offense type were significantly related to new commitment in bivariate analyses. Similarly, it was necessary that the year of admission was included in our analyses as well. It was measured on a one-unit scale to reflect a progression from the first year of study to the last (2008 = 0, 2009 = 1, 2010 = 2...). These variables were entered in the analysis to control for possible confounding relationships when estimating the association between placement types and youth returns to the juvenile justice system.

Analytic Process for Objective 2

We were interested in whether the shifts in individual placement from facilities to community-based alternatives could reduce subsequent offending. First, descriptive statistics for the subsample were examined in order to contextualize the main analyses. We then assessed bivariate relationships between the covariates, placements, and recidivism to better understand potential confounds and consider the justification for their inclusion in the multivariate analysis. Next, the raw rates of recidivism were calculated and compared across placements. We constructed a line graph to roughly compare the proportion of youth committed to DYS for a new offense after release from placement or case disposition in the case of community-based sanctions. Finally, matching and weighted regression analyses using a propensity score were carried out to compare the likelihood of recidivism across similarly-situated youths. Our goal was to estimate the effects

of alternatives, and it was essential to distinguish the effect of placement from these possible confounds. Where appropriate, we also conduct some sensitivity checks and supplemental descriptive analyses to elaborate on relevant findings.

The comparative effects of different placement types were estimated within the framework of propensity score analysis because the characteristics of youth placed on community-based interventions or supervision could differ considerably from those committed to state residential facilities—especially in terms of offense severity and risk for subsequent offending. Propensity score techniques derive from the causal inference framework and allow for the estimation of effects by producing the unobserved counterfactual outcome (Morgan & Winship, 2015). In the context of the current study, we employed these techniques to determine the causal effect of community-based alternatives in reducing subsequent offending compared to similarly-situated institutionalized youth.

Average Treatment Effect (ATE) and Average Treatment effect among the Treated (ATT) are often used in the course of these analyses. These two effects can differ when treatment effects differ across individuals with heterogeneous characteristics. ATE is more meaningful when all member of the population have equal access to every treatment. ATT is more relevant when treatments are more or less likely to be offered or effective for certain subpopulations. ATT was more relevant in this study as the results of Objective 1 show that the profile of youths differ significantly across placements and there is some evidence of differential treatment effectiveness across particular placements/treatments and youth risk profiles (Lipsey, 2009). In this case, the ATT compares the average outcome for RECLAIM (or Probation) youth if they were instead sent to DYS with the mean outcome of DYS youth, or $\mu_{R.R} - \mu_{R.D}$. Within the framework, this study

followed McCaffrey et al. (2013)'s suggestion for estimating treatment effects with multiple categories. Specific treatment effects from pairwise contrasts are listed in the table below.

We also modify the estimation model to accurately compare across multiple treatment categories. A Generalized Boosted Modeling (GBM) approach holds a few advantages over popular solutions for multi-treatment matching such as multinomial or ordinal logistic regression (Imbens, 2000; McCaffrey et al., 2013). GBM relies on iterative simulations for estimating the propensity scores that can minimize the difference in covariates across treatment groups. Linearity assumptions are relaxed in this context thus enabling GBM to produce more stable weights compared to parametric models (Lee, Lessler, & Stuart, 2010; McCaffrey, Ridgeway, & Morral, 2004).

Stopping rules for the iterations were based on the standardized bias and Kolmogorov-Smirnov (KS) statistics. These statistics are used to gauge the difference in the weighted mean of selected covariates between treatment groups. The balance between treatment groups is assessed by comparing these statistics before and after incorporating the weights on each covariate. McCaffrey et al. (2013) recommends using the cutoff .20 to identify an imbalance. The goal is reduce these statistics below .20 on all covariates with propensity score weights. We use the Toolkit for Weighting and Analysis of Nonequivalent Groups (TWANG) command in STATA (Ridgeway, McCaffrey, Morral, Burgette, & Griffin, 2006).

Table 1. Illustration of Estimation of Treatment Effects

Effect	ATT			
	ATE	DYS cases	RECLAIM cases	Probation cases
RECLAIM vs. DYS	$\mu_R - \mu_D$	$\mu_{D.R} - \mu_{D.D}$ ATT of REC among those treated in DYS	$\mu_{R.R} - \mu_{R.D}$ ATT of DYS among those treated in REC	---
Prob vs. DYS	$\mu_P - \mu_D$	$\mu_{D.P} - \mu_{D.D}$ ATT of probation among those treated in DYS	---	$\mu_{P.P} - \mu_{P.D}$ ATT of DYS among those treated in probation

Table 1. Illustration of Estimation of Treatment Effects

Effect	ATT			
	ATE	DYS cases	RECLAIM cases	Probation cases
RECLAIM vs. Prob	$\mu_R - \mu_P$	---	$\mu_{R.P} - \mu_{R.R}$ ATT of probation among those treated in REC	$\mu_{P.P} - \mu_{P.R}$ ATT of REC among treated in probation

The treatment effects in the above table are estimated using the doubly robust method. This approach is used to address the imbalance that might remain after incorporating the propensity score weights (McCaffrey et al., 2013). The regression method, a commonly used control function approach, involves a dummy treatment indicator in the regression model (Apel & Sweeten, 2010). In this case, the coefficient represents the treatment effect. The doubly robust method extends this approach and adds pretreatment covariates in the model as well. The coefficient still represents the treatment effect, but the effect size is more conservative in that pretreatment covariates are incorporated twice: once in producing the weights and again as control variables in estimating the treatment effects. We include pretreatment covariates (that remained imbalanced after weighting in the regression model or all covariates) in the regression model. Again, weights were then applied using the survey set (*svyset*) function in Stata 14.0.

Research Objective 3: Impact on County-Level Juvenile Crime Rates

The third research objective draws on county-level data and a series of publicly available measures to consider county-level variation in juvenile justice reform inputs and their potential impacts on juvenile crime rates. To formalize the tests of these trends, we use a series of longitudinal statistical models and hypotheses tests.

Data and Measures

We utilize several county-level variables in considering the third study objective, which focuses on variation across county courts as well as the potential impacts of different aspects of

reform efforts (and related inputs) on broader trends in juvenile crime. We collected and integrated various types of data to characterize the 88 Ohio counties and their juvenile courts. This includes Uniform Crime Report data on juvenile arrest rates, state administrative reports on juvenile justice inputs and decisions, county administrative data on juvenile court budgets, and various county-level census indicators to adjust for relevant controls when estimating relationships between crime rates and variables that reflect juvenile justice reform in Ohio.

Juvenile Arrest Rates

Total Juvenile Arrest Rate. The total number of juvenile arrests in a county for each year were gathered from the UCR County Level Detailed Arrest and Offense Data: 2008 – 2014. The UCR County Level Detailed Arrest and Offense Data are published annually by the Federal Bureau of Investigation (FBI). The data sets were retrieved from the Inter-university Consortium for Political and Social Research (ICPSR) maintained by the University of Michigan (www.icpsr.umich.edu). The UCR County Level Detailed Arrest and Offense Data reports the count of arrest and the accompanying offense for UCR Part 1 and Part 2 crimes (see Table A1 in Appendix for a list of all crimes included). Data are collected by the FBI from agencies and states participating in the UCR program. Data for county-level detailed arrests and offenses are submitted voluntarily by state, county, and city law enforcement agencies, to the FBI, on a monthly basis. The FBI then reviews the data for completeness and accuracy (United States Department of Justice, 2014). In the case where an unusual fluctuation in counts is detected the FBI contacts reporting agencies to correct or explain the counts (United States Department of Justice, 2014).

If an agency reported 3 to 11 months of data – not all 12 months – an imputation algorithm was used to yield 12-month equivalents. Agencies that reported fewer than three months of data were replaced with rates calculated from agencies reporting 12 months of data located within the

agencies geographic space, within the state. Data from agencies were linked to a corresponding FIPS code for the county. In the case that an agency was located in multiple counties, the county containing the largest population is used.

Most Ohio counties reported more than three months of data. In 2008, eight Counties reported fewer than three months of data. Every year of data collection (2009 – 2014) thereafter, either one or two counties reported less than three months of data. Table 2 shows the average percent of data reported per year. If a county reported three months or fewer of data coverage then the indicator would be less than or equal to 25.0. Conversely, if a county reported all 12 months of data for the year—the coverage indicator would be 100.0.

Table 2. County-Level Detailed Arrest and Offense Coverage Indicator

Year	Median	Mean	SD	Min	Max
2008	93.75	81.98	24.75	5.95	100.0
2009	94.76	86.80	18.68	5.91	100.0
2010	94.90	86.51	20.25	5.81	100.0
2011	95.24	86.00	22.00	0.00	100.0
2012	93.68	86.03	18.57	0.00	100.0
2013	92.07	84.48	21.20	0.00	100.0
2014	91.96	85.37	18.82	0.00	100.0

Notes: Only two counties had coverage indicators of 0; Noble (2011, 2012, 2013, 2014) and Seneca (2013).

The 2015 UCR County Level Detailed Arrest and Offense dataset was not published at the time of this report. The research staff attempted to use different publicly available UCR sources to obtain data for 2015. However, attempts to aggregate different sources of information to repeat these datasets provided inaccurate estimates.⁴ Therefore, 2015 data for those variables are missing.

Juvenile arrest was standardized by juvenile population in the county. County juvenile populations (10 – 17) were drawn from a publicly available source operated by OJJDP, which uses

⁴ Specifically, we attempted to use the Arrests by Age, Sex, and Race file to reconstruct County-level estimates, but they differed substantially within counties when compared to data for the other years.

data from the US Census Bureau subsequently modified by the National Center for Health Statistics (National Center for Health Statistics, 2018). County juvenile population estimates are available for all years (2008 – 2015). To standardize county total juvenile arrests, we divided the total number of juvenile arrests in a county during a given year by the county juvenile population for that year. Offenses included in total juvenile arrest rate include crimes against persons, crimes against property, drug offenses, and status offenses (see Appendix Table A1 for full list). We then multiplied that by 1,000. Thus, the total juvenile arrest rate is interpreted as the number of juvenile arrests in a county for a given year per 1,000 juveniles residing in that county.

In order to fit the count based (Poisson) regression models, we rounded the total juvenile arrest rate to the closest integer. The mean total juvenile arrest rate across all 88 Ohio county's was 25.19 arrest per 1,000 juveniles, with a substantial degree of variation around that number (SD = 20.47; see Table 3). The total juvenile arrest rate ranged from 0 to 155 across all counties and years.

Table 3. Descriptive Statistics for Ohio County Juvenile Arrest Rates, 2008 – 2014.

	N	Mean	SD	Min	Max
Total Juvenile Arrest					
<i>Overall</i>	616	25.19	20.47	0.00	155.00
<i>Between County</i>	88		18.39	1.57	85.00
<i>Within County</i>	616		9.18	-31.38	111.62
Juvenile Violent Arrest					
<i>Overall</i>	616	4.96	3.95	0.00	25
<i>Between County</i>	88		3.69	0.14	21.43
<i>Within County</i>	616		1.45	-1.90	12.25

The standard deviation for between county differences in total juvenile arrest rate is 18.39, while the standard deviation for within county differences is 9.18. The large range for the within county difference measure (-31.38 to 111.62) signifies that there are changes in juvenile arrest

rates for some counties over time that should be further assessed in the context of shifts in juvenile justice system inputs occurring during this time (Land, McCall, & Nagin, 1996).

Juvenile Violent Arrest Rate. Like the total juvenile arrest rate, the juvenile violent arrest rate was gathered from the UCR County Level Detailed Arrest and Offense Data: 2008 – 2014. The same procedure was used by the FBI in data collection. Juvenile violent arrest rate is a standardized measure based on the count of arrests for those aged 10 to 17 standardized by county juvenile populations. Juvenile violent arrest rate uses a subsection of arrests included in the total juvenile arrest rate. The subsection of arrests include juvenile arrests for murder, rape, robbery, aggravated assault, and other assault.

The mean juvenile violent arrest rate in a county was 4.96 violent arrests per 1,000 juveniles ($SD = 3.95$). The juvenile violent arrest rate ranged from 0 to 25 juvenile violent arrest per 1,000 juveniles. The descriptive statistics show the majority of the variation in juvenile violent arrest rate is between counties (Between $SD = 3.69$ vs. Within $SD = 1.45$). Further, the range for between county differences is larger than the range for within county differences, which differs from the total juvenile arrest rate and reflects more stability over time. This can impact regression estimates as there is less variation over time to explain.

Justice Initiatives

Commitment Rate. Felony adjudication and youth commitment data were gathered from the 2008 – 2015 DYS Profile of Youth Adjudicated or Committed for Felony Offenses Annual Reports. These reports contain information about the number of youth adjudicated for a felony offense in a county and the number of those adjudications which resulted in a commitment to an institution during the fiscal year. Data were available for all years of interest (2008 – 2015). Commitment rate is measured as the number of placements in a state facility, from a county, in a

given year divided by the number of juvenile felony adjudications in that county during that year. The total is then multiplied by 100; therefore, commitment rate is interpreted as the percent of juvenile felony adjudications committed to DYS facilities, in a county, in a fiscal year. The average percent of felony adjudications which resulted in a commitment was 11.53 percent (SD = 9.49). The standard deviation of within county differences equaled 10.62, which is a great deal of variation in the level of felony adjudications across counties. It also appears that there was roughly an equal amount variation in between and within county commitment rates from 2008 to 2015. Descriptive statistics for all justice initiative variables are listed in Table 4.

Table 4. Descriptive Statistics for Justice Initiative Variables, 2008 – 2015

	N	Mean	SD	Min	Max
Commitment Rate					
<i>Between County</i>	88	11.53	9.50	0.00	43.19
<i>Within County</i>	701	0.00	10.62	-30.15	78.63
<i>Lag -1 Between County</i>	88	11.67	9.62	0.00	43.89
<i>Lag -1 Within County</i>	614	0.00	1.29	-31.60	75.58
Aggregate Risk ^a					
<i>Between County</i>	88	8.36	5.15	1.24	22.95
<i>Within County</i>	440	0.00	5.65	-17.85	39.67
<i>Lag -1 Between County</i>	88	7.71	4.83	1.05	22.74
<i>Lag -1 Within County</i>	440	0.00	5.61	-19.94	40.79
Targeted RECLAIM					
<i>Between County</i>	88	0.42	1.00	0.00	3.50
<i>Within County</i>	704	0.00	0.83	-3.50	3.50
<i>Lag -1 Between County</i>	88	0.34	0.83	0.00	3.00
<i>Lag -1 Within County</i>	616	0.00	0.70	0.00	3.00
RECLAIM cases					
<i>Between County</i>	88	145.33	183.11	0.00	1483.04
<i>Within County</i>	704	0.00	90.14	-340.64	1033.05
<i>Lag -1 Between County</i>	88	149.70	179.22	0.00	1407.55
<i>Lag -1 Within County</i>	616	0.00	82.10	-337.15	1006.57
Transfer Rate					
<i>Between County</i>	88	1.17	1.36	0.00	6.14
<i>Within County</i>	704	0.00	1.91	-4.62	24.31
<i>Lag -1 Between County</i>	88	1.23	1.42	0.00	5.85

	N	Mean	SD	Min	Max
<i>Lag -1 Within County</i>	616	0.00	1.98	-5.28	23.81
Juvenile Court Budget					
<i>Between County</i>	69	1759.81	1317.48	23.78	8279.71
<i>Within County</i>	510	0.00	471.43	-2387.90	1988.11
<i>Lag -1 Between County</i>	68	1689.28	1284.78	22.47	8120.43
<i>Lag -1 Within County</i>	444	0.00	414.11	-2228.70	1815.36

Notes: ^aCalculated from 2010 – 2014.

Aggregate Risk. Aggregate risk is measured as the percent of youth assessed as high risk in a county during a year. Information on aggregate risk was gathered from the Ohio Youth Assessment System (OYAS) database (see description above). When available, assessment data from the disposition tool were used. The disposition tool, like the residential and reentry tools, are used post-adjudication and aim to facilitate the best service to youth while under criminal justice supervision. In the case that a youth was not assessed using the disposition instrument or screener, tools that are used prior to disposition (diversion and detention) were prioritized. As a secondary option, when a youth was not assessed prior to or at disposition, post-disposition tools (residential and reentry) were used. Post-adjudication tools like the residential and re-entry tools were not prioritized because the disposition tool occurs at the beginning of criminal justice supervision while the residential and reentry tool are used at the middle or end of criminal justice supervision. Risk/needs tools were given the least priority. Table 5 provides an itemized assessment type list by priority.

Table 5. Priority of OYAS Tools in Aggregate Risk Measure

Priority List	Assessment Type
1	Disposition Instrument
2	Disposition Screener
3	Diversion
4	Detention
5	Residential
6	Reentry
7	Risk/Needs

Data on aggregate risk in a county are available from 2008 – 2014, all years for which juvenile arrest rates are available. However, the OYAS was implemented state-wide in 2009; therefore, measures of aggregate risk are more informative from 2010 onwards. Thus, models which assess the association between aggregate risk and juvenile arrest rates are limited to cases that were referred to the system from 2010 to 2014. Aggregate risk offers a sense of the composition of cases that each county processes. The average percent of juveniles assessed as high risk for a typical Ohio county was 8.36 percent ($SD = 5.15$). The standard deviation of within county differences equals 6.77. Thus, it appears there is roughly an equal amount of variation in the between and within county differences in aggregate risk.

Targeted RECLAIM Involvement. County Targeted RECLAIM involvement was gathered from the DYS Annual Reports for Funding Years 2009 – 2015. These annual reports include information about the specific counties eligible for Targeted RECLAIM dollars, the programs funded by Targeted RECLAIM dollars in each county, and the amount of money allocated to each county, each year. County Targeted RECLAIM involvement was coded sequentially to denote both if a county was involved in Targeted RECLAIM and the number of years they were involved (see Osgood, 2010). Thus, the first year a county was eligible for Targeted RECLAIM allocations in the upcoming fiscal year they were coded as “1.” The second year a county was eligible for Targeted RECLAIM allocations they were coded as “2,” and so forth. If the county was never involved in Targeted RECLAIM it was coded as “0” throughout all years. This allows for some consideration of the difference in juvenile arrest rates in years where Targeted RECLAIM was in place (or not). It also allows us to estimate a potential increased impact as a county is involved for a longer period time.

The first year that any county was eligible for Targeted RECLAIM allocations was 2009. Funds were first appropriated in 2010 to six counties: Cuyahoga, Franklin, Hamilton, Lucas, Montgomery, and Summit. In 2009, these six counties accounted for 63 percent of the total commitments to DYS (Ohio Department of Youth Services, 2017). In 2012, Targeted RECLAIM funding was expanded to include eight other counties: Allen, Ashtabula, Licking, Lorain, Mahoning, Medina, Stark, and Trumbull. In 2013, Butler County was added. Thus, 15 counties over the study period had at least one allocation of Targeted RECLAIM funding while 73 counties did not (See Table 6).

Table 6. Targeted RECLAIM Involvement, 2008 – 2015

Involvement Time	Number of Counties (%)
No involvement	73 (82.9)
3 years of involvement	1 (1.1)
4 years of involvement	8 (9.0)
7 years of involvement	6 (6.8)

RECLAIM. The number of RECLAIM cases in a county, per year, was gathered from the OYAS database (see discussion of Aggregate Risk for data collection procedure). In order to standardize RECLAIM usage across counties, the number of RECLAIM cases in a given year, was divided by the delinquency caseload in the county, then multiplied by 1,000. Thus, RECLAIM usage is interpreted as the number of RECLAIM cases per 1,000 cases on a county's delinquency caseload. The average number of RECLAIM cases per 1,000 delinquency cases for all Ohio counties from 2008 to 2015 was 145.33 (Between SD = 183.11), signifying substantial between county variation in the degree to which counties used RECLAIM. The standard deviation of between county differences is double the standard deviation of within county differences (Within SD = 90.14).

Transfer Rate. Transfer refers to juvenile cases waived from juvenile to adult court. This measure was gathered from the DYS Profile of Youth Transferred to Adult Court Reports from FY 2008 to 2015. The relationship between transfer rate and county juvenile arrest rates are complicated. Mainly, some of the cases that are “diverted” from DYS custody may actually move into the adult system. This measure offers an important control in studying arrest rates — especially violent arrests — because over-time variation in these rates can affect the number of the highest risk cases that must be handled in Juvenile Courts and Corrections and indirectly play a role in juvenile justice practices and reform efforts.⁵

Transfer rate is measured as the number of juvenile waivers to adult court, in a county in a year, divided by the delinquency caseload in that county, in the given year, multiplied by 1,000. Thus, transfer rate represents the number of juvenile transfers per 1,000 delinquency cases. The average county in Ohio between 2008 and 2015 transferred 1.17 juveniles for every 1,000 delinquency cases (SD = 1.36). The standard deviation of within county differences in transfer rate equals 1.91. The comparison of these means and standard deviations suggests overdispersion based in part on a large number of “no transfer” observations and other low values of transfer rate. There is roughly an equal amount of variation in the between- and within county differences in youth transfer from 2008 to 2015.

Juvenile Court Budget. Juvenile court budget was gathered through various sources. First, we used publicly available internet sources to find Comprehensive Annual Financial Reports containing juvenile court budgets for Ohio counties from 2008 to 2015. Frequently these appeared

⁵While we pick up transfers originating in the juvenile court using this measure, we miss direct files (or legislative transfers) to the adult court which bypass the juvenile system entirely. Estimates of direct file cases vary considerably across states, making it difficult to know the exact impact of trends in direct file (Dawson, 2000; Griffin et al., 2011). The impact of direct filing of juvenile cases to adult court is likely limited in this case given broader trends in juvenile crime rates and the limited effect for transfer overall, but is hard to quantify precisely.

on county auditors or juvenile court websites. After the extensive internet search, counties with missing data were contacted via email seeking the juvenile court budget each Fiscal Year from 2008 to 2015. After email correspondence, typically with the county auditor's office, any missing counties were contacted via telephone. Table 7 provides an overview of data coverage that emerged from this process.

Table 7. Number of Ohio Counties with Juvenile Court Budget Data

Year	Counties	% of Total (n=88)
2008	61	69.3
2009	63	71.6
2010	61	69.3
2011	65	73.9
2012	64	72.7
2013	65	73.9
2014	65	73.9
2015	66	75.0

The measure used for juvenile court budget was drawn from each court's general fund as it was more uniformly available across the counties. Some counties received juvenile court special funds, but details on sources and uses varied across counties. Juvenile court budget was divided by the delinquency caseload in the county, for a given year, to get a standardized budget measure that reflected per capita spending (see below for delinquency caseload data collection procedure).⁶ Juvenile court budget is measured in United States dollars. The average county from 2008 to 2015 had a juvenile court budget of \$1,759.81 per delinquency case, with a fairly high degree of variation around that average (SD = \$1,317.48). The standard deviation of within county juvenile court budget (\$471.43) is substantially lower than that between the counties. This indicates that

⁶ Note that the standardization technique for this measure differs from transfer rate and RECLAIM usage as it is per one case on a county's delinquency caseload as opposed to 1,000 cases.

there is more variation between counties in juvenile court budget per delinquency case than there is change within counties over time.

Given the variability in coverage we assessed whether there were differences in the average juvenile arrest rates in counties with and without juvenile court budget data (see Table 8). This varies from year to year. In 2010 and 2011, the average total juvenile arrest rate was significantly lower among counties for which we did not obtain juvenile court budget information compared to counties where data were available. In 2008, 2009, 2010, and 2013 the average juvenile violent arrest rate was significantly lower among counties without juvenile court budget information compared to those for which juvenile court budget information was available.

Table 8. Mean Juvenile Crime Rate Differences by Juvenile Court Budget Coverage

Year	Total Crime Rate	Violent Crime Rate
2008	-9.65	-2.26*
2009	-11.79*	-2.89**
2010	-11.29*	-2.96**
2011	-4.44	-1.61
2012	-5.69	-1.33
2013	-5.63	-2.10**
2014	-4.87	-1.66

Notes: Reference group = No juvenile court budget information; Statistics presented are difference in means; H_0 =Difference in Means = 0 with t test. *p < 0.05, **p < 0.01; ***p<0.001.

Community Level Controls

Delinquency Caseload. The delinquency caseload in a county was gathered from the 2008 – 2015 Ohio State Courts Statistical Summary. Individual Ohio courts are required to submit caseload information to the Supreme Court of Ohio each year. Delinquency caseload in juvenile courts was used, as opposed to total juvenile caseload, due to jurisdictional heterogeneity. For example, in 2012 of the courts that had juvenile jurisdiction, 11 counties had juvenile jurisdiction exclusively, 66 counties had juvenile and probate jurisdiction, 6 counties had juvenile and

domestic relations jurisdiction, 4 counties had juvenile, probate and domestic relations jurisdiction, and 5 counties had juvenile, probate, domestic relations and general jurisdiction. The average yearly delinquency caseload in Ohio county juvenile courts from 2008 – 2015 was 1,125.30 cases (SD = 2,345.60). The standard deviation suggests a great deal of variation in the average delinquency caseloads relative to the mean. The standard deviation of within county differences in delinquency caseload was 639.95 and ranged from -4,931.50 to 11,176.50. Thus, most of the variation in juvenile court delinquency caseload occurs between counties; however, there was a substantial amount of variation within counties during this time period as well.

Children Under Poverty Line. Children under poverty line was measured using the 2008 – 2015 Small Area Income and Poverty Estimates from the United States Census Bureau. Small Area Income and Poverty Estimates are measured at the district, county, and state level. This analysis uses the county-level measure of poverty. Data for this measure are available for all study years (2008 – 2015). Small Area Income and Poverty Estimates draw on the American Community Survey, which is gathered every 5 years, and the 2000 (or 2010) United States Census. Estimates for number of children under the poverty line in counties for 2008 and 2009 is relative to the 2005 American Community Survey, while 2010 – 2015 estimates are relative to the 2010 American Community Survey. To estimate the number of children under the poverty line, a regression model was developed with five predictors from the American Community Survey:

Predictor 1. The log of the number of child exemptions claimed on tax returns whose adjusted gross income falls below the official poverty threshold for a family of the size implied by the number of exemptions on the form

Predictor 2: The log of the number of SNAP benefit recipients in July of the *previous* year

Predictor 3: The log of the estimated resident population under 18 as of July 1

Predictor 4: The log of the total number of child exemptions indicated on tax returns

Predictor 5: The log of the Census 2010 (*2000 Census for 2008 and 2009*) estimate of the number of related children in poverty ages 5 to 17

The dependent variable in the regression model is the log of the number of children in poverty ages 5 to 17 in each county. Children under the poverty line is measured as a percentage. The average county in the average year had 21.33 percent of children under the poverty line (SD = 6.57). The county-level prevalence of children under the poverty line ranged from 5.64 to 35.0 percent. The standard deviation of within county differences equals 2.34. This indicates that there is more variation in the percentage of children under the poverty line between counties than within counties across years. Both values suggest relatively little variation around the mean in county level percentage of children under the poverty line during these years. Table 9 presents the descriptive statistics for county-level controls.

Table 9. Descriptive Statistics of Ohio County-Level Controls, 2008 - 2015

	N	Mean	SD	Min	Max
Delinquency Caseload					
<i>Between County</i>	88	1125.30	2431.33	24.00	22442.00
<i>Within County</i>	616	0.00	639.948	-3806.20	12301.8
<i>Lag -1 Between County</i>	88	1159.84	2437.42	48.57	16192.29
<i>Lag -1 Within County</i>	616	0.00	626.75	-2453.16	11631.84
Children Under Poverty Line					
<i>Between County</i>	88	21.68	6.61	5.78	34.86
<i>Within County</i>	704	0.00	2.12	-7.20	6.55
Educational Attainment					
<i>Between County</i>	88	17.73	6.98	2.83	63.39
Juvenile Population					
<i>Between County</i>	88	131315.00	212368.00	13310.40	1271347.00
<i>Within County</i>	704	0.00	4345.66	-50829.00	58256.88
<i>Lag -1 Between County</i>	88	14203.39	22215.32	1303.00	134512.00
<i>Lag -1 Within County</i>	616	0.00	889.66	5109.39	25046.39

Educational Attainment. Educational Attainment was gathered from the American Community Survey 5-Year Estimates by the United States Census Bureau. Educational attainment

was measured as the percentage of the county population aged 18 to 24 without a high school diploma. Educational Attainment was treated as time-stable measure for two reasons. First, there was not significant within county variation across years. Second, due to missing data in 2008, the time-stable measure allows for educational attainment to be used without reducing data coverage in panel Poisson regression models. Between 2009 and 2015, 17.7 percent of the population, aged 18 – 24, in the average county had no high school diploma (SD = 7.01).

Summary of County-Level Data

Table 10 identifies and briefly defines the different county-level measures used to study Objective 3. It also indicates how they are utilized in our multivariate models. Generally, these variables reflect aspects of the juvenile justice reform initiatives in Ohio (e.g., Commitment Rate, Risk Levels, RECLAIM) and key control variables (e.g., Child Poverty, Transfer Rate, County Delinquency Caseloads).

Table 10. Measures for Juvenile Justice Trends and Arrest Rates Analyses: Summary

Variable	Definition	Function
Dependent Variables		
Juvenile Arrest Rate	Number of UCR-Recorded Arrests per 1000 Youths (Ages 10-17)	Dependent Variable
Juvenile Violent Arrest Rate	Number of UCR-Recorded Violent Arrests per 1000 Youths (Ages 10-17)	Dependent Variable
Justice Reform Initiatives		
Commitment Rate	Percentage of Adjudications that result in Commitments	Time Varying
Risk Level	Percentage of juveniles assessed as high risk	Time Varying
Targeted RECLAIM	Length of time (years) a county has been eligible for Targeted RECLAIM funding in the next Fiscal Year.	Time Varying

Variable	Definition	Function
RECLAIM	(Number of RECLAIM cases/delinquency caseload) * 1000	Time Varying
Transfer Rate	(Number of juvenile waivers/delinquency caseload) * 1000	Time Varying
Juvenile Court Budget	(Juvenile court budget/delinquency caseload)	Time Varying
County Level Controls		
Children Under Poverty Line	Percent of children under the poverty line	Time Varying
Educational Attainment	Percent of residents aged 18-24 without a High School Diploma	Time Stable
Delinquency Caseload	Number of delinquency cases in a county	Time Varying

Analytic Process for Objective 3

We assess the impact of juvenile justice initiatives to reduce institutional placement with respect to community-level juvenile arrest rates at both state and local level in two steps. First, we present univariate statistics and panel data line plots to show within county stability and change from 2008 to 2014.⁷ Descriptive statistics are used to provide summaries about the sample and measures used in analysis. These include three components: overall estimates (for dependent variables), between county estimates, and within county estimates. Independent variables are decomposed into between and within county components. Between county variables are included in the analysis as control variables. The mean of between county estimations is the sum of scores within a county divided by the number of years available for that measure.

Within county estimates, the focus of this analysis, examine county-level change or stability over time. Within county measures are deviation scores between observations and county-level averages. Therefore, the mean of within county measures always equal zero. Within county

⁷ 2015 data are included when available.

variation provides us with knowledge of within county change (or stability) associated with an event or trend in an influence variable (Allison, 2009; Halaby, 2004; Osgood, 2010). If all data are available, between county measures are calculated over 88 observations (counties); within county measures are calculated over 704 observations (88 counties x 8 years = 704 observations). With longitudinal data, we examine the within county variation in terms of county-level change over time (Osgood, 2010). Within county measures reflect the changes from 2008 to 2014 believed to be the result of key juvenile justice reform efforts in Ohio.

Panel-data line plots visually describe changes or stability in measures over time. Since there are 88 counties, panel-data line plots offer a sense of the larger patterns in the data. To summarize mean trends and associated county-level variation we estimate latent growth curves in conjunction with those descriptive plots. These models also offer the advantage of formally testing relevant parameters for the Intercept (i.e., starting level) and Slope(s) (i.e., longitudinal trend) via hypothesis tests with respect to their means and variances (Bollen & Curran, 2006; Preacher et al., 2008). In particular, we test the null hypothesis that the mean latent growth factors (μ_α , μ_β) and their variance components (φ_α^2 , φ_β^2) equal zero. This, in turn, captures the degree to which observed change is statistically different from zero and summarizes how Ohio counties vary around average trends. In parallel, we manually perform the hypotheses tests on the variance estimates by dividing the variance component estimate by its standard error to obtain the z-statistics. We then compared the obtained z-statistics to the z-critical values for each significance level (e.g., 1.96 for $p < 0.05$).

Second, we assessed the bivariate and multivariate association between juvenile justice reform initiatives and juvenile arrest rates. Pairwise comparisons (*Pearson's correlation coefficient*) between the dependent variable(s) and independent variables were used to assess

bivariate associations, which are considered in relation to their direction, magnitude, and statistical significance. We then use multivariate models—longitudinal panel Poisson regression analysis—to isolate the effects of juvenile justice initiatives while controlling for other relevant county-level factors. The rationale for using dependent data panel regression analysis is that each year of data for a county is not independent of the previous years' data (Halaby, 2005; Wooldridge, 2009).

Count based regression models are needed to analyze these effects (Long, 1997; Long & Freese, 2006; Osgood, 2000). Small counts of crime relative to the juvenile population present two problems to analyzing this data (Osgood, 2000). First, because the precision of the estimated crime rate depends on the size of the juvenile population, variation in juvenile population size across counties will lead to the violation of the assumption of homoscedasticity (equal variance) in standard regression models. The error in prediction will be more likely for counties with small population sizes. Second, the assumption of normality is violated. In theory, a true zero (zero juvenile arrest in a county for the year) is possible and as juvenile populations decrease an arrest rate of zero will be observed for a larger proportion of cases.

In order to model data for Objective 3, variables were entered sequentially into the regression models. Specifically, we use quasi-forward selection to fit panel data Poisson regression models. Pure forward selection includes adding each variable one at a time (Blanchet, Legandre, & Borcard, 2008). However, we start with key variables in the model, adding control variables to assess potential robustness of the substantively relevant measures, and repeating this process until all theoretically relevant/available measures are included in the model. Then, we estimate another model with the next key independent variable and add the same relevant measures sequentially to that model. Using all measures in one model would lead to substantial data loss because listwise

deletion reduces the sample size for some measures and for the model (e.g., see juvenile court budget).

Two main dependent variables were used in Objective 3 – total juvenile arrest rate and violent juvenile arrest rate. For each of these outcome measures, sequential regression models will be estimated for four main independent variables that can shift with Ohio’s juvenile justice reform efforts: Commitment Rate, Aggregate County Risk, Targeted RECLAIM involvement, and RECLAIM usage (8 total sequential models). For each of these models, four within county variables (and their between county controls) are added to the model sequentially. In addition, we control for between county differences in educational attainment (see Measures section). Two of the measures – juvenile-to-adult court transfer rate and juvenile court budget – are used exclusive of each other because of their potential dependence.

In addition to using forward selection to ensure that theoretically relevant factors are included in the analysis and assessed relative to our core questions, we employed tests of stationarity (Levin, Lin, & Chu, 2002). If a panel is stationary over time, it means the value for the following time point is predictable but not by random error; therefore, no error correction mechanism is needed. We also test the association between both concurrent and lagged versions of independent variables on juvenile arrest rates. Testing these permutations of effects is important as the panel structure of the data may reflect multiple different theoretical mechanisms (see Collins, 2006). In addition to the variation in different juvenile justice inputs over time, there are inevitable phase-in periods with each additional initiative (e.g., Targeted RECLAIM) that may have impacts which take time to set in. At the same time, it is possible that certain changes may occur nearly simultaneously given the degree to which decision-making inputs affect placements, dispositions, and juvenile arrests in an integrated fashion. Considering both lagged and concurrent

independent-dependent variable relationships allows us to test different potential mechanisms underlying aspects of juvenile justice initiatives and juvenile arrest rates in Ohio.

Research Objective 4: Evaluate Costs and Benefits of Initiatives

The final portion of the study focuses on the aggregate costs and benefits of the juvenile justice reform initiatives undertaken in Ohio. This focuses on the broader implications of comprehensive changes to juvenile justice policy and practice in financial terms. The analysis integrates public expenditure data with findings from the other research objectives to offer a basic sense of the possible impacts of these initiatives on public budgets. Specifically, we provide a sense of the relative benefit or cost of these approaches at the state and county-levels (see Roman 2004) through systematic analysis of the standardized costs attached to pre and post-reform placement and treatment patterns (Cohen & Bowles 2010). We utilize those levels as they most closely correspond to the “whose costs?” question, which is of most interest from a policy standpoint (see Cohen, 2000). We integrate relevant findings from previous sections of the report with some measures of cost to analyze the impact.

This section first describes the methods used to obtain and process relevant cost data for the study. We then discuss the measures used and some assumptions associated with them. Finally, we identify the analytic strategy for analyzing that information to draw inferences about the financial impact of recent changes in juvenile justice in Ohio.

Measures

State and Local Expenditures. We relied on multiple sources of data in developing estimates for the Objective 4 analysis. In doing so we tried to be mindful of the different units of analysis at which costs and benefits might accrue. Given that, we utilized state-level expenditure reports to help to establish broader trends in spending associated with the different juvenile justice

initiatives discussed to this point. As a starting point we obtained and analyzed all annual reports and monthly “fact sheet” updates provided by the State of Ohio Department of Youth Services for the years of interest to the study from the agency website (www.dys.ohio.gov/Home/DYS-News).

These reports include services offered by DYS, a listing of DYS facilities and regional offices, and relevant statistics to DYS operations. These statistics include percent of admissions by county, average facility populations by site, average parole population by sites, and an itemized overview of the budget expenditures during the fiscal year. They also provide an itemized budget broken down into seven sections: (1) institutions and private facilities, (2) parole and community corrections, (3) juvenile court subsidies and grants, (4) administrative support, (5) debt services, and capital – physical plant improvements. For the purpose of this analysis, we focus on total fiscal year expenditures, spending on institutions and private facilities, spending on parole and community corrections, and juvenile court subsidies and grants. From there we were able to identify particular spending designations in U.S. dollars by year and category (i.e., Juvenile Court subsidies, DYS Facilities, DYS Parole and Community Supervision). We also consulted relevant Ohio Executive Budgets to determine whether they added details on relevant expenses. We utilize the data drawn from juvenile court sources to establish some per case costs for juvenile court processing. That process is described in the section on Research Objective 3 methods above.

When decisions had to be made about which cost estimates to utilize in our analyses, we opted for dollars from 2014 or later depending on availability. Those were (a) most proximal to the current state of policy and practice in Ohio and elsewhere while (b) still aligning with the estimates that we obtain in other elements of the study in terms of time coverage. Following Henrichson and Galgano (2013) we utilize estimated marginal, per-youth costs wherever possible as they better reflect the amount of dollar increase/decreased experienced for a unit change in

facility population or other community based program referral. This also comports with the use of comparative recidivism rates utilized to estimate placement effects in Objective 2.

Initiative and Programming Costs. We utilize multiple sources to develop potential cost measures for the analysis, which are then utilized to make inferences about relative financial impact at the state level. As with Objective 3, from the standpoint of policy analysis, this helps to identify the potential gains at the level that is likely most pertinent to further adoption and use of available alternatives. Broader costs of DYS custody and alternatives are utilized based on available data and published accounts of those initiatives. Some costs are estimated on a per-participant basis and an average length of service in the study from which the costs were measured. In part we draw on cost estimates from work by the Washington State Institute of Public Policy for some costs (i.e., Probation) (WSIPP, 2018: 187). Although their dollar values likely vary somewhat from those of other states, these values are perceived to be reasonable estimates in previous discussions of juvenile justice reform (National Research Council, 2013). We also use monetary values from a previous study on these initiatives in Ohio (Latessa et al., 2014) to set some cost estimates for RECLAIM and probation expenditures per case. Finally, we utilize cost estimates from our data gathering with juvenile courts in Ohio to set average juvenile court processing costs.

Initiative Effect Size and Weighted Cost/Benefit. The main driver of the cost-benefit comparison is the standardized—and covariate adjusted—size of the difference between DYS placement and community placement. We extract the effect from the Objective 2 analyses and use that to identify the difference in likelihood of commitment for relevant groups. That then allows for an assessment of the degree of anticipated benefit in reducing recidivism associated with particular elements of juvenile justice initiatives. We also utilize more conservative estimate to

consider scenarios where that effect is upwardly biased based on possible unmeasured confounding variables and/or undercounting of commitment in the non-DYS sample (Manski, 2013). This helps in establishing a range of possible cost-benefit estimates that reflect inherent uncertainty in evaluating policy and program effects as well as estimating financial aspects of changes in fairly diffuse initiatives.

This value is then used to develop an estimate of the overall cost(benefit) by integrating dollar amounts from the sources just described with the evaluation of the initiative inherent in the other study objectives. Assuming that C is indexed as cost (benefit), the weighted effect size is p , and the marginal cost is M (Henrichson & Rinaldi, 2014), C is calculated as:

$$C = pM$$

This estimate can then be considered using different comparisons and assumptions to assess potential impacts on cost. They are also aggregated depending on the number and relative proportion of cases that were placed in Probation, RECLAIM, or DYS custody.

Analytic Process for Objective 4

We utilize the cost estimates described above to calculate various summaries of cost and benefit to answer questions about the financial impact of juvenile justice reform in Ohio and possible benefits that might come with expanded buy-in within the state and in others. This involves four stages of analysis. First, we analyze descriptive statistics of pertinent budgetary trends in Ohio juvenile justice to help to offer a sense of how spending contextualize subsequent findings. Then, in the second and third steps, we assess relevant costs and benefits to the state and local agencies in order to consider the impact of these shifts in policy and practice at the levels where they occurred in Ohio. Finally, we present some sensitivity analyses to appropriately qualify conclusions on the basis of the assumptions of the analysis and the uncertainty around the treatment

effect estimates (Cohen, 2000; Henrichson & Rinaldi, 2014). In particular, we substitute the lower bound of the estimated difference between DYS custody and community-based alternatives to estimate financial benefits more conservatively. Due to the nature of cost analysis, the Objective 4 results section incorporates some details on measure development and calculation as particular inputs and outputs are used to arrive at relevant results.

Summary of Methods and Analytic Procedures

As a collective, this set of data sources provides multiple vantage points for trying to understand the activity that has taken place in Ohio's juvenile justice system since 2008. The analysis of randomly selected administrative records first tracked the movement of cases into and out of different placement options over the course of several years. A comparative analysis of a subset of those records then offers insight on the degree to which particular placements were associated with a differential likelihood of recidivism. The Objective 3 analysis then pivots to consider county-level trends in the various inputs and outputs that reflect these changes to the juvenile justice system. Finally, cost measures are used to assess the possible financial ramifications of these changes to juvenile justice policy and practice. Collectively, the components of the research plan amount to an intensive case study of broad juvenile justice trends in Ohio during a crucial period in the system's history, offering insight for stakeholders in the state as well as lessons generalizable to other policy and implementation settings.

RESULTS

We present the relevant results for the four research objectives below. The results are based on comprehensive analysis of the data described in the prior section. The results reflect answers obtained from the main analytic procedures described above as well as different sensitivity checks around model assumptions and potential artifactual findings.

Research Objective 1 Results: Impact on Placement

Table 11 presents an overview of the characteristics of the sample used in the analyses for the first research objective. The subsample consists of 5,478 youth referred to the juvenile court and placed on probation, RECLAIM, Targeted RECLAIM, committed to community-based corrections facilities (CCFs), or committed to DYS facilities between January 2008 and December 2015. The average age at the time of admission was approximately 15 years old (overall SD = 1.75) for all groups except for the DYS group. The average was slightly higher for the DYS youth at 17.07 years old with the smallest standard deviation around the mean (SD = 1.04).

The racial composition of the sample differed across disposition categories. Black/African-American youths make up most of the youth confined in the residential facilities or placed on Targeted RECLAIM programs. Minority youth comprised 24 percent of the probation and RECLAIM samples. Males make up much of the sample across disposition types, but the discrepancy in the distribution is much greater for Targeted RECLAIM and DYS groups. More than 90 percent of the youth are male among these two groups. The OYAS risk levels are also presented below. Youth classified as moderate risk comprise the largest proportion across all disposition groups. High risk youths cover the second largest portion for TR and DYS groups while low risk is the second most prevalent category for probation and RECLAIM groups.

Referral offense was available for a subset of the sample. The composition of most serious offense differed across placements in general. The majority of youth in Targeted RECLAIM and DYS were committed for a violent or property offense. Almost half of youth confined in DYS facilities were violent offenders. In contrast, status and unruly delinquents took up the majority of community sample. The distribution of violent offense and status/unruly categories demonstrated the greatest contrast across groups ($\chi^2=618.7$, $p<.01$, $V=0.36$; $\chi^2=1090.9$, $p<.01$, $V=0.48$). Cases

with a sex offense were disproportionately concentrated in the non-community sample. The general profile of the Targeted RECLAIM sample is closer in nature to DYS when considered relative to other community-based options. This finding is consistent with the purpose of the TR initiative to divert higher-risk felony youth from incarceration. It appears that TR is working to facilitate deinstitutionalization of youth who were otherwise most likely to be committed to DYS based on their profile.

The results of statistical tests of independence confirm the observations made above. As indicated by the last column of the table below, the profile of youth differs across placement types. Youth referred to probation, community-based treatments, and DYS facilities show different characteristics in terms of age, race, gender, and risk level. We incorporate yearly contrasts in the next analysis.

Table 11. Description of Demographic Information and Risk Level by Disposition, 2008 - 2015

Variables	Probation	RECLAIM	TR	DYS	Total	Difference
Mean Age (Standard Dev)	15.41 (1.63)	15.13 (1.83)	15.69 (1.36)	17.07 (1.04)	15.90 (1.75)	F = 592.56** $\eta^2 = .21$
Race (% Black)	24.7%	23.7%	82.6%	72.6%	45.0%	$\chi^2 = 1675.72^{**}$ V = .56
Gender (% Male)	69.5%	64.3%	92.6%	94.0%	77.5%	$\chi^2 = 596.04^{**}$ V = .33
<i>OYAS Risk Level</i>						
Low risk	33.4%	42.7%	21.5%	17.7%	30.8%	$\chi^2 = 240.76^{**}$ V = .22
Moderate risk	59.6%	50.3%	46.0%	40.4%	48.4%	$\chi^2 = 46.15^{**}$ V = .10
High risk	6.9%	5.1%	32.5%	27.8%	15.2%	$\chi^2 = 643.64^{**}$ V = .35
Valid N	1,062	2,121	362	1,908	5,168	
<i>Referral Offense</i>						
Violent	16.6%	13.5%	29.2%	48.6%	25.3%	$\chi^2 = 618.67^{**}$ V = .36
Sex offense	3.0%	2.1%	8.0%	9.5%	4.9%	$\chi^2 = 109.98^{**}$ V = .15
Property	25.9%	26.3%	34.5%	28.1%	23.9%	$\chi^2 = 9.31^*$ V = .04

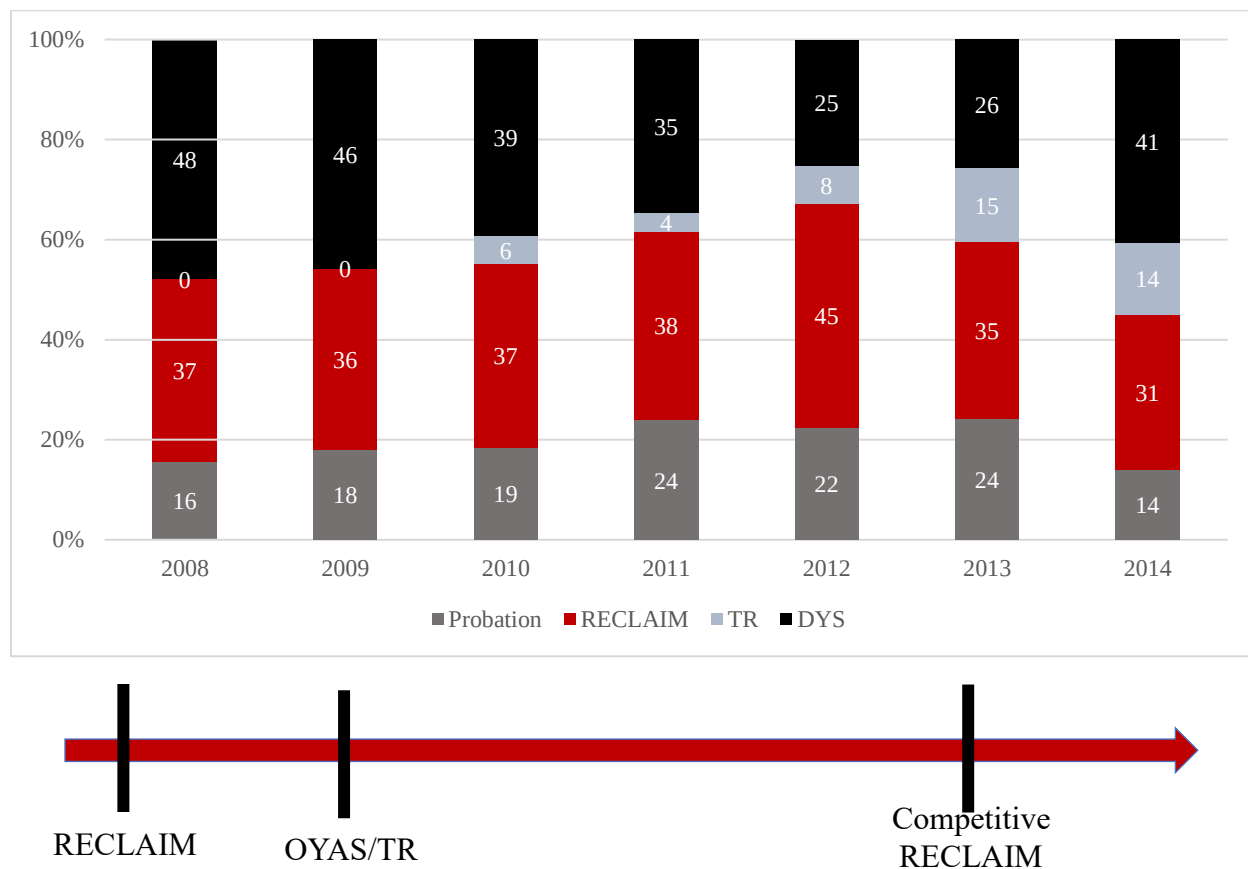
Table 11. Description of Demographic Information and Risk Level by Disposition, 2008 - 2015

Variables	Probation	RECLAIM	TR	DYS	Total	Difference
Drug/Alcohol	8.3%	7.8%	5.7%	3.4%	5.3%	$\chi^2 = 41.27^{**}$ $V = .09$
Status/Unruly	37.5%	43.0%	8.3%	0.0%	19.8%	$\chi^2 = 1090.98^{**}$ $V = .48$
Other	8.6%	7.4%	14.4%	10.3%	8.0%	$\chi^2 = 17.73^{**}$ $V = .06$
Valid N	1,007	1,595	264	1,908	4,774	

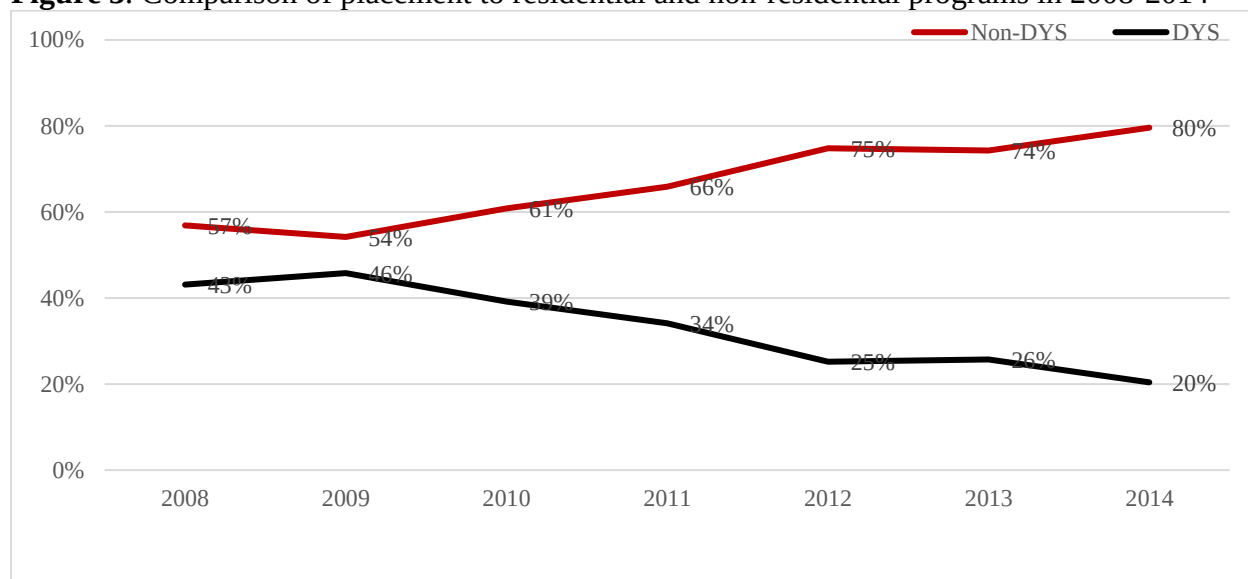
****** $p < .01$, ***** $p < .05$; Valid N is sample size for each analysis based on cases with complete data on both included variables

Impact of reform on placement trends over time

Figure 2 below illustrates the trends of placements over the progression of different initiatives. The stacked bar graphs show the relative composition, in percentages, of cases in the different placement categories in a given year. The arrow under the bar graph represents the timeline of reform. RECLAIM began prior to the study period, followed by the implementation of the OYAS and Targeted RECLAIM in 2010, and Competitive RECLAIM in 2013. There is a general decline in the relative prevalence of DYS commitments in the overall sample of cases as well as increases in the proportion of RECLAIM placements as the reforms progressed. Probation shows a relatively stable makeup around 20 percent over time. The overall variation in the distribution of placements over the years was statistically significant ($\chi^2=46.5$, $df=10$, $p<.01$, $V=0.17$), but low-to-moderate in strength.

Figure 2. Relative (%) Distribution of Placement Types Over the Progression of Reform Initiatives

Next, we present a graph comparing the trend in state residential (DYS) versus community-based placement. To better assess the impact of changes on deinstitutionalization, different types of non-DYS dispositions (e.g., diversion, community-based placements) are collapsed into a single category and are collectively represented by the red line (Figure 3). Compared to the composition of non-residential placement in 2008 (56.9%), the non-residential placement was at 79.6 percent in 2014. In contrast, commitment to DYS, represented by the black line below, decreased by 52.7 percent over six years (43.1% vs. 20.4%). This trend is also statistically significant ($\chi^2=148.37$, $df=6$, $p<.01$, $V=0.17$).

Figure 3. Comparison of placement to residential and non-residential programs in 2008-2014

Comparison of placement outcome relative to risk level over time

Next we examined the placement trends for different risk level groups in more detail. Recall that we should see shifting profiles of risk and disposition over the study term if the “inputs” into this process (i.e., placement and referral decisions) are changing as intended with the policy changes. For example, the prevalence of low risk youth in DYS facilities should decline over these years. It was appropriate to compare the distribution of placement outcomes in the context of risk levels as that was an important corollary variable in the core initiatives in Ohio. We then assessed the overtime placement trends at the low and high ends of the risk level distribution to consider relative shifts over time.

Figure 4 shows the patterns in the likelihood of different placement outcomes for low risk youths over time. The most important trend is the reduction in DYS placement. More than 30 percent of low risk youths were placed in DYS facilities in 2008. That number decreased to ten percent in 2012 as the reform progressed, and remained in single digits thereafter. This portion of cases mostly moved to diversionary, RECLAIM referrals, but the increase in TR placement from

2011 to 2015 is also notable. The composition of TR increased continuously and exceeded that of DYS from 2014 (9.5% vs. 7.3%). Probation was more frequently used in 2015 compared to 2008, but the trend fluctuated somewhat in the intervening years. It does not deviate much from 20 percent in these data after a slight increase between 2008 and 2009.

Figure 4. Relative Trends in Placement Outcomes for Low Risk Youth Over Time

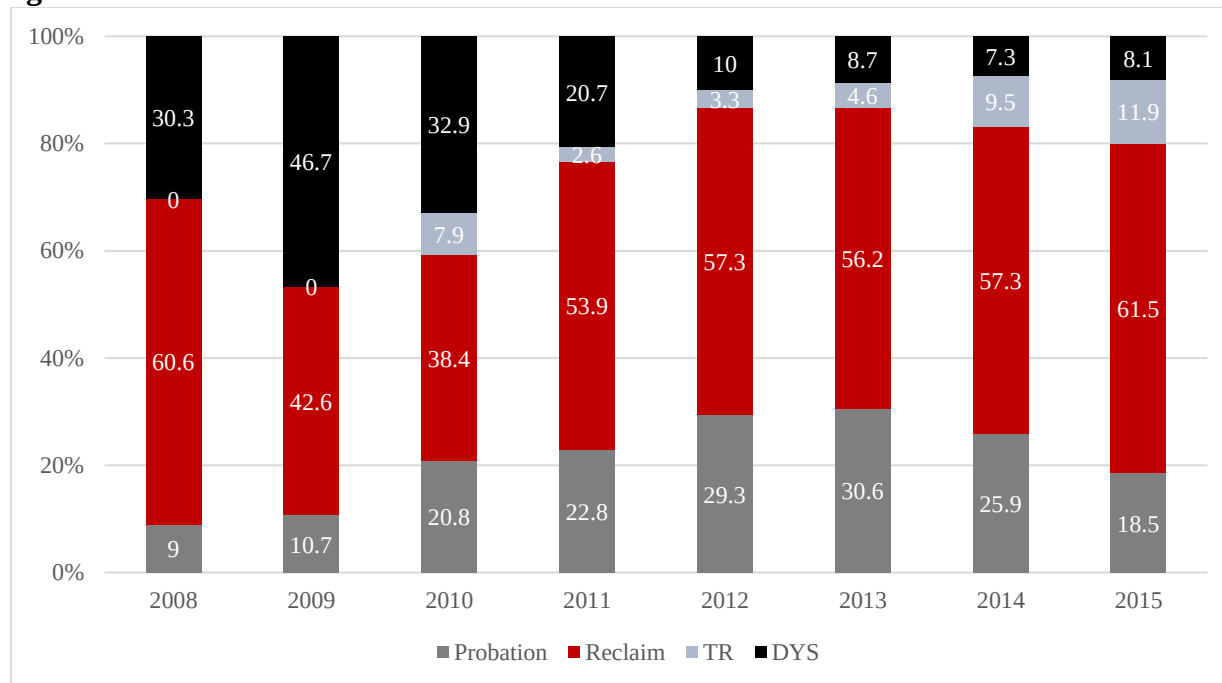


Table 12. Crosstabulation of Admission Year x Placement Outcome Contrasts Among Low Risk

Contrast	Sample size	Uncorrected χ^2	F test Cramer's V
Full contrast (four groups)	n = 2,019	$\chi^2(21) = 180.05, p < .01$	F = 14.43, $p < .01$ V = .32
Without TR (three groups)	n = 1,941	$\chi^2(14) = 149.32, p < .01$	F = 16.59, $p < .01$ V = .37
DYS Commitment vs. Other	n = 1,941	$\chi^2(7) = 120.31, p < .01$	F = 92.38, $p < .01$ V = .51

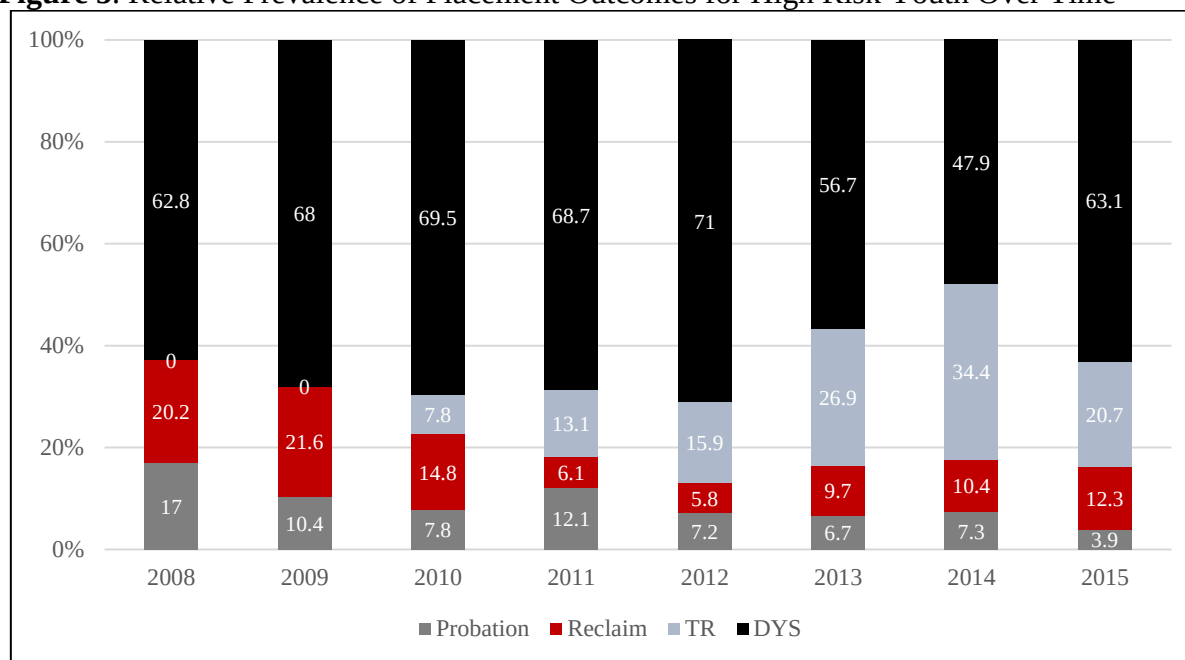
Figure 4 shows that the likelihood of different placement decisions has changed over time among youth who were classified as low risk. A crosstabulation of placement outcome across year of admission was performed with normalized sampling weights. The results of three analyses with different placement contrasts all produced statistically significant associations. The measure of

association indicates that placement outcome for low risk youths changed significantly over time and that relationship was moderate-to-high in strength ($V = .32$ to $.51$) (Table 12). The conclusions were consistent regardless of the contrasts made among subgroups. These results confirm that, as the juvenile justice reform process continued across the years from 2008 to 2015, youth identified as low risk were increasingly less likely to be institutionalized and more frequently placed in various community-based alternatives. This was especially true in the years following 2011 and reflects aggregate shifts in placement patterns.

Similarly, Figure 5 displays the trends in placement outcomes for high risk youths. The change in placement trend is less consistent compared to the trend among low risk youths, which is not surprising as these cases may be more challenging to handle in the context of placement reform (i.e., ideally a nontrivial proportion of youths would be kept in the community but that might depend on the exact nature of the offense and other elements of the youth's history). The most notable change among low risk youths was that DYS placement was replaced largely by RECLAIM dispositions. In contrast, among high youths, there was a slight reduction in DYS placements mostly attributable to Targeted RECLAIM placements. The prevalence of TR placement for high-risk youths started at seven percent in 2010 early in that initiative, increased continuously, and reached a peak of 34 percent in 2014. It should be noted that, even though a reduced portion who were placed in DYS facilities moved to TR initiatives (frequently CCFs), residential placement consistently marks the most prevalent type of disposition for high risk youths (ranges from 56.7% to 71%). Even in 2014, when the DYS disposition had its lowest prevalence, the likelihood of non-residential placement dispositions is below 50 percent. This is not surprising given the nature of these cases, so it is impactful when county courts and partner agencies/facilities develop and use alternatives for at least a portion of those high risk cases.

Almost 40 percent of the high-risk youth were violent offenders, taking up the largest portion among this risk group. More than 80 percent of them were referred to DYS custody and about sixteen percent remained in the community. Although not a large difference, the proportional representation of violent offense cases in DYS custody grew over the time frame of interest (38.3% in 2008, 52.6% in 2013, 41.5% in 2014).

We were also interested in whether the risk profile of DYS youth shifted as Targeted RECLAIM began to partially handle high risk youths. As mentioned above, the “high” risk level covered a sizeable range of risk scores (e.g., can cover 18 to 34 in the most comprehensive tools). Two-way analysis of variance indicated that the average risk score significantly differed across placements and time. That is, the average risk score among high risk youth was greater for the DYS group and this difference became slightly more pronounced over time ($F = 38.321, p < .01$). Although the trends suggest some general risk shifting over time, these results collectively indicate that, proportionately, the profile of residential youth was increasingly higher risk, based on the average score, and comprised of serious offenders as these initiatives progressed.

Figure 5. Relative Prevalence of Placement Outcomes for High Risk Youth Over Time**Table 13.** Crosstabulation of Admission Year x Placement Outcome Contrasts Among High Risk Youths

Contrast	Sample size	Uncorrected χ^2	F test Cramer's V
Full contrast (four groups)	n = 1,164	$\chi^2(21) = 157.14, p < .01$	F = 4.77, $p < .01$ V = .24
Without TR (three groups)	n = 1,046	$\chi^2(14) = 107.48, p < .01$	F = 4.46, $p < .01$ V = .18
DYS Commitment vs. Other	n = 1,046	$\chi^2(7) = 67.27, p < .01$	F = 10.35, $p < .01$ V = .21

The result of the Chi-Square analysis above (Table 13) confirms the relationships and trends in placement outcomes over time portrayed in the bar graph (Figure 5). All contrasts were statistically significant. The strength of association was weaker in general compared to the contrasts made for low risk youths ($V = .18-.24$), however, which reflects relatively more stability in DYS placement for the high risk cases. Nevertheless, the results of formal tests of association—combined with the visual trends—suggest that placement outcomes for high risk youth changed

some over time as these initiatives continued and deepened, but also that the core approach to reserving residential custody for the highest risk cases remains.

Figure 6. Relative Prevalence of Placement Outcomes for Moderate Risk Youth Over Time

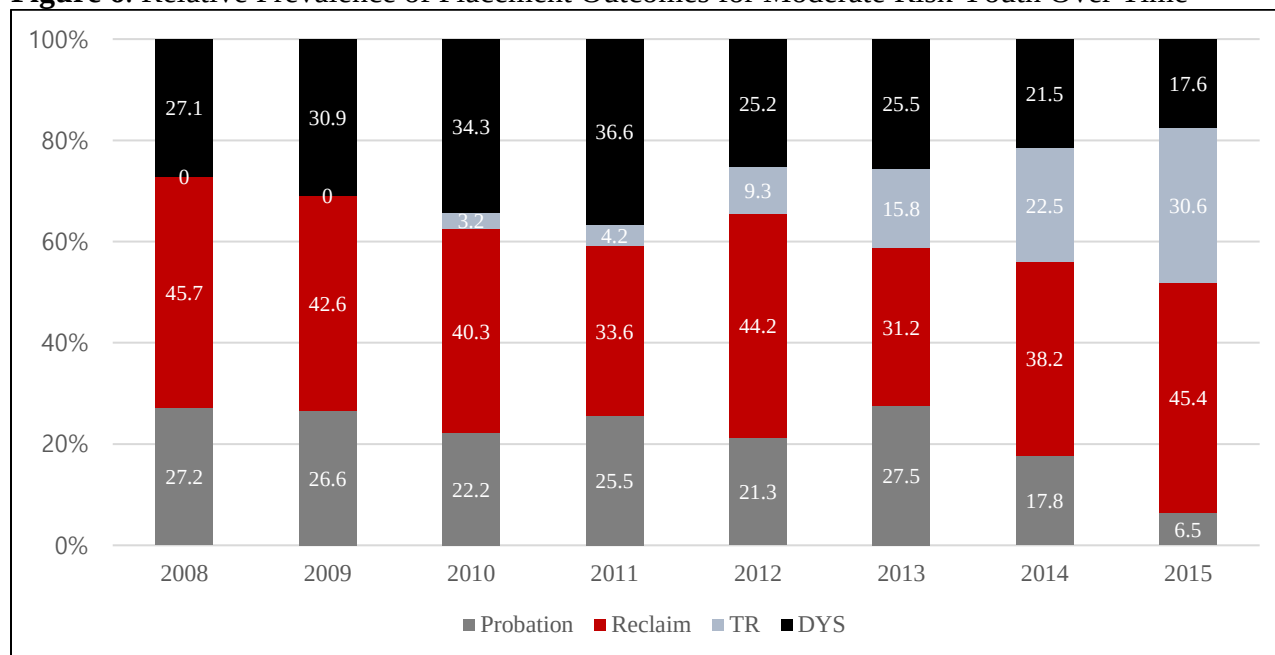


Table 14. Crosstabulation of Admission Year x Placement Outcome among Moderate Risk Youths

Contrast	Sample size	Uncorrected χ^2	F test Cramer's V
Full contrast (four groups)	n = 2,652	$\chi^2(21) = 74.69, p < .01$	F = 5.52, $p < .01$ V = .20
Without TR (three groups)	n = 2,485	$\chi^2(14) = 29.28, p < .01$	F = 3.07, $p < .01$ V = .10
DYS Commitment vs. Other	n = 2,485	$\chi^2(7) = 8.24, p < .01$	F = 5.94, $p < .01$ V = .09

While analysis of trends in the low and high risk cases helps to identify potential changes at the top and bottom of the distribution, we analyzed potential shifts for moderate risk youth as well. The results show a pattern like the high risk group in which greater fluctuations are found among Targeted RECLAIM and DYS placements compared to the other two options. As with the high risk group, the relative growth of Targeted RECLAIM impacted the size of the DYS facility population. This trend is consistent with the aims of the TR initiative toward providing options

higher risk youths. All contrasts were statistically significant, indicating that reform brought about change in the trends of disposition over time among moderate risk youth. However, the magnitude of influence was weaker than in the other two risk populations ($V = .09 - .20$).

Multivariate analyses of the impact of youth characteristics on placement outcomes

These trends are instructive, but do not fully account for other factors that may impact placement decisions. They also do not precisely convey how the trends in risk level and time worked across the observation window. To further consider such questions we estimated multivariate statistical models contrasting the likelihood of the three disposition outcomes: probation, RECLAIM programs, and DYS placement to more formally consider trends in placement over time with greater degrees of control for aspects of individual cases. The key purpose of such analyses is to formally test whether the relative likelihood of dispositional outcomes differ by risk level and admission year while holding other factors constant. The first model contained indicators of OYAS risk levels and year of admission. Interaction terms for risk levels and admission year were introduced in the second model. For the third model, we included demographic variables for the case as controls (i.e., age at the time of admission, youth sex, and race). The final model (model 4) involved interaction terms in addition to risk levels and demographic factors. All models were estimated using multinomial logistic regression with normalized sampling weights. The results for each model are presented in Table 15 below.

Models 1 and 2 examined whether risk levels and admission year influenced the likelihood of disposition outcomes. Coefficients associated with low risk were statistically significant for models contrasting RECLAIM/Probation vs. DYS. Youths identified as low risk were more likely to be sent to RECLAIM programs compared to DYS or probation ($b = .57, p < .01$). However, the likelihood of being placed on probation or being sent to DYS did not significantly differ by risk

level ($b = .16$). Being identified as high risk was significantly associated with an increased likelihood of DYS placement compared to probation or RECLAIM ($b = -1.86, p < .01$; $b = -1.99, p < .01$). It did not, however, differentiate the likelihood of being placed on probation versus RECLAIM. Including the interaction terms significantly improved the model fit ($\chi^2(4) = 140.74, p < .01$). Over time, net of the other controls in the model, youths identified as low risk were increasingly more likely to be put on probation or RECLAIM compared to DYS ($b = .48, p < .01$; $b = .33, p < .01$). In contrast, the effect of high risk did not demonstrate significant change over time when controlling for other covariates.⁸

In Model 3, when demographic variables were introduced, the effects of risk level and admission year were similar to those in the first model. Being high risk was associated with a decreased likelihood of probation or RECLAIM compared to DYS placements whereas being low risk was related to an increased likelihood of RECLAIM against DYS and probation. Controlling for the effects of risk and admission year, youth's age, sex, and race had statistically significant effects on placement decisions. Older, male, African American youths were more likely to be institutionalized compared to probation or RECLAIM in both model 3 and 4.

Interaction terms added in Model 4 significantly improved the model fit ($\chi^2(4) = 73.72, p < .01$). As the juvenile justice reform continued, the relationship between low risk status—as compared to moderate risk—and placement outcomes became stronger over time. Even after controlling for youth's demographic characteristics, low risk status was increasingly associated

⁸ The statistical power to detect interaction effects for high risk youths and time may have been limited because of the lower prevalence of high risk youths in non-residential placements (see generally McClelland & Judd, 1993). For example, the number of cases in each high risk-by-year cell ranges from only 7 to 27 in non-DYS groups. The estimates for the interaction terms in the models below are directionally consistent with expectations for those cases, however, and the evidence shown in Table 13 is also suggestive of that trend.

with greater chance of a non-residential disposition such as probation and RECLAIM programs ($b = .55, p < .01$; $b = .41, p < .01$). As identified above, the proportion of low risk youth with a DYS placement declined precipitously over the study period. As with Model 2, high risk status did not significantly interact with the year of admission. Although being high risk was negatively associated with the chance of probation or RECLAIM relative to residential placement, its effect did not significantly change over time.

The multivariate results suggest that there has been a shift in the placement trends among youth referred to juvenile courts in the time period under study. The role of risk profile was most notable in predicting the placement decision both in its persistent influence and interacting effect. In general, being low risk was associated with a higher likelihood of community-based placement, whereas high risk was associated with higher odds of residential placement. These effects remained significant when other control variables were introduced in the model. The interaction of risk level and admission year was statistically significant for low risk youth, which reflects some shifts in placement over time—even controlling for other relevant variables. We also tested versions of the interaction term models with categorical year indicators in supplemental analysis in order to pinpoint specific effects for risk at particular years. Generally, the trend was linear in that low risk status had an increasingly stronger effect on RECLAIM versus DYS placement. There were some years where the interaction estimate weakened slightly, but the general trend held.

Table 15. Results of Multinomial Logistic Regression Analysis of Admission Year and Risk level

	Model 1 b (se)	Model 2 b (se)	Model 3 b (se)	Model 4 b (se)
Probation vs. DYS				
Low risk	.16 (.09)	-1.62 (.20)**	.10 (.13)	-2.08 (.29)**
High risk	-1.86 (.14)**	-1.32 (.27)**	-1.22 (.16)**	-.95 (.32)**
Admission year	.09 (.02)**	-.03 (.03)	.01 (.02)	-.11 (.03)**
Age at admission	—	—	-.49 (.10)**	-.51 (.11)**
Male	—	—	-1.52 (.15)**	-1.54 (.16)**
Black	—	—	-2.16 (.10)**	-2.12 (.11)**
Low risk by Year	—	.48 (.05)**	—	.55 (.07)**
High risk by Year	—	-.12 (.07)	—	-.05 (.07)
RECLAIM vs. DYS				
Low risk	.57 (.08)**	-.67 (.16)**	.54 (.12)**	-1.10 (.27)**
High risk	-1.99 (.12)**	-1.55 (.23)**	-1.29 (.15)**	-1.14 (.31)**
Admission year	.09 (.02)**	.01 (.02)	.01 (.02)	-.06 (.03)
Age at admission	—	—	-.57 (.10)**	-.57 (.11)**
Male	—	—	-1.68 (.14)**	-1.71 (.14)**
Black	—	—	-2.16 (.10)**	-2.13 (.10)**
Low risk by Year	—	.36 (.04)**	—	.41 (.07)**
High risk by Year	—	-.09 (.05)	—	-.02 (.07)
Probation vs. RECLAIM				
Low risk	-.41 (.08)**	-.94 (.18)**	-.43 (.08)**	-.98 (.17)**
High risk	.13 (.16)	.23 (.32)	.07 (.16)	.19 (.30)
Admission year	.01 (.01)	-.04 (.03)	.01 (.01)	-.04 (.02)
Age at admission	—	—	.07 (.02)**	.07 (.02)**
Male	—	—	.17 (.08)*	.16 (.08)*
Black	—	—	-.01 (.09)	.02 (.09)
Low risk by Year	—	.12 (.04)**	—	.13 (.03)**
High risk by Year	—	-.02 (.07)	—	-.03 (.07)
Pseudo R ²	.07	.07	.24	.25
Wald test	$\chi^2(4) = 140.74, p < .01$		$\chi^2(4) = 73.72, p < .01$	

** $p < .01$, * $p < .05$, $n = 4,805$

Justice system related information, such as past juvenile justice involvement and the nature of a youth's offense, is also expected to impact placement decisions. Previous contact with the juvenile justice system was taken into account in assessing risk, and we included the type of referral offense in the next analysis with a sub sample of 4,208 youths for which valid focal offense data were available (see Table 16). Violent and sex offenses were combined into a serious offense

category (Referred for a violent or sex offense = 1; Other offenses = 0). In the same manner as the models above, the first model included risk level, offense type, and year. Interaction terms and youth demographics were added to subsequent models. Interaction terms significantly improved the model fit in both cases ($\chi^2(6) = 142.58, p < .01$; $\chi^2(6) = 98.14, p < .01$). Substantive findings remained largely unchanged. Being older, high risk, male, and Black was associated with a lower likelihood of community-based placement, and the impact of low risk increased over time both in Model 2 and 4 ($b = .60, p < .01$; $b = .63, p < .01$).

Youth who were adjudicated for serious offenses (i.e. violent and sex offenders) were consistently less likely to be committed to probation and RECLAIM than state residential facilities in all models ($b = -1.90, p < .01$; $b = -2.09, p < .01$). However, the interaction terms for the offense type were not statistically significant, indicating that the impact of serious offense on placement decisions was not all that pronounced.

Table 16. Results of Multinomial Logistic Regression Analysis

	Model 1 b (se)	Model 2 b (se)	Model 3 b (se)	Model 4 b (se)
Probation vs. DYS				
Low risk	.19 (.10)	-1.87 (.24)**	.13 (.13)	-2.23 (.30)**
High risk	-1.83 (.15)**	-1.37 (.29)**	-1.70 (.17)**	-1.32 (.34)**
Serious offense	-1.81 (.09)**	-1.77 (.21)**	-1.99 (.12)**	-1.90 (.25)**
Admission year	.10 (.02)**	-.01 (.03)	.14 (.03)**	.01 (.04)
Age at admission	—	—	-1.16 (.05)**	-1.18 (.05)**
Male	—	—	-1.47 (.16)**	-1.47 (.16)**
Black	—	—	-1.80 (.11)**	-1.12 (.11)**
Low risk by Year	—	.55 (.06)**	—	.63 (.07)**
High risk by Year	—	-.10 (.07)	—	-.07 (.08)
Offense by Year	—	-.01 (.05)	—	-.03 (.06)
RECLAIM vs. DYS				
Low risk	.38 (.10)**	-1.59 (.21)**	.34 (.12)**	-1.94 (.29)**
High risk	-1.88 (.13)**	-1.20 (.26)**	-1.67 (.16)**	-1.11 (.32)**
Serious offense	-2.10 (.09)**	-1.95 (.19)**	-2.28 (.12)**	-2.09 (.25)**
Admission year	.16 (.02)**	.06 (.03)*	.20 (.03)**	.09 (.04)*
Age at admission	—	—	-1.23 (.05)**	-1.24 (.05)**
Male	—	—	-1.63 (.15)**	-1.63 (.16)**
Black	—	—	-1.84 (.11)**	-1.80 (.10)**
Low risk by Year	—	.53 (.05)**	—	.60 (.07)**
High risk by Year	—	-.15 (.06)*	—	-.12 (.08)
Offense by Year	—	-.03 (.05)	—	-.05 (.06)
Probation vs. RECLAIM				
Low risk	-.19 (.09)*	-.28 (.22)	-.21 (.09)*	-.29 (.22)
High risk	.05 (.17)	-.17 (.32)	-.02 (.16)	-.21 (.32)
Serious offense	.29 (.11)**	.18 (.23)	.28 (.11)**	.19 (.23)
Admission year	-.06 (.01)**	-.08 (.03)**	-.06 (.02)**	-.07 (.02)*
Age at admission	—	—	.07 (.02)**	.06 (.02)**
Male	—	—	.16 (.08)	.16 (.08)
Black	—	—	.04 (.09)	.04 (.09)
Low risk by Year	—	.02 (.04)	—	.02 (.04)
High risk by Year	—	.05 (.08)	—	.05 (.08)
Serious Offense by Year	—	.03 (.05)	—	.03 (.05)
<i>Pseudo R²</i>	.14	.16	.34	.35
<i>Wald test</i>	$\chi^2(6) = 142.58, p < .01$		$\chi^2(6) = 98.14, p < .01$	

** $p < .01$, * $p < .05$, $n = 4,208$

Table 17 shows a summary profile that helps to tie together several points from this set of analyses. We descriptively compare the case composition in this random sample of cases, focusing especially on those remanded to DYS custody. While there are relatively few statistically

significant differences in the sociodemographic profiles of those in DYS placement, other relevant variables do show instructive differences in our random sample of cases. Compared to 2008/2009, the average OYAS Risk Score and Risk Levels shift significantly, reflecting moderate-sized differences across the placement alternatives. Although nonsignificant, there is also a small difference in the percent of youth who were in DYS custody for a serious offense, which captures violent or sex offenses, where their relative prevalence was greater at the end of the time period under study. It is notable that the effect sizes are strongest for the risk measures as it suggest a shifting allocation of cases at different risk levels between those early and later points in the study period.

Table 17. Comparison of Characteristics of Youth Referred to DYS at Different Points in Reform

Variables	Characteristics of 2008/2009 Youth	Characteristics of 2014 Youth	Effect size (Cohen's <i>d</i>/<i>Phi</i>)
% Male	91.6%	91.5%	-.01
% Black	75.1%	84.8%	.02
Average Age	16.24	16.80	.16
% Serious Offense	46.7%	54.1%	.02
Average Risk Score	13.67	16.43*	.57*
OYAS Low risk	24.3%	15.1%	-.15**
OYAS Moderate risk	54.3%	41.5%	-.14**
OYAS High risk	21.4%	43.4%	.28**

** $p < .01$, * $p < .05$

Summary of Objective 1 Results

Analyses for Objective 1 largely confirm that perceived shifts in placement trends occurred as anticipated. Formal statistical tests revealed that the series of reform initiatives were effective in reducing rates of institutional placement in Ohio. The relative composition of non-residential placement increased by 22.7 percent while residential placement decreased substantially. Approximately 50 percent of the study sample was placed on community-based alternatives in 2008, compared to almost 80 percent in 2014. Collectively, diversion from DYS facilities occurred to youth across all risk levels over time to some degree. The effect of risk in

determining placement decisions was statistically significant even after relevant characteristics of youth and the timing of the reform were controlled. Being low or high risk was consistently associated with non-residential and residential placements, respectively. As the initiative matured, low risk youth were increasingly likely to be placed on community-based treatments. Following the reforms, youth were generally more likely to be placed appropriately relative to their risk level. The profile of offenders has slightly shifted that the youth committed to DYS in the later point of the reform contained greater composition of high risk, serious offenders with higher OYAS scores.

Research Objective 2 Results: Relative Effectiveness of Alternative Placements

Research Objective 2 sought to compare the effectiveness of the different placements just discussed in reducing subsequent offending. Stated differently: what do those placement trend shifts mean in terms of impact on individual outcomes? Recidivism information was available for roughly half of the cases in the sample used for the Objective 1 analysis (50.7%). Table 18 below describes the characteristics of the sample. The subsample includes 2,855 youth supervised on probation, referred to RECLAIM programs, or placed in DYS facilities. The Targeted RECLAIM sample was not analyzed independently in the same way as the other groups due to its insufficient sample size for matching. The composition of youth across groups was largely similar to the total sample (see Objective 1 descriptive statistics).

The DYS cases tended to be older, included more male and minority youths, and consisted of more serious offenders and higher risk cases compared to the other groups in the analytic sample. The last column of the table presents tests and measures of association for the relationships between key variables and DYS commitment for a new offense. Age, minority status, male, referred for a serious offense, and risk levels were significantly related to an increased likelihood of re-commitment to DYS. Their measures of association range from .03 to .22, which are weak

to moderate in strength. We include these variables in the matching and modeling process to control for their impact on recidivism in our sample.

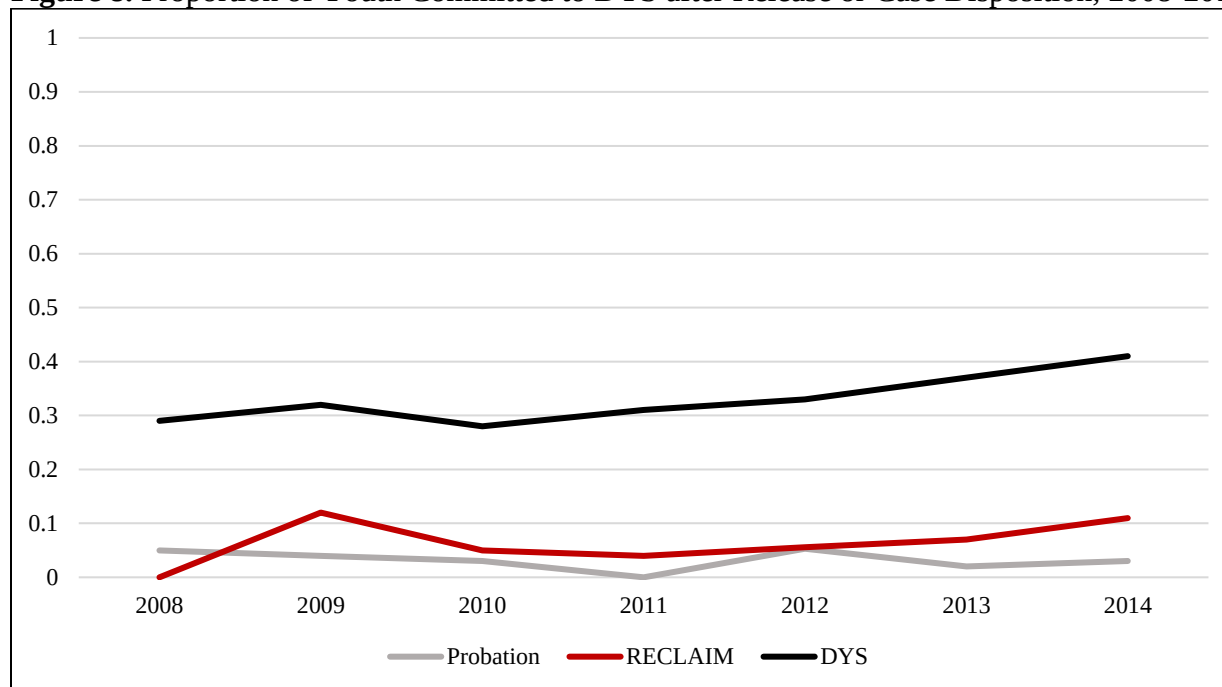
Table 18. Description of Analytic Sample and Bivariate Relationship with Recidivism

Variables	Probation	RECLAIM	DYS	Relationship with New Commitment to DYS
Average Age	15.32	15.20	17.08	$t = 6.56^{**}$
Gender (% Male)	62%	64%	94%	Cohen's $d = .03$ $\chi^2 = 71.8^{**}$ $\Phi = .16$
Race (% Black)	.30%	30%	73%	$\chi^2 = 96.5^{**}$ $\Phi = .18$
Serious Offense	17%	17%	58%	$\chi^2 = 6.6^{**}$ $\Phi = .05$
<i>OYAS Risk Level</i>				$\chi^2 = 127.3^{**}$ $V = .22$
Low risk	37%	44%	21%	
Moderate risk	58%	49%	47%	
High risk	5%	7%	32%	
Valid N	339	564	1,908	2,780

$^{**}p < .01$, $^{*}p < .05$; Valid N is sample size for each analysis based on cases with complete data on both included variables

Proportion of youth committed to DYS for a new offense

First, we compared rates of re-commitment to DYS facilities without accounting for different characteristics of youth in relation to placement type. We present a line graph comparing the recidivism of youth on different placements below. As described in the measures section for Objective 2, new commitment to DYS or an Adult Prison facility is used as the indicator for recidivism. The proportion of youth who were committed to residential facilities as a result of a new offense after being released from each program was calculated. Overall, the new or repeat commitment rate is higher for the DYS youths compared to the groups received community alternatives represented by the red and grey lines (Figure 8). The rates were significantly different across groups ($F = 12.72$, $p < .01$), but the magnitude of difference did not change significantly over time. Approximately 30 to 40 percent of DYS youth returned to the facilities whereas the recidivism rates were much lower in this community sample.

Figure 8. Proportion of Youth Committed to DYS after Release or Case Disposition, 2008-2014

Comparative analysis of different placements using propensity score weighting

The tables and accompanying text below present a series of matching and regression results associated with the second research objective. A total sample of 2,855 cases was available for this statistical modeling, although this was subject to some item-level missingness in certain analyses. The first step of this analytic process was to obtain appropriate propensity score weights to maximize the balance in key covariates across groups. All models converged within the maximum number of iterations (5,000) suggested by McCaffrey et al. (2013). Standardized bias and Kolmogorov-Smirnov (KS) statistics were substantially reduced as a result of applying the weights produced in the estimation process.

Six sets of weights were produced using the Generalized Boosted Regression Modeling (GBM) approach and were applied to each potential outcome (Table 19). The first part of the table displays the means of RECLAIM and Probation youth adjusted to approximate the characteristics

of the DYS youth. Compared to the unweighted means in the descriptive table above and the first column, the weighted means of RECLAIM youth have become closer to the DYS group. The average age of admission and composition of low risk youth among RECLAIM have been adjusted to the extent that the two groups do not statistically differ after weighting (standardized difference = -.02, -.26). Other covariates differed after applying the weights, but the weighting process resulted in substantially reductions in the baseline differences between the two groups. This is evident in the closer proximity in each weighted estimate mean value relative to the RECLAIM or Probation mean in the set of unweighted estimates.

Table 19. Unweighted and Weighted Means, and Standardized Differences of Matched Variables

	Unweighted Means		Weighted Estimates	
	DYS	RECLAIM	REC to DYS	Std. Diff
Age at admission	17.08	15.20	17.09	-.02
Male	.94	.64	.85	.40**
Black	.73	.30	.54	.41**
Serious offense	.58	.17	.38	.40**
OYAS Low risk	.21	.44	.31	-.26
OYAS High risk	.32	.07	.16	.36**
N or Adjusted Sample size	1,908	564	66	---
	DYS	Probation	Prob. to DYS	Std. Diff
Age at admission	17.08	15.32	16.20	.83**
Male	.94	.62	.84	.42**
Black	.73	.30	.62	.24
Serious offense	.58	.17	.43	.32*
OYAS Low risk	.21	.37	.31	-.25
OYAS High risk	.32	.05	.16	.35**
N or Adjusted Sample size	1,908	339	51	---
	RECLAIM	Probation	Prob. to REC	Std. Diff
Age at admission	15.20	15.32	15.17	0
Male	.64	.62	.64	0
Black	.30	.30	.30	-.02
Serious offense	.17	.17	.17	-.01
OYAS Low risk	.44	.37	.43	.03
OYAS High risk	.07	.05	.05	.07
N or Adjusted Sample size	564	339	319	---

** $p < .01$, * $p < .05$

These covariate-driven weighted data were then used to estimate the outcome if the youths from one group were instead placed on an alternative disposition. For example, the estimates in the first column represent the adjusted means of RECLAIM youth to match the profile of DYS youths, and these were used to estimate the effect of the counterfactual case of RECLAIM youth

who had instead been placed in DYS facilities. The Probation and RECLAIM groups in the bottom rows were more similar before matching, but differences were minimal at each point.⁹

Next, the treatment effects were estimated as the difference in the treatment and weighted comparison group means. The goal was to weight the comparison group and then examine whether the treatment effect significantly differs from zero among similarly-situated cases. The effects were estimated by fitting the regression model with the treatment group indicator predicting incarceration along with the covariates that remained unbalanced. Different sets of covariates achieved balance in the previous step and were included in the regression model. This ensured we obtained “doubly robust” estimates of the treatment effect in that the impact of covariates was adjusted for twice in the process (Bang & Robins, 2005). In addition to unbalanced covariates, we included the admission year in the models to both control for timing during the period of study and also as a control for “time at risk” for recidivism. Although the time window for the study allowed for a minimum of a one-year follow up period for all cases in the sample prior to data collection, it was nevertheless necessary to account for the differential time each youth had to recidivate. A series of dummy variables indicating the year of admission was included in the regression models to control for differential follow-up periods. Here we present the results of models contrasting the DYS placement against community-based options (Table 20). All treatment effects, indicated in bold text, were statistically significant.¹⁰ The sample sizes reflect the pooled sample sizes for

⁹We present these estimates here for comprehensiveness, but our main interest is in comparing DYS custody to the other two conditions.

¹⁰Sixteen percent of the Targeted RECLAIM sample was committed to DYS during the follow-up period. Yearly rates ranged to 24 percent in 2013. General recidivism as well as the rates of individual years were lower than DYS youth, but relatively higher than the RECLAIM and Probation samples. All youths placed on Targeted RECLAIM received CBT-based treatments. Multisystemic therapy and Thinking for a Change (T4C) were the most frequently used treatment programs. The profile of youth who recidivated after

comparison across the respective ATT estimation processes (i.e., RECLAIM vs. DYS, Probation vs. DYS).

Table 20. Results of Treatment Effects Using Doubly Robust Estimation Predicting New Commitment

	(1) DYS to RECLAIM b(se)	(2) RECLAIM to DYS b(se)	(3) DYS to Probation b(se)	(4) Probation to DYS b(se)
Treatment indicator	.26 (.03)**	-.24 (.04)**	.24 (.05)**	-.30 (.04)**
Age at admission	---	.01 (.01)	-.02 (.01)	-.02 (.01)*
Male	.10 (.03)**	.03 (.03)	.15 (.04)**	.01 (.02)
Black	.05 (.02)*	.03 (.02)	---	.07 (.03)**
Serious offense	-.06 (.02)**	-.03 (.03)	-.07 (.02)**	-.03 (.03)
OYAS Low risk	---	-.10 (.02)**	---	-.10 (.02)**
OYAS High risk	.08 (.03)**	.05 (.04)	.10 (.03)**	-.02 (.03)
Admitted in 2009	.03 (.03)	.10 (.04)**	.01 (.04)	.02 (.04)
Admitted in 2010	-.04 (.03)	.02 (.03)	-.04 (.04)	-.01 (.03)
Admitted in 2011	-.01 (.03)	.08 (.04)*	-.01 (.04)	-.01 (.03)
Admitted in 2012	.01 (.04)	.09 (.04)*	.01 (.05)	.06 (.04)
Admitted in 2013	.07 (.05)	.16 (.05)**	.05 (.05)	.04 (.04)
Admitted in 2014	.06 (.05)	.16 (.04)**	.09 (.06)	.05 (.03)
Admitted in 2015	-.01 (.04)	.05 (.03)	.01 (.06)	.03 (.05)
<i>Pseudo R²</i>	.10	.16	.10	.21
N	2,138	2,138	1,960	1,956

** $p < .01$, * $p < .05$; b=estimate of average treatment effect on treated (ATT); standard error of the estimate in parentheses

Average Treatment Effect for the Treated (ATT) estimates are calculated by taking the adjusted difference between the treatment effects of youth who actually received the treatment and the ones who received an alternative (Table 20). The difference between RECLAIM and Probation cases relative to those treated in DYS was statistically significant and of moderate size, with DYS cases having a roughly .26 difference in the proportion of cases later placed in DYS. These results indicate that some DYS youths—who were weighted to be like RECLAIM youths— would have

Targeted RECLAIM placement tended to be moderate risk (36.8% vs. RECLAIM = 62.9%; DYS = 46.7%) and serious offenders (44.4% vs. RECLAIM = 8.8%; DYS = 53.0%).

had less chance of incarceration if they were placed in the community instead. Conversely, the effects of residential placement for the youths who were actually kept in the community are positively and significantly related to increased chances of incarceration. This suggests that committing the youths who are typically treated in the community could lead to greater chance of incarceration and vice versa. The difference in the treatment effects are greater in the weighted analysis compared to the raw difference in the unweighted sample. The relative impact of residential placement on recidivism was associated with an increased likelihood of recidivism at the univariate level, and was greater when relevant covariates were added.¹¹

Comparison of Recidivism and Treatment Referral

Table 21 shows an overview of treatment and other designations for the different groups assessed to this point in the study. As mentioned in the measures section, these data were limited in terms of the number of cases for which we were able to retrieve information and also in the level of detail provided. For example, roughly 10 percent of DYS cases had information on programming as those were not collected until late in the study period. Additionally, as in the case of probation, the designations were not necessarily definitive or inclusive of multiple intervention types.¹²

The profile of cases in Table 21 helps to add context to the results above as it provides a sense of the distribution of programming received by the community groups. Recall that DYS data

¹¹There is apt to be county-level variation in placement patterns, available programming, supervision intensity, and data retrieval. Therefore, we estimated multivariate models using county-level fixed effects in order to add an additional layer of control for those sources of variation. The results of that modeling process suggest that the statistically significant, elevated level of recidivism among youths placed in DYS versus community-based placements held after accounting for county effects.

¹²DYS cases could have more than one treatment type designation and therefore their entries do not sum to 100 percent in Table 21.

were only available for a portion of the study period and therefore this is an incomplete picture of the treatment and other programming received by those youths. The general “supervision” designation was used in 75 percent of probation cases, which reduces insight on specific programming. The RECLAIM group predominately consisted of diversion cases (47%) followed by CBT (22.2%) and mental health treatment/counseling (11.3%).¹³ Recognizing that many low and moderate risk youths will not even be considered for DYS placements, this suggests that youth in those community-based placements are successful for a variety of different reasons based on varying exposure to programming. Therefore it is difficult to point to one particular program that drives the comparative differences observed between DYS youths and those in the other study groups. The positive results seem to come from generally finding the right approach for a variety of justice-involved youths.

Table 21. Overview of Program Referral Patterns.

Program Type	Probation	RECLAIM	Targeted RECLAIM	DYS
Cognitive Behavioral Therapy (CBT)	17.1%	22.2%	100.0%	82.7%
Mental Health/Counseling	3.6%	11.3%		46.0%
Substance Abuse	1.9%	6.2%		60.9%
Supervision	75.0%	2.4%		---
Diversion	0.5%	47.0%		---
Community Service/Restitution	1.7%	9.2%		---
Other	0.7%	1.7%		---
Valid N	416	793	143	202

Comparability of the Objective 2 and Objective 1 samples

The representativeness of the sample used for Objective 2 analysis informs the degree to which the results generalize to our sampling frame, which was the population of cases processed and assessed in Ohio juvenile courts and in DYS custody between 2008 and 2015. The

¹³All Targeted RECLAIM cases had CBT by virtue of the program definition.

comparisons in Table 22 below assess that question to determine whether nonresponse on the part of local courts and/or missing data on particular measures (e.g., recidivism) may impact our inferences. The analysis below suggests that there are some significant differences between the cases that we analyzed for Objective 2 and the larger random sample of cases from the sampling frame used for Objective 1—particularly among the RECLAIM and probation cases. In all cases for the larger sample, the differences suggest that the analytic sample comprises youth with higher risk levels and more serious referral offenses than the 5,478 cases that were drawn randomly from the sampling frame. While those differences were relatively small, they suggest that the analytic sample was somewhat higher risk than the initial draw from the OYAS system (e.g., proportionally more high risk and violent cases). This means that the comparative findings just discussed should be applicable to the population of youth in Ohio’s juvenile justice system during the time frame under study—especially given that the focus is on recidivism via commitment to DYS custody.

Table 22. Comparison of Analytic and Full Sample to Assess Representativeness of Estimates

Variables	Probation sample		RECLAIM sample		Total sample	
	Analytic	Full	Analytic	Full	Analytic	Full
Average Age	15.32	15.36	15.17	15.00	16.47	15.90
Race (% Black)	.30*	.23	.29**	.22	.59	.45
Gender (% Male)	.62**	.73	.64	.64	.84	.78
<i>OYAS Risk Level</i>						
Low risk	.36	.32	.44	.43	.28	.32
Moderate risk	.58	.60	.49	.52	.49	.51
High risk	.05	.07	.06	.05	.23	.16
<i>Referral Offense</i>						
Violent	.15	.17	.14	.13	.38	.29
Sex offense	.02	.03	.02	.02	.07	.06
Property	.23	.27	.24	.27	.27	.27
Drug/Alcohol	.06*	.09	.08	.08	.05	.06
Status/Unruly	.45**	.34	.43	.43	.13	.23
Other	.09	.09	.07	.07	.07	.09
Valid N	321 – 339	686 – 728	505 – 565	1,090 – 1,575	2,776 – 2,855	4,774 – 5,478

** $p < .01$, * $p < .05$

Summary of Objective 2 Results

The results for Objective 2 suggest that youths who received community-based treatments had a lower likelihood of recidivism than those placed in institutional placements. A greater proportion of institutionalized youth was subsequently committed to DYS across all years of the study period compared to non-institutional placements. When adjusting for relevant covariates to produce weighted samples of similarly-situated cases, there was a moderate-sized difference between those groups (0.25 on a scale from 0 to 1.0). In part using a counterfactual comparative framework, the results indicated that youth who were actually treated in the community settings would fare worse had they been committed to DYS facilities instead. There were no differences when looking at possible interactions with different years of juvenile justice involvement suggesting a fairly consistent effect over time. The group differences held after an additional layer of control was added in the estimation process, including covariates for year at which the youth was involved in the juvenile justice system as well. This suggests that the initiative to divert certain profiles of youth to community was successful in terms of reducing the chance of their subsequent commitment to residential facilities. We also see that youths in the RECLAIM and other community-based intervention groups had a variety of “programming types,” including cognitive behavioral therapy and needs-based services. The data for DYS youths only captured the latter part of the observation window and therefore that could not be comparatively assessed in the same manner as the other samples. Still, the findings suggest that the positive results for the community-based intervention group are likely attributable to an array of different referral or supervision types—including the diversion of some youth from the system altogether.

We were limited to a sub sample and one definition of recidivism in these analyses. Nevertheless, the sensitivity analysis indicated that the analytic sample was not very different from

the full sample and it tended to be higher risk and more serious when differences occurred. This suggests that—in addition to the differences in placement trends over time from the Objective 1 results—the reform redistributed placements toward strategies that tend to produce lower recidivism rates. These results pertain to individual cases; we also considered some county and state-level trends.

Research Objective 3 Results: Impact on Community-Level Juvenile Crime Rates

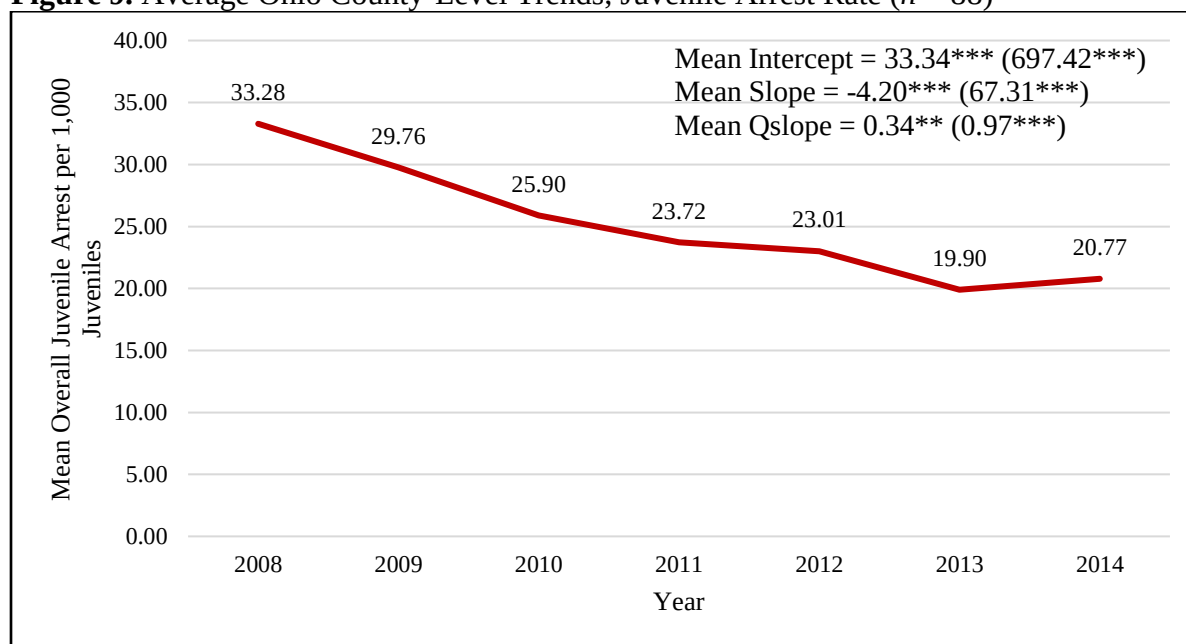
Research Objective 3 moves the focus of analysis from delinquency cases to the county level in order to assess the degree to which there are relationships between the shifts in juvenile justice initiatives associated with recent reforms and juvenile crime rates (as commonly measured and discussed in policy with official arrest rates). The assessment of trends also lends some insight about these shifts over time and formally attaches some hypothesis tests around their degree of change/stability and variation across counties.

Analysis of County Level Juvenile Justice and Crime Trends

Describing trends over time offers a place to start in assessing the impact of changes that emerged with juvenile justice reforms. If the reform had any deleterious or beneficial impact we should expect that as certain time-based indicators, which reflect the reforms, change, so too will juvenile arrest rates. For example, the proportion of adjudicated youths committed to facilities after being adjudicated delinquent might be related to juvenile arrest rates in the subsequent year. If the justice initiative indicators have unintended consequences that harm public safety, we would expect increased crime rates as the reforms were further implemented. Alternatively, a null effect or inverse relationship would suggest that there was no effect—or even an improvement in public safety as the reforms were implemented.

We begin with the univariate trends in each of the relevant variables. As shown in Figure 9, the total juvenile arrest rate in Ohio counties decreased from 2008 to 2014. Due to the slight uptick in total juvenile arrest rate in 2014, the latent growth curve model includes a quadratic slope term. The average slope in total juvenile arrest rate was -4.20, a significant decrease. The average slope of the uptick in the total juvenile arrest rates was 0.34. There was statistically and substantively significant variation in initial arrest rates and over-time trends between counties ($\phi_a^2 = 697.42$, $\phi_\beta^2 = 67.31$). There was significant variation in counties for the quadratic slope as well ($\phi_{\beta_q}^2 = 0.97$). Further, significant covariance between the intercept, slope, and quadratic slope were detected. This suggest a relationship between counties' initial juvenile arrest rate (2008) and their pattern of arrest rates over time.

Figure 9. Average Ohio County-Level Trends, Juvenile Arrest Rate ($n = 88$)

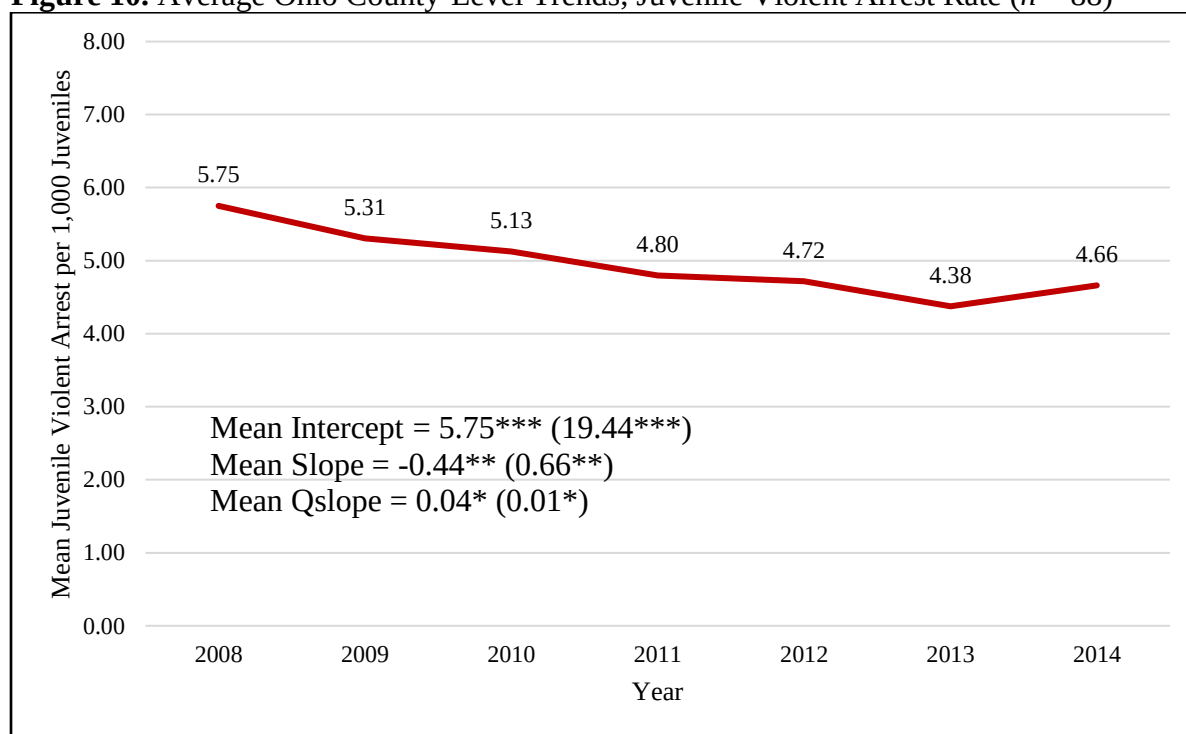


Notes: Variance presented in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Similarly, the violent juvenile arrest rate decreased from 2008 to 2014 (see Figure 10). The average slope in juvenile violent arrest rates was -0.44 with significant variation between counties

($\varphi_{\beta}^2 = 0.66$). To compare the variance to the mean, we can take the square root of the slope variance, $\varphi_{\beta} = 0.81$. This indicates substantial variation in the average slope of juvenile violent arrest rates across counties from 2008 to 2014. Due to the uptick in juvenile violent arrest rates in 2014, a quadratic term was added to the latent growth curve model. The average quadratic slope equaled 0.04 — a small, but statistically significant increase ($\varphi_{\beta_q}^2 = 0.01$). Significant covariance was found in the intercept and slope relationship, and the slope and quadratic slope as well. No evidence of covariance between the intercept and quadratic slope was detected.

Figure 10. Average Ohio County-Level Trends, Juvenile Violent Arrest Rate ($n = 88$)

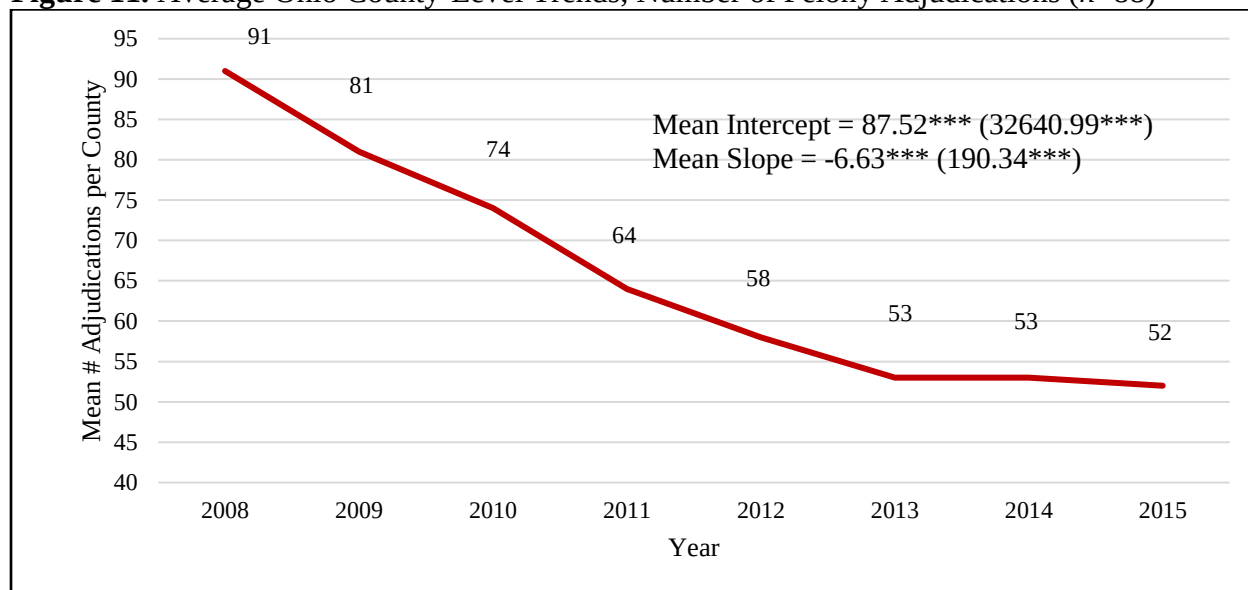


Notes: Variance presented in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The decreases in the juvenile arrest rates (total and violent) in counties coincided with a decrease in the average felony adjudications and commitments of youth across counties as well. As shown in Figure 11, from 2008 to 2015 the average number of juveniles adjudicated for a felony offense decreased. For adjudications, the average slope, was -6.63, which is a statistically

significant linear decline. The variance in the slopes of adjudications were large, 190.34 ($\phi_\beta = 13.80$), indicating the trends in adjudications from 2008 to 2015 varied across counties.

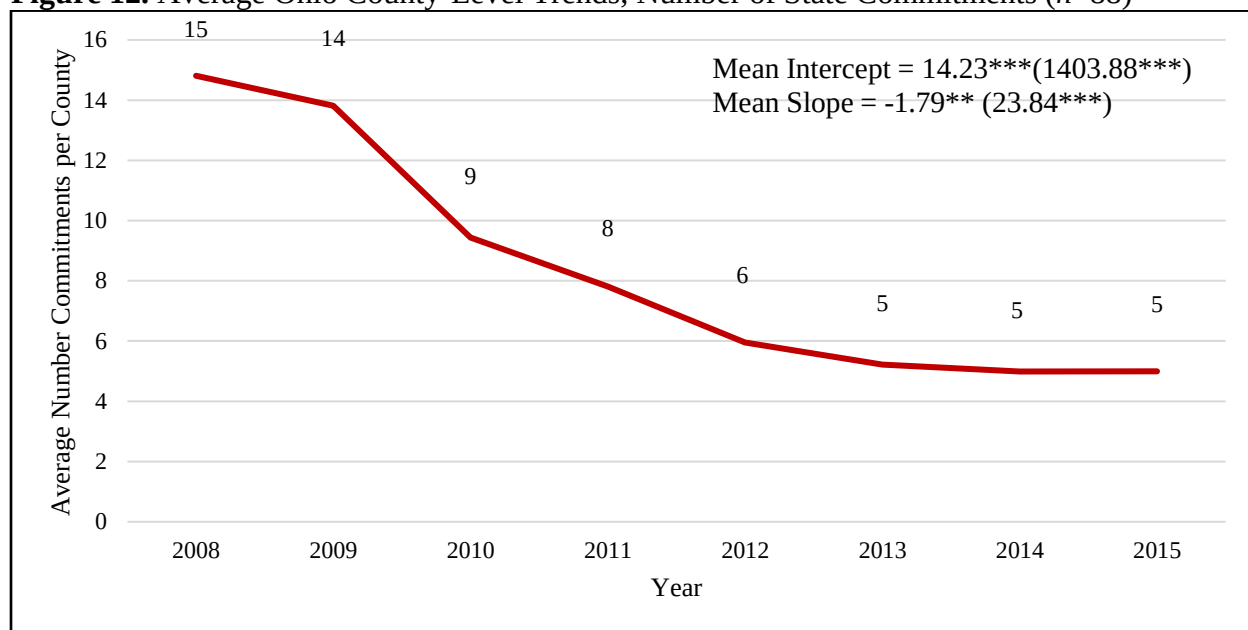
Figure 11. Average Ohio County-Level Trends, Number of Felony Adjudications ($n=88$)



Notes: Variance presented in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 12 presents the average decline in commitments to DYS facilities from 2008 to 2015.¹⁴ For commitments, the average slope equaled -1.79, which was significantly different than zero. The variance in slopes across counties equaled 23.84 ($\phi_\beta = 4.88$), a considerable amount of variation given the mean slope. In short, both adjudications and commitments in Ohio decreased significantly from 2008 – 2015 and there was significant between county variation in those trends.

¹⁴Where possible we utilize raw values in these plots and accompanying tests in order to maximize compatibility with the latent growth modeling aspect of the trend analysis. We later standardize measures for use in multivariate models where appropriate.

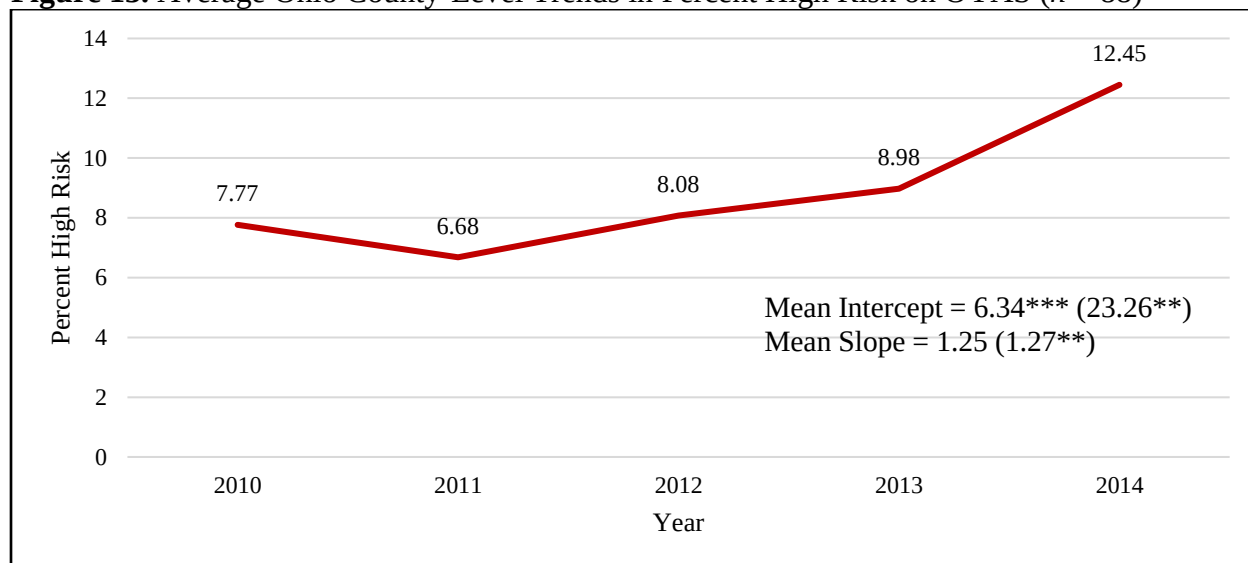
Figure 12. Average Ohio County-Level Trends, Number of State Commitments ($n=88$)

Notes: Variance presented in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

While these trends reflect important aspects of juvenile justice reform efforts, others more formally index those policy and programmatic changes. As shown in Objective 1, the change in aggregate risk levels of youth processed in county juvenile courts may also result from these reforms. The average percentage of youth assessed as high risk in counties is depicted in Figure 13. From 2010 to 2011, the average percent of high-risk youth assessed in Ohio counties decreased slightly. After 2011, the average percent of high-risk youth in a county increased through 2014, offering some indirect evidence of a lack of net-widening in conjunction with these initiatives. As shown in the mean and variance estimates for the intercept, the between county differences in the starting point of counties were statistically significant. There was also a relatively small, but

statistically significant upward trend during this time period zero ($\mu_{\beta_q} = 1.25$). That trend varied significantly across counties, however.¹⁵

Figure 13. Average Ohio County-Level Trends in Percent High Risk on OYAS ($n = 88$)



Notes: Variance presented in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

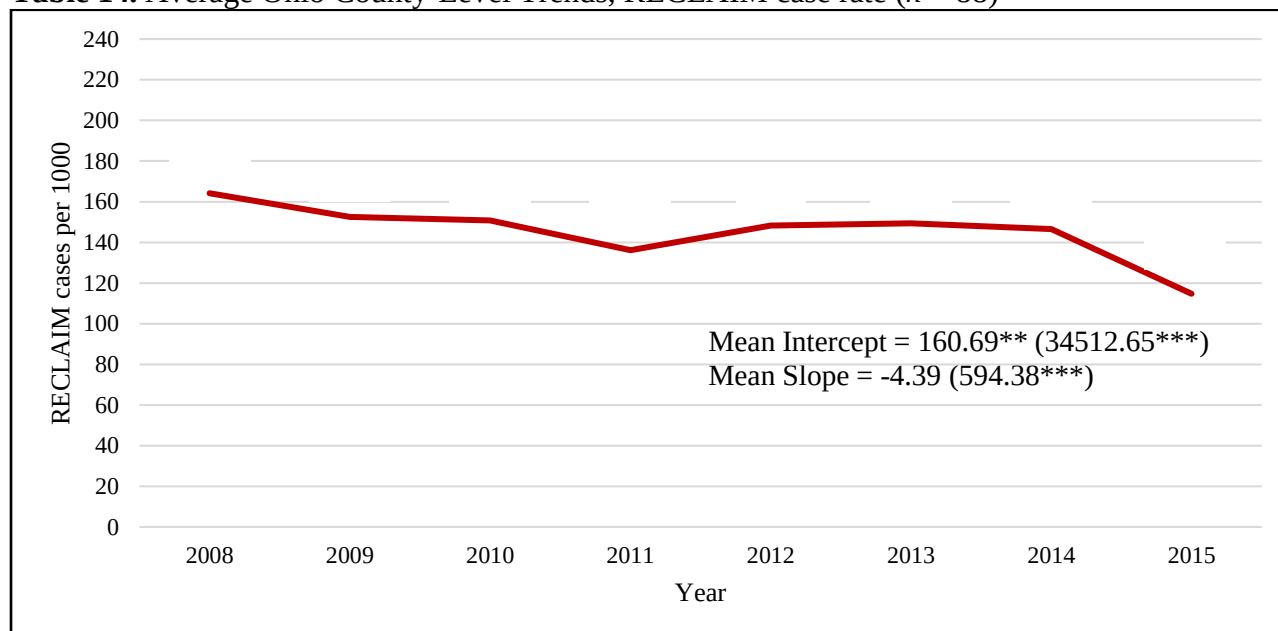
RECLAIM cases per 1,000 youth on a juvenile court caseload generally decreased from 2008 to 2015 (see Figure 14). There was a slight uptick in the average number of RECLAIM cases per 1,000 delinquency cases in 2012. However, after 2012 the average number of RECLAIM cases per county decreased slightly, which is consistent in direction with other trends shown above. The latent growth curve model accompanying this trend suggests that there was, on average, about 160 RECLAIM cases per 1,000 in this sample of juvenile courts. The variance around that starting level was statistically significant. The model results suggest a fair degree of stability over the time period as the slope ($b = -4.39$) was not significantly different from zero.¹⁶ The variance component

¹⁵The model was re-estimated without 2014 data to account for the possibility that an outlier year may have affected the overall trend. The statistical estimates do not change, nor do the substantive conclusions.

¹⁶Lower rate of RECLAIM in 2015 may in part reflect partial data for those cases in that year.

suggests that the over-time trend in RECLAIM cases differed significantly across the 88 counties, however.

Table 14. Average Ohio County-Level Trends, RECLAIM case rate ($n = 88$)

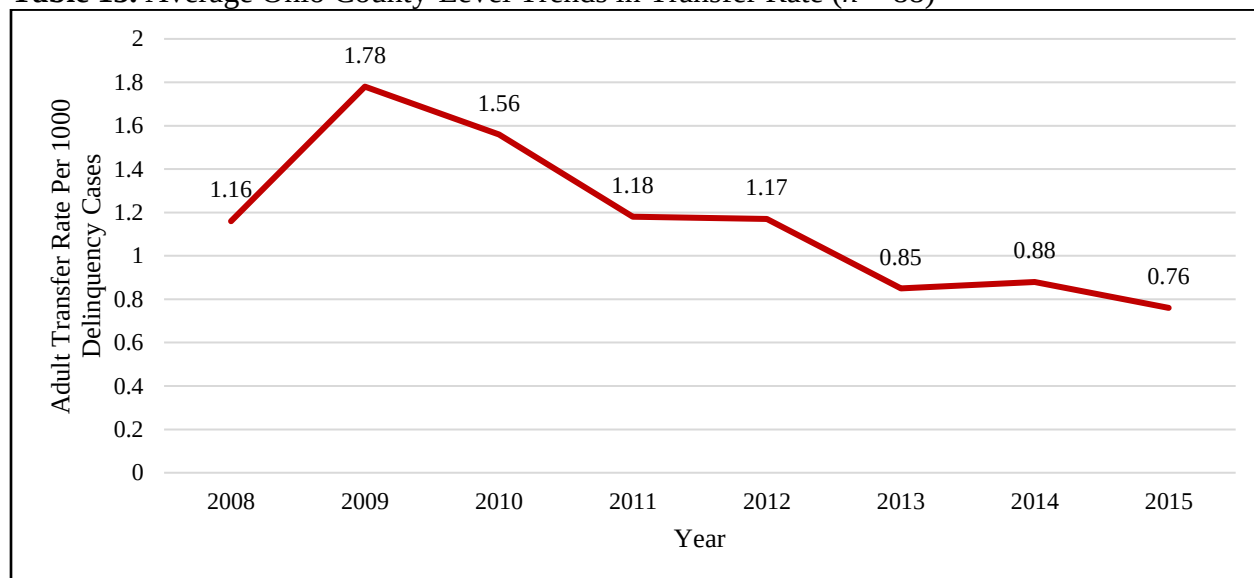


Notes: Variance presented in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Two ancillary justice initiative measures, juvenile transfer rate and juvenile court budget, are accounted for in Objective 3 analysis. As shown in Figure 15, the average transfer rate for counties in Ohio increased from 2008 to 2009, but decreased each year from 2009 to 2015. This suggests that changes in DYS commitments did not emerge due to greater levels of transfer to adult court. If it played a role, such evidence would counteract the notion of using the “least restrictive alternative” in placement reform. Visually we see an average decrease over time, although there is some variation evident. There was limited variation in the dependent variable in this case, which was a count, because of the prevalence of zeros (>60% in all years). We therefore estimated an alternate growth curve model using a zero-inflated count distribution (Lambert, 1992) and found that neither the initial starting point nor the trend over time was statistically significant.

The estimates suggested that there was significant variance in the initial rate of transfer to adult court, however.

Table 15. Average Ohio County-Level Trends in Transfer Rate ($n = 88$)

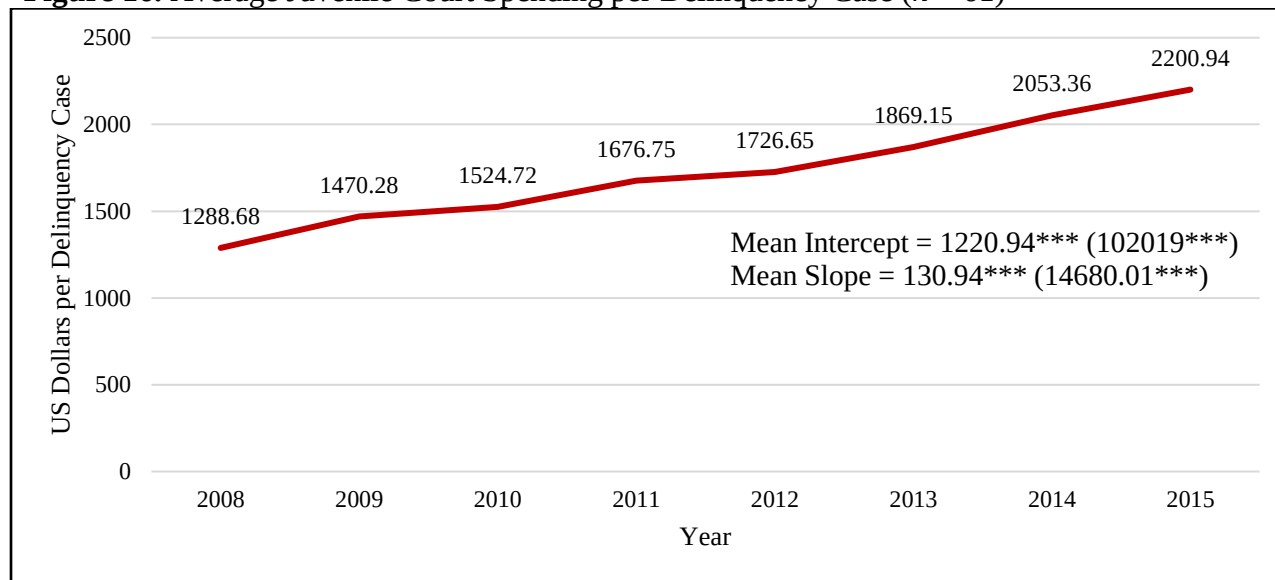


Notes: Variance presented in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Juvenile court budget data were gathered from publicly available reports (i.e. Comprehensive Annual Financial Reports and Juvenile Court Reports). As shown in Figure 16, the average juvenile court budget per delinquency case on a county delinquency caseload increased each year from 2008 to 2015. In addition, the trend was significantly different from zero ($\mu_\beta = 130.94$) with a significant amount of county-level dispersion from the average slope ($\varphi_\beta^2 = 14680.01$, $\varphi_\beta = 121.16$), suggesting that counties differ in their respective rates of change or stability. The average starting point for trend lines across counties was \$1,220.94 for every case on a county delinquency caseload. The variation around that estimate was significant, indicating that counties spending on juvenile courts are variable by county ($\varphi_\alpha^2 = 102,019.00$). Overall, however, this suggests that even as caseloads have declined in recent years there has been an

increase in spending per delinquency case. Assuming some of this spending is directed at better addressing the risks and needs of those cases, this is potentially important in affecting the results identified in Objective 2.

Figure 16. Average Juvenile Court Spending per Delinquency Case ($n = 61$)



Notes: Variance presented in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

While these reforms (decrease in adjudications/commitments, Targeted RECLAIM, and aggregate risk) and other justice-related changes (transfer and juvenile court budget) in Ohio are theorized to impact juvenile arrest rates, juvenile arrest rates may also be impacted by community-level factors. These analyses identified three community level factors that may impact juvenile arrest rates: percentage of children under poverty line, educational attainment, and delinquency caseload (Osgood, 2000). The average percentage of children under the poverty line in Ohio counties increased from 2008 to 2011 (2008 = 18.60; 2011 = 23.21). Then from 2012 to 2015, the average percentage of children under the poverty line decreased each year (2012 = 22.92; 2015 = 20.45). In addition, the change in the percentage of children under the poverty line within county varies over this time window. The average county's percentage of residents aged 18 to 24 without

a high school diploma decreased from 2009 to 2015. With the exception of a few counties, the percentage of 18 to 24 year old's without a high school diploma was relatively stable over time. The average Ohio county increased their educational attainment (decreased their percentage of residents 18 – 24 without a high school diploma) from 2009 to 2015 (2009 = 18.69; 2015 = 16.36). The average juvenile court delinquency caseload in a county decreased every year from 2008 to 2015 (2008 = 1590.00; 2015 = 883.50) as well.

Bivariate Relationships Between Arrest Rates and Key Independent Variables

Building on this understanding of county-level trends, we conducted bivariate analyses to elaborate on anticipated relationships and inform our multivariate model specifications. As shown in Table 23, the between county percentage of youth assessed as high risk; Targeted RECLAIM involvement; number of RECLAIM cases per every 1,000 cases on the county delinquency caseload; number of juvenile transfers to the adult court per 1,000 cases on the county delinquency caseload; and juvenile court budget per case on a county delinquency caseload are significantly correlated with county total juvenile arrest rate. All correlations are positive. Therefore, as the independent variables noted above increased at the county level, so too did the total juvenile arrest rate in a county. The magnitude of the correlations was weak to moderate ($r = 0.13$ to 0.33).

Between county levels of percentage of youth assessed as high risk; Targeted RECLAIM involvement; number of RECLAIM cases per every 1,000 cases on a county delinquency caseload; number of juvenile transfers to adult court per 1,000 cases on a county delinquency caseload; and juvenile court budget per case on a county delinquency caseload are significantly correlated with the juvenile violent arrest rate. All correlations are positive and weak to moderate ($r = 0.18$ to 0.40). Therefore, as the average of the independent variables listed above increased within a county, the average juvenile violent arrest rate in that county increased. For example, the percent

of youth assessed in the county as high risk was weakly positively associated with the juvenile violent arrest rate ($r = 0.19$, $p < 0.001$). Counties that assessed a greater percentage of high risk youth tended to have higher juvenile violent crime rates.

Table 23. Relationships of Covariates and Between County Juvenile Arrest Rates

	Total	Violent
Commitment Rate	-0.002	-0.08
Aggregate Risk	0.22***	0.19***
Targeted RECLAIM	0.33***	0.38***
RECLAIM	0.13**	0.11**
Transfer Rate	0.29***	0.40***
Juvenile Court Budget	0.17***	0.00
Children Under Poverty Line	-0.04	0.11**
Educational Attainment	-0.17***	-0.10*
Delinquency Caseload	0.24***	0.32***
Juvenile Population	0.25***	0.33***

Notes: Statistics presented are Pearson's correlation coefficients. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

These between county correlations inform us about the general trends across counties, not accounting for time. For example, total juvenile arrest rate and between county transfer rate were weakly positively correlated ($r = 0.22$; $p < 0.001$). Thus, as the average number of transfers per 1,000 cases on a county's delinquency caseload from 2008–2014 increased, so did the total juvenile arrest rate in that county—weakly. Counties that had more transfers per 1,000 delinquency cases tended to have higher total juvenile arrest rates. Similarly, the average number of RECLAIM cases per 1,000 delinquency cases on a county's delinquency caseload was weakly positively correlated with total juvenile arrest rate ($r = 0.13$; $p < 0.01$). Thus, counties with a higher average RECLAIM use per 1,000 delinquency cases tended to have higher total juvenile arrest rates. The time trends, however, are what is most pertinent to understanding the potential relationships of juvenile justice reform inputs and juvenile arrest rates.

The within county correlations inform us about the trends over the study period (See Table 24). From these correlations we can infer that as independent variables within a county in a given year — compared to the mean of that measure from 2008 – 2014—increased, the total (or violent) juvenile arrest rate in the county from 2008 – 2014 decreased. Among within county relationships, the percentage of youth assessed as high risk, Targeted RECLAIM involvement, and juvenile court budget per delinquency case were significantly correlated with the total juvenile arrest rate. All correlations with justice initiative variables were negative and weak ($r = -0.19$ to -0.11).

Table 24. Relationships Within County Juvenile Arrest Rates and Key Covariates

	Total	Violent
Commitment Rate	0.03	0.01
Aggregate Risk	-0.11**	-0.03
Targeted RECLAIM	-0.19***	-0.18***
RECLAIM	0.06	0.02
Transfer Rate	0.03	0.01
Juvenile Court Budget	-0.17***	-0.09
Children Under Poverty Line	-0.15***	-0.09*
Delinquency Caseload	0.13**	0.12**
Juvenile Population	0.12**	0.11**

Notes: Statistics presented are Pearson's correlation coefficients. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Counties exposed to Targeted RECLAIM for longer periods of time tended to have lower total juvenile arrest rates ($r = -0.19$; $p < 0.001$). Within county change in Targeted RECLAIM involvement was the only justice initiative variable significantly associated with juvenile violent arrest rate ($r = -0.18$; $p < 0.001$). This association was weak and negative. Thus, longer exposure to Targeted RECLAIM was associated with a lower juvenile violent arrest rate in a given year from 2008 to 2014. It is clear that the over time relationships between juvenile crime rates and the selected covariates are less consistent and weaker than for the standing county-level differences. Still, we are most interested in how these trends might change together in order to understand

whether and how county-level variation in juvenile justice practices during the study period were related to broader juvenile arrest trends.

Pairwise comparisons and variance inflation factor (VIF) tests between independent variables were used as an initial check for multicollinearity. For the most part, collinearity between independent variables was not a problem using $r > 0.80$ and $VIF \geq 4$ as the cutoff points (Wooldridge, 2009). Two findings caused us to modify our modeling strategies below. First, statistically significant, strong relationships were found between delinquency caseload and juvenile population ($r = 0.91$, $p < 0.001$). Second, the average time that a county was exposed to Targeted RECLAIM was strongly associated with the average juvenile population in a county ($r = 0.83$, $p < 0.001$). Further, the average time a county was exposed to Targeted RECLAIM was on the cusp of the $r = 0.80$ cut-off point when regressed with the between county estimates of delinquency caseload ($r = 0.76$, $p < 0.001$).

We use delinquency caseload in multivariate regression models as opposed to juvenile population. Given that this is a study of juvenile court processes, the number of delinquency cases in a county is more informative than the juvenile population because only a small proportion of youth in a county will be referred to and processed in the juvenile justice system. Additionally, we do include the number of youths in a county in the calculation of the juvenile arrest rate measure. In addition, we estimated regression models assessing Targeted RECLAIM involvement with and without delinquency caseload in the model and no substantive changes to the direction, significance, or magnitude of point estimates were detected. The Variance Inflation Factors (VIFs) ranged from 1.11 to 3.43. No independent variable had a variation inflation factor greater than 10 – the recommended cut off point for collinearity (Fox, 2015). Substantively, the measure with the greatest VIF – between county estimates of Targeted RECLAIM involvement – indicates that the

standard errors are larger by a factor of 3.74 compared to if there were no intercorrelations between Targeted RECLAIM involvement and the other remaining predictors in the model.¹⁷

Multivariate Models of Juvenile Arrest Rates and Ohio's Juvenile System Reforms

We estimate a series of Fixed Effect regression models to examine the relationships between within county variation over time and juvenile arrest rates. In doing so, we control for the between county differences and county-level controls described above (Allison, 2009).

Juvenile Justice Initiative Variables

Commitment Rate. When only controlling for between county differences in commitment rate, within county increases in commitment rate were associated with an increase in the total juvenile arrest rate by 0.24 percent.¹⁸ That commitment rate measure captures the percentage of adjudications that result in commitments. When controls were added to the model, within county changes in commitment rate became nonsignificant. Within county change in commitment rate—across all models—was not a significant predictor of juvenile violent arrest rate. Lagged models were used to assess the impact of independent variables on the next year's total, and violent, juvenile arrest rate as well. Across all lagged models, within county change in commitment rate was not a significant predictor of the following years' total, or violent, juvenile arrest rate.

Aggregate Risk. Only controlling for between county differences in aggregate risk, a one percentage increase in aggregate risk was associated with a decrease in the total juvenile arrest rate by 0.19 percent. When controls were added to the model, the effect of within county change in aggregate risk decreased slightly (IRR = 0.9931; $p < 0.01$). A similar trend occurred, regarding

¹⁷ VIFs for each set of covariates used in the panel level regression analysis indicated that collinearity was not a substantial problem (VIF ranged from 1.00 to 3.74).

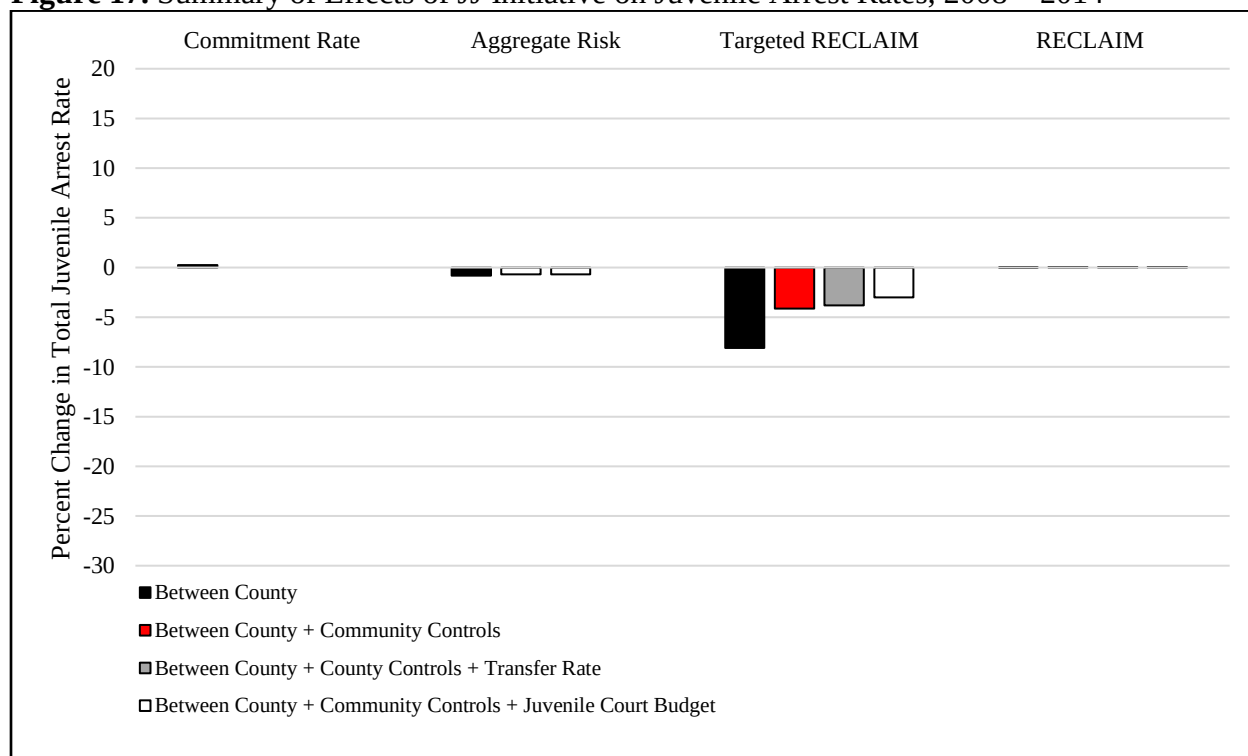
¹⁸Statistics presented are Incidence Rate Ratios (IRR). These statistics are interpreted as the multiplicative change in the expected rate of the outcome for a one-unit difference in the independent variable. They are converted to percentage effects in current interpretation.

aggregate risk, when adding transfer rate to the model with community level predictors (IRR = 0.9932; $p < 0.01$). These estimates are relatively small, however. When juvenile court budget – as opposed to transfer rate – was included along with controls, the effect of within county change in aggregate risk became non-significant. Within county change in aggregate risk – across all models – was a non-significant predictor of juvenile violent arrest rate. Within county change in aggregate risk was not a significant predictor across all lagged models assessing the following years' total, and violent, juvenile arrest rates.

Targeted RECLAIM. Across all models within county change in Targeted RECLAIM involvement was negatively associated with total juvenile arrest rate. Specifically, a one unit increase in county Targeted RECLAIM involvement (i.e., an additional year) was associated with a decrease in the total juvenile arrest rate in that county by a factor of 0.92 – controlling only for between county differences in Targeted RECLAIM involvement. This represents an eight percent drop in the expected juvenile arrest rate for each year exposed to Targeted RECLAIM allocations. When community level controls were added to the model, the effect of within county change decreased but remained statistically significant (IRR = 0.96; $p < 0.001$). Controlling for transfer rate, along with the community level covariates, had a minimal impact on the effect of within county change in aggregate risk (IRR = 0.96; $p < 0.001$). Alternatively, when juvenile court budget was added to the model along with the community level covariates, the IRR for Targeted RECLAIM involvement increased to 0.97 ($p < 0.05$). Controlling only for between county differences in Targeted RECLAIM involvement, a one-year increase in Targeted RECLAIM involvement was associated with a six percent decrease in a county's violent juvenile arrest rate. However, when adding community-level covariates to the model, the effect of Targeted RECLAIM involvement became nonsignificant.

In lagged models, when only controlling for between county differences, a one-year increase in county Targeted RECLAIM involvement was associated with an 8 percent decrease in the following year's total juvenile arrest rate. With the addition of community-level covariates, the effect of Targeted RECLAIM involvement was associated with a five percent decrease in the following year's total juvenile arrest rate. With the addition of transfer rate to the lagged model, county Targeted RECLAIM involvement remained statistically significant and the magnitude of the relationship remained unchanged ($IRR = 0.95$; $p < 0.001$). Contrary to the concurrent model when juvenile court budget was included in the lagged model, Targeted RECLAIM involvement stayed significant ($IRR = 0.96$; $p < 0.01$).

RECLAIM Usage. Within county change in RECLAIM use was positively associated with county total juvenile arrest rate across all models (when controlling for community-level factors, community level factors + transfer rate, and community level factors + juvenile court budget). The IRR values across all three models ranged from 1.0003 to 1.0006. Thus, for every 100 RECLAIM case increase, per 1,000 cases on a county's delinquency caseload, the total juvenile arrest rate is expected to increase by 0.03 to 0.06 percent—a very small effect (Osgood, 2000). Similar to the concurrent model, the IRRs for the lagged models signify for every 100 RECLAIM case increase, the expected increase in following year county total juvenile arrest rate is 0.03 or 0.04 percent. RECLAIM use did not have a significant relationship with the following year's violent juvenile arrest rate. Figure 17 summarizes the net impacts of the juvenile justice input variables on the Total Juvenile Arrest Rates from 2008 to 2014. As can be seen in the plot, the four measures included there show relatively small impacts on that arrest rate variable and none showed significant and substantial positive relationships with the juvenile arrest rates.

Figure 17. Summary of Effects of JJ Initiative on Juvenile Arrest Rates, 2008 – 2014

Transfer Rate. Within county change in transfer rate (per 1,000 cases on a county's delinquency caseload) was generally associated with an increase in a county's total juvenile arrest rate. In three of the four concurrent models assessing total juvenile arrest rate, a one unit increase in transfer rate was associated with a two percent increase in the total juvenile arrest rate, which suggests a modest association. Within county change in transfer rate was not a significant predictor of the following year's total, or violent, juvenile arrest rate.

Juvenile Court Budget. Juvenile court budget per case was negatively associated with total juvenile arrest rate. However, these estimates were not very large in a substantive sense (IRR = 0.99). The relationship with violent juvenile arrest rate was nonsignificant. In the lagged models, within county change in juvenile court budget was associated with a small decrease in the

following year's total juvenile arrest rate ($IRR = 0.99$; $p < 0.001$). Juvenile court budget was not a significant predictor of the following year's violent juvenile arrest rate.

Community and County-Level Controls

The percentage of children in a county under the poverty line was a fairly consistent predictor of total juvenile arrest rate. In the concurrent models, the percent of children under the poverty line was generally a significant negative predictor of total and violent juvenile arrest rate. Among concurrent models assessing total juvenile arrest rate, 10 of 12 models indicated that as the percentage of children under the poverty line increased, the total juvenile arrest rate in that county decreased.¹⁹ The last within county estimate, county delinquency caseload was a significant predictor in some models. However, in all models, the IRR for significant effects of within county change in delinquency caseload was never larger than 1.0002, which is very weak substantively.

Summary of Objective 3 Results

Generally, these results suggest that there was a limited relationship between aspects of juvenile justice reform and juvenile arrest rates, which are frequently used in public discussions of crime trends. In general, where there was a relationship, it was toward a reduction in those rates from 2008 to 2014. Among the 88 counties in Ohio, there was significant variation around the average trends in juvenile arrests rates. While there is a statewide trend in Ohio juvenile arrests rates and juvenile justice, there are local differences in arrest rates and the markers of juvenile justice reform. We confirmed this variability in the nature of the county-level time series via stationarity or unit root tests (Moody & Marvell, 2018). If a panel is stationary over time, it means

¹⁹ In the model signifying a positive relationship, the main independent variable was aggregate risk. The first two models—controlling for census/community level covariates only and controlling for census/community level covariates + transfer rate—were nonsignificant for within county change in children under the poverty line.

the value for the following time point is predictable but not by random error; therefore, no error correction mechanism is needed. Stationarity tests of panels included Levin-Liu-Chu, Fisher, and Hadri LaGrange Multiplier tests. From these tests, we conclude that some panels are stationary in these time series variables and some are not. However, we find that generally panels are stationary across all panel. This lends evidence to the fact that the data were handled appropriately here, while also pointing out the lack of uniformity in trends across counties.

In addition, we find mixed results in the effect of justice reforms on juvenile arrest rates in counties. Commitment rate and aggregate risk showed negligible relationships with juvenile arrest rates within counties. County Targeted RECLAIM involvement was frequently associated with a decrease in the juvenile arrest rates in counties. That is—the longer a county was involved in Targeted RECLAIM, the lower their juvenile arrest rate. Further, county RECLAIM usage was significantly, but not substantively, associated with juvenile arrest rates. For the most part, no justice predictor was related to violent juvenile arrest rates. This is likely due in part to the limited range and scope of the violent juvenile arrest rate measure, but it could also suggest that this trend is less malleable than some less serious offenses for which the juvenile justice system might have more flexibility (e.g., status offenses). Since the variation around the average trend in violent juvenile arrest rate was small (as shown in the Latent Growth Curve Model), it is possible that there was not much variation to explain. Finally, when comparing concurrent models to lagged models, we found no substantive changes in the magnitude or direction of point estimates.

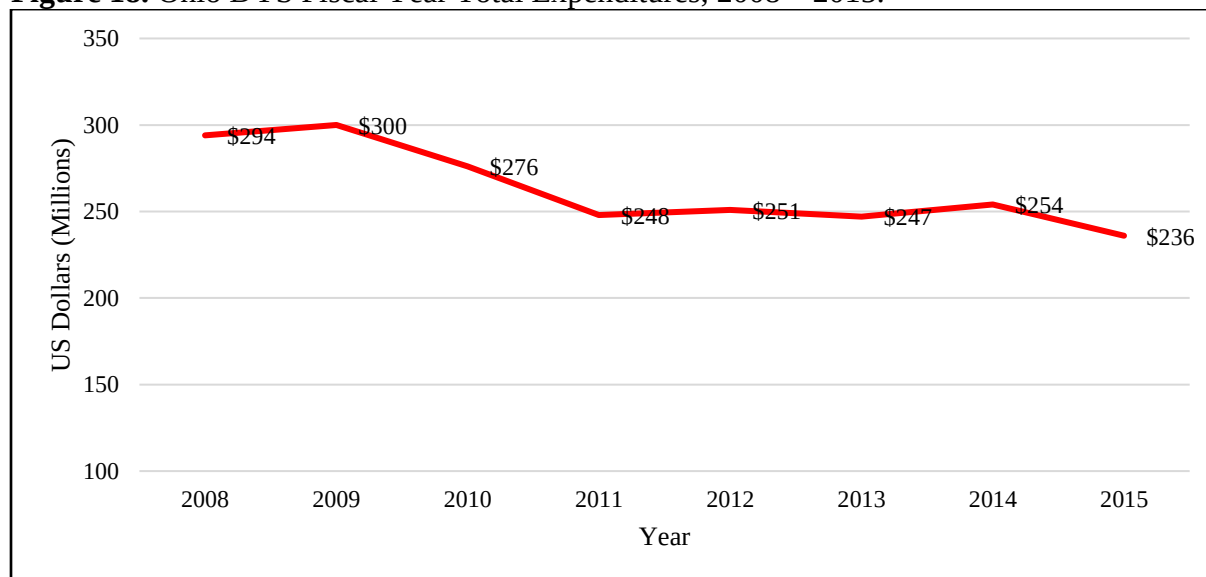
Research Objective 4 Results: Evaluate Costs and Benefits of Initiatives

The analyses for Study Objective 4 add context to the previous results by looking more specifically at the cost and benefit considerations associated with the different case and agency level inputs/outputs. As in the previous sections of the report, we begin by presenting some trends

observed over the time period under study (2008-2015) in order to establish context for the financial implications of the different initiatives undertaken in Ohio. We then move on to results from formal analyses of benefits and costs using multiple relevant input and outputs.

Ohio Juvenile Justice Expenditure Trends. The reforms identified in the study were generally spearheaded or subsidized at the state level and so we start with those trends. Ohio DYS fiscal year expenditures are itemized by seven areas: (1) institutions and private facilities, (2) parole and community corrections, (3) juvenile court subsidies and grants, (4) administrative support (5) debt services, and (6) capital – physical plant improvements. As shown in Figure 18, from 2008 to 2015, DYS Fiscal Year Expenditures generally declined. The difference in DYS spending between 2008 and 2015 was approximately 57 million dollars, which is a 19.5 percent decline across those years.

Figure 18. Ohio DYS Fiscal Year Total Expenditures, 2008 – 2015.

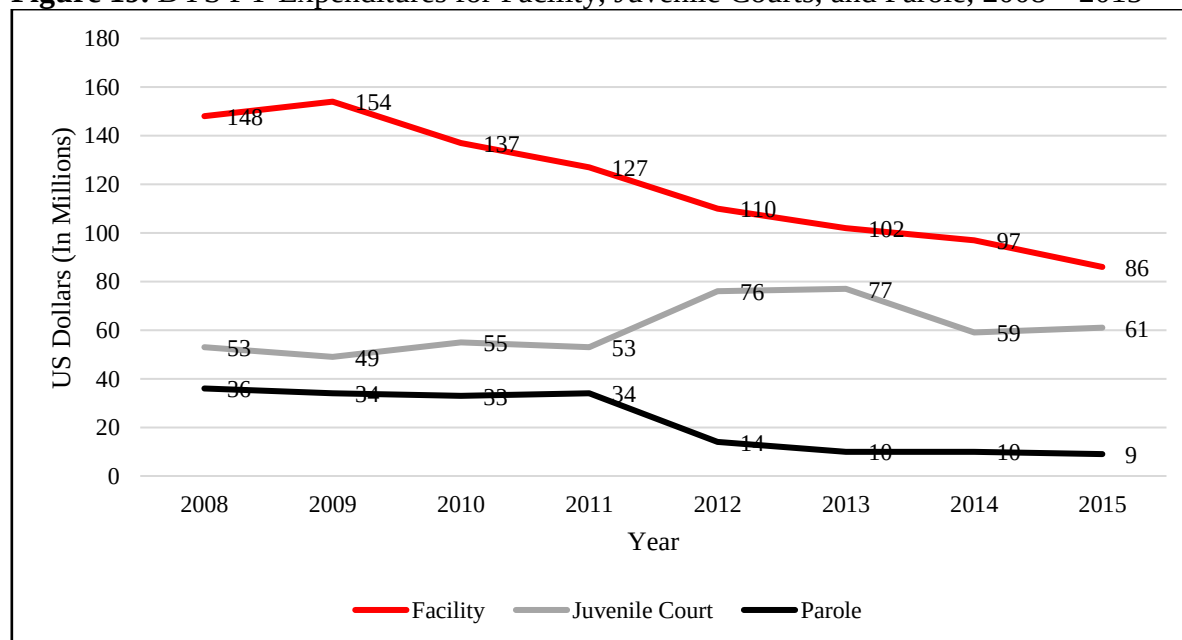


Source: Ohio Department of Youth Services Annual Reports.

Three categories of DYS funding: (1) institutions and private facilities, (2) parole and community corrections, and (3) juvenile court subsidies and grants are particularly relevant to juvenile justice reform in Ohio and largely reflect the trends that were seen in the Objective 1 and

Objective 3 analyses. As shown in Figure 19, spending on facilities has generally decreased from 2008 to 2015, which is in line with the decline in youths committed to DYS described above. A large portion of the decrease in DYS spending came from expenditures on DYS institutions and private facilities. In 2015 DYS reported spending a total of 62 million dollars less on facilities and institutions than in 2008, which was a 42 percent decline. Parole and community corrections spending declined sharply during that time period as well. The trends, however look different for juvenile court grants and subsidies, which increased across that time frame with peaks in 2012 and 2013, reflecting usage of programs like RECLAIM and Targeted RECLAIM. Importantly, this spending increased even as juvenile court caseloads typically declined in Ohio and nationwide, effectively meaning that—on balance—more resources were directed at youths who entered the juvenile justice system (see also Figure 16 and below).

Figure 19. DYS FY Expenditures for Facility, Juvenile Courts, and Parole, 2008 – 2015

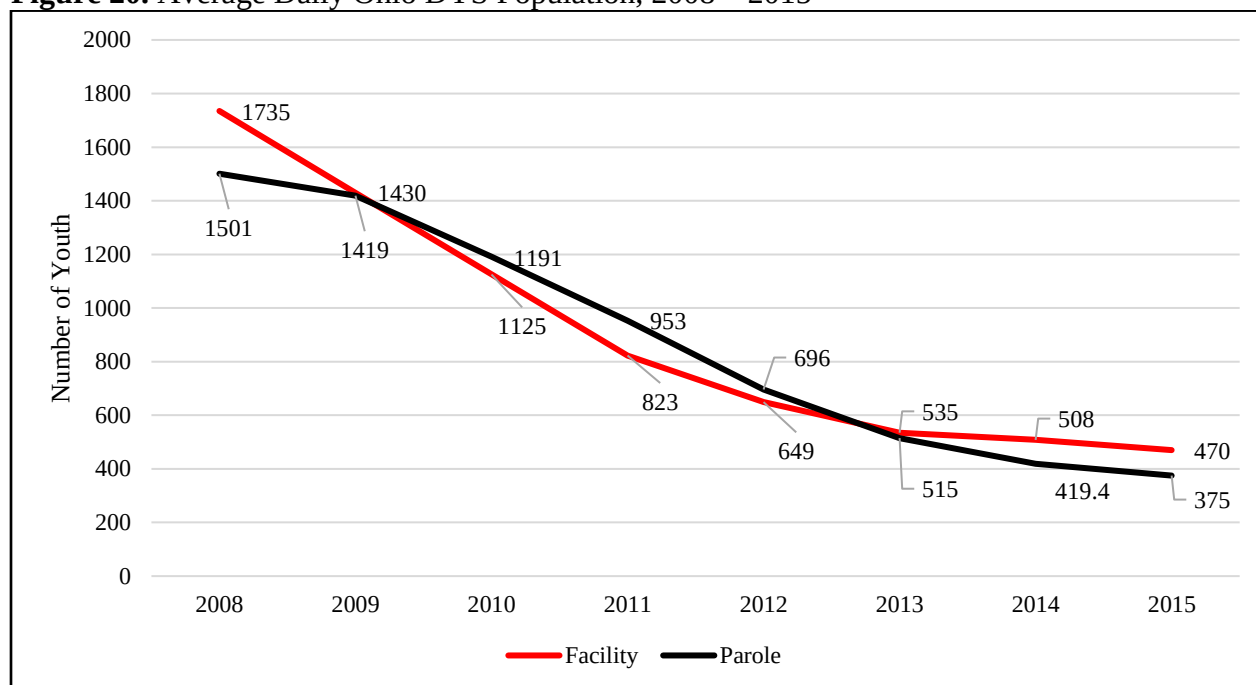


Source: Ohio Department of Youth Services Annual Reports.

Spending on juvenile court grants/subsidies and parole/community corrections remained relatively stable from 2008 to 2011. However, after 2011 the spending on juvenile court

grants/subsidies increased as spending on parole/community corrections and facilities decreased. The trends in the first few years of the study period suggest an unclear alignment of spending on juvenile court subsidies and parole while a drop in facility spending occurred. The latter years of the study period, however, suggest an association between cost-savings from the state facility and parole spending with a general increase in those juvenile court subsidies. For example, in the year following Targeted RECLAIM initiation (2011), DYS spending on parole/community corrections and juvenile court grants/subsidies remained proportional to pre-Targeted RECLAIM levels. Given that counties were increasingly using community correctional facilities and other alternatives to DYS placement—the shift in from parole/community supervision to juvenile court grants/subsidies suggest the state was incentivizing counties in line with the objectives of RECLAIM efforts. Arguably, the proportional shifts in resource allocation during the last few years also show greater optimization of overall expenditures aligned with trends in placement for juvenile justice populations.

The question of optimization can be elaborated by considering average per youth spending. This also sets the stage for later analysis of costs and benefits. To reiterate patterns shown earlier, concurrent to these financial trends, caseloads and custody counts shifted as well. The number of youth under DYS supervision on an average day decreased each year from 2008 to 2015 (see Figure 20). In 2008, the average daily DYS facility population was 1,735 youth. By 2015, the average daily DYS facility population decreased by 73 percent to 470 youth. Similarly, the average daily DYS parole population was 1,501 youth. By 2015, the average daily DYS parole population decreased by 75 percent to 375 youth.

Figure 20. Average Daily Ohio DYS Population, 2008 – 2015

Source: Ohio Department of Youth Services Annual Reports.

Per diem, per youth DYS facility spending was calculated by multiplying the average daily facility population by 365 then dividing that total by that years facility expenditures, where t was a given year:

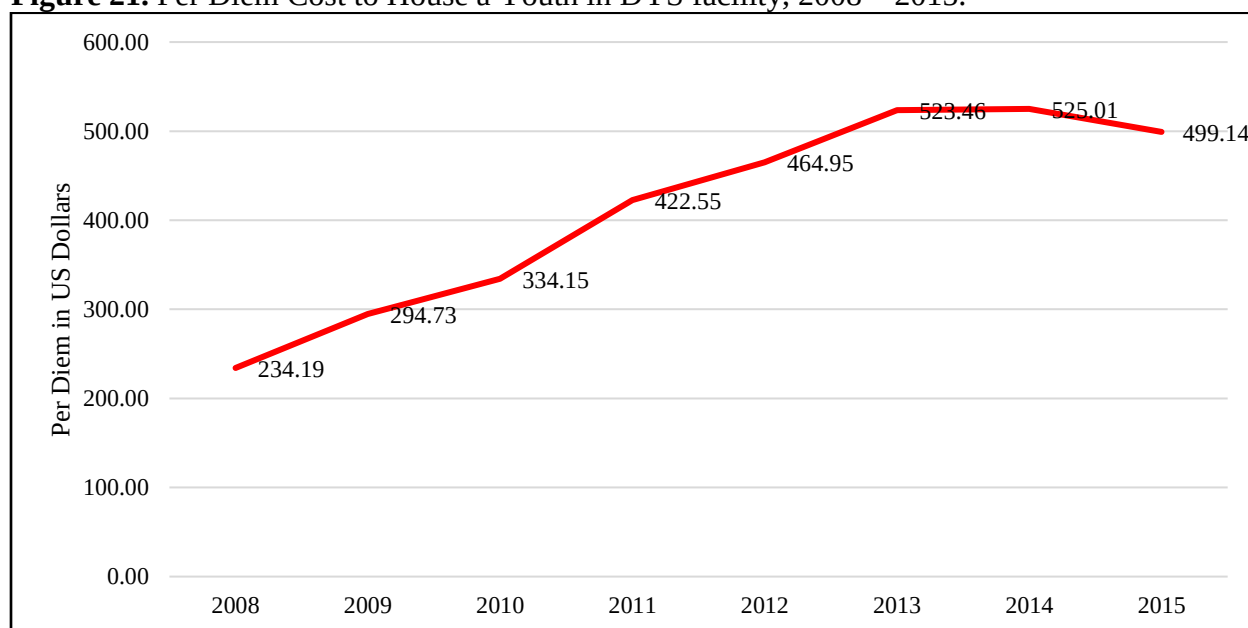
$$\text{Juvenile Facility Per Diem}_t = \frac{\text{Average Daily facility population}_t * 365}{\text{DYS Facility Expenditures}_t}$$

This helps to establish an estimate of the cost per youth in a DYS facility. Figure 21 shows that as spending on institutions and the average DYS facility daily population decreased, the average daily cost to house a youth increased before it reached a plateau late in the study period (2013-2015). Those average costs are roughly in line with those of \$541 dollars per diem given for FY2015 by DYS.²⁰ Projected over a year this amounts to \$197,465, which is at the high end of recent estimates based on a survey of youth confinement costs across the U.S. (Justice Policy

²⁰See January 2016 Ohio DYS fact sheet at www.dys.ohio.gov.

Institute, 2014). For Ohio, this reflects the fact that overhead costs to run juvenile correctional facilities remain even as the population declines and facilities close. Almost one-third of the cost of running a correctional facility comes in infrastructure costs, such as staff wages (Pfaff, 2017). If the cost to run facilities is relatively fixed – regardless of the number of youth who are committed there – a significant reduction in the cost of juvenile facilities on the part of the state will have to come through closing facilities (which has occurred). Still it is unlikely that these costs can be fully offset due to stable spending on overhead.

Figure 21. Per Diem Cost to House a Youth in DYS facility, 2008 – 2015.



Source: Ohio Department of Youth Services Annual Reports.

Previous estimation approaches put the costs much closer to the overall figure identified above (see Latessa et al., 2014). Following Henrichson and Galgano (2013) we utilize estimated marginal costs as they better reflect the amount of cost experienced for an addition or subtraction of a youth to a DYS facility. The marginal cost per youth for FY2015 was estimated at \$31.46, which is \$11,891 per youth based on the average length of stay in DYS facilities during that time period. These costs include provision of medical care and treatment programming (which

increasingly involves evidence-based modalities). We utilize these cost estimates in the analyses below.

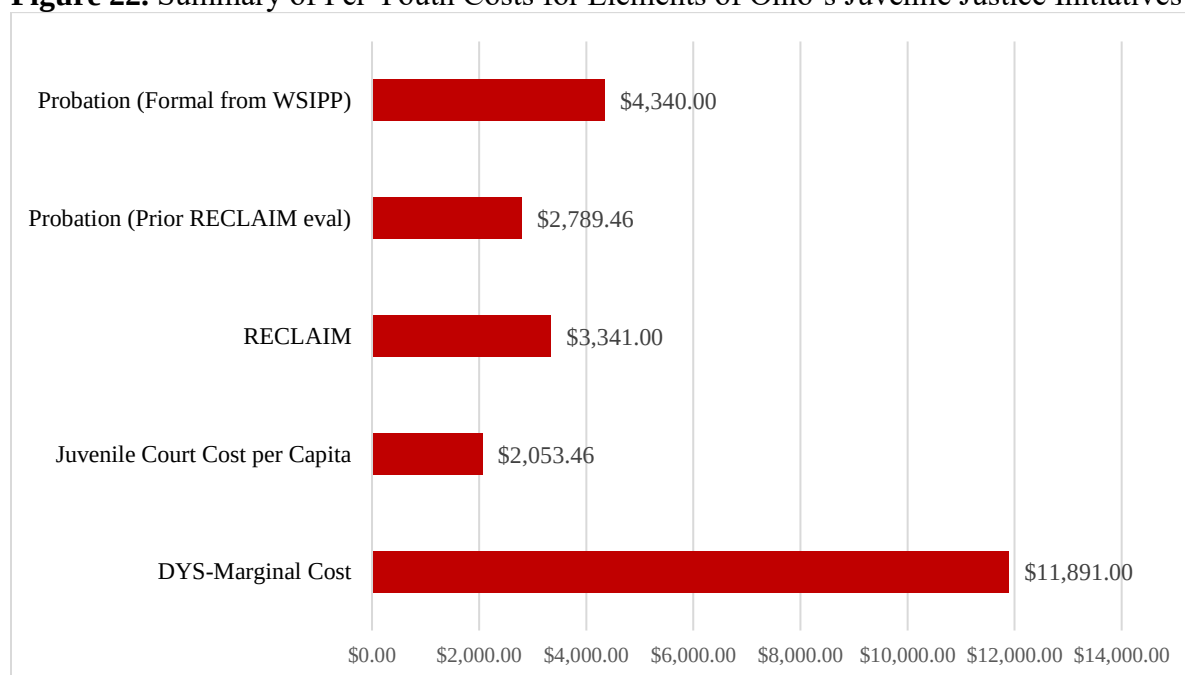
Similar to the average daily DYS facility population, the per diem cost to supervise a youth on parole was calculated by multiplying the average daily parole population in a year by 365 then dividing the total by the years parole/community supervision spending. Findings regarding the per diem cost to supervise a juvenile reflect two things. First, it costs substantially less, on average, to supervise an DYS youth on parole or community supervision than in a facility. Specifically, the average daily cost to house an DYS juvenile across over the 8 year study period was \$410.27. Meanwhile, the average daily cost to supervise an DYS juvenile on parole or community supervision over the 8 year study period was \$68.81. Second, the variation in the average cost to supervise a youth over time likely reflects a difference in allocations between years. As mentioned earlier, between FY 2011 and 2012 there was a shift from funding DYS parole/community supervision to more juvenile courts/subsidies. The different sources of funding impacting parole/community supervision highlights the shortcomings of the measure.

The parallel trends from the juvenile court budget data (n=61) shown in Figure 16 above suggest that juvenile courts are also now spending more per case than in 2008—even adjusting for inflation. This is likely linked to similar trends as in the other expenditure pools, but the upshot is that more financial resources are being directed at each justice-involved youth. This set of descriptive trends based on budgetary data helps to establish the financial context surrounding the state and county-level processes and initiatives described earlier in the report. Simultaneously, they help in establishing cost measures relevant to the Objective 4 results.

Collectively, these values are used to develop a comparative sense of the net cost savings and benefit across the years under study to develop an estimate of the overall financial impact of

Ohio's recent juvenile justice initiatives.²¹ The per-youth costs of relevant aspects of Ohio's juvenile justice initiatives are summarized in Figure 22. We utilized the most relevant yearly cost estimates available or converted to U.S. dollars for 2014 or 2015. The Probation Supervision costs are based on reported values from the WSIPP, which are described above. We also utilize a less conservative value based on Latessa et al. (2014), which those authors mention as falling in line with prior work by WSIPP (\$736 per youth + court processing costs).

Figure 22. Summary of Per Youth Costs for Elements of Ohio's Juvenile Justice Initiatives



These values help to establish a general sense of the various costs—and potential financial benefits (Cohen, 2000)—that accrue based on different referral patterns. These basic cost measures are first integrated to estimate the cost effectiveness benefits accrued to Ohio based on these initiatives. These impacts in turn could be experienced at the County level as well due to the incentive structure associated with RECLAIM and Targeted RECLAIM. We start by

²¹Use of marginal costs can make this estimate appear to be more conservative, but it also recognizes that there are various uncertainties that come with measuring and analyzing costs and benefits.

considering the DYS and RECLAIM comparison. Though this contrast might not be relevant across the full spectrum of cases due to the limited overlap evident in the Objective 2 analysis, there was a window early in the study period when there was a greater mix of youths placed in DYS custody. We use the effect size, $p=0.24$, which reflects a 24 percent point lower prevalence of new incarceration for RECLAIM relative to DYS placement, in conjunction with the marginal cost of DYS, $M_d=\$11,483$ and RECLAIM, $M_r= \$3,341$ to begin to understand the cost effectiveness of the shifts in these trends. This is summarized in Table 25. Based on the counterfactual described in the Objective 2 analysis (placement in RECLAIM vs. DYS), the first few columns show the DYS facility population, recidivism rate, and the number of estimated recidivists in each year between 2008 and 2014.²² This is followed by the number of recidivists that might be prevented based on the alternative placement (RECLAIM). This is then followed by the potential DYS cost savings based on recommitment avoided for those cases and the potential RECLAIM costs. The final column in the Table considers the ratio of the potential savings to costs based on those cost calculations.

Based on the conservative, marginal costs to the juvenile justice system, the estimated savings over the time period of interest would be 5.7 million dollars statewide. RECLAIM costs for those cases would total roughly 1.6 million during that same time frame. The net savings in marginal juvenile justice system costs of the initiative based on these analyses would total approximately four million dollars would have accrued across the time frame in question. The savings to cost ratio computed based on these different placements was approximately \$3.50 meaning that amount would be saved for each dollar spent on RECLAIM relative to DYS.

²²2015 is omitted due to the relatively smaller sample size in estimating key relationships.

Table 26 shows similar data for the formal Probation placement relative to DYS custody cost comparison (estimated based on WSIPP costs). The effect size is $p=0.30$, which suggests a 30 percent point lower prevalence of new incarceration for Probation relative to DYS placement. As described above, the marginal, per-youth cost of formal probation ($M_p=\$3,985$) is based on values calculated by WSIPP. Those costs come in the fourth and sixth columns of the table. In aggregate the net anticipated savings from placing youth on Probation rather than in DYS custody would be about 4.5 million dollars. The accompanying savings-to-cost ratio is \$2.74, which suggests a good deal of value in that type of community-based alternative to state residential placement.

We also analyzed cost effectiveness when accounting for additional juvenile court costs. The use of juvenile court costs adds a column to Tables 25 and 26 and adds those dollar values to the DYS costs and therefore is not shown in full. We draw on the county-level juvenile court budget data described above to establish the cost per delinquency cases. When adding average juvenile court costs per capita (\$2,053 in 2014), which are noted in Figure 22, the potential net cost-savings over the period of interest increases approximately nine hundred thousand dollars to roughly \$4.95 million across the study period.²³ The accompanying estimated benefit-cost ratio is \$3.93 for every dollar spent on RECLAIM options. For probation, the overall projected net savings (\$5.6 million) and benefit-cost ratios (\$3.14) are also substantial.

There are several sources of potential variability in these estimates. Each of the community-based alternatives also brings potential changes in the patterns of treatment and

²³This assumes that these recidivism cases are processed in the juvenile court. This would depend on the youth's age relative to adult jurisdiction and the degree to which their return to custody might be hastened via a violation of their conditions of parole. Given these assumptions we generally report more conservative savings and cost-benefit ratios when summarizing results.

sanction referrals that can affect the relative likelihood of recidivism compared to DYS custody. Additionally, there is apt to be heterogeneity in impact across subgroups of youths, counties, probation agencies, and referrals. Given that potential variability and common uncertainty in estimating treatment effects and costs, we also present a slightly more conservative calculation based on the lower bound of the 95% confidence interval for each estimate. This was $p=-0.16$ for RECLAIM and $p=-0.22$ for formal intensive probation supervision. In the former case the net savings would be 2.7 million dollars and in the latter roughly 3.3 million dollars. Again, these estimates are conservative based on the returns for public juvenile justice investments and the lower bound effect size estimates. An upper bound on the probation benefit-to-cost can be set by using a value identified in Latessa et al. (2014): \$736 per case in 2011 dollars. This in turn should be added to the court cost. We make a monetary adjustment to place that cost in 2014 dollars and combine that with the information already presented in the tables below. This estimate yields a projected net savings amount of \$6.8 million dollars over the time frame of interest here and an average benefit-cost ratio of \$5.50 for each dollar spent on that alternative to DYS placement. Even taken conservatively, these analyses suggest a good deal of potential cost effectiveness and benefit to public agency budgets associated with these alternatives to state residential placement.

Table 25. Estimate of Cost Effectiveness for Alternatives to DYS Custody, RECLAIM, 2008-2014

Year	DYS Facility Population	Recidivism Rate (%)	# Recidivists	Potential Reduction RECLAIM $p = -0.24$	DYS Cost Savings	RECLAIM Costs	Net Savings	Savings to Cost Ratio
2008	1735	29.0	503	121	\$1,316,603	\$378,087	\$938,516	\$3.48
2009	1430	32.0	458	110	\$1,180,388	\$338,917	\$841,471	\$3.48
2010	1125	28.0	315	76	\$821,318	\$235,796	\$585,522	\$3.48
2011	823	31.0	255	61	\$688,667	\$197,777	\$490,891	\$3.48
2012	649	33.0	214	51	\$587,768	\$168,749	\$419,019	\$3.48
2013	535	37.0	198	48	\$552,756	\$158,724	\$394,031	\$3.48
2014	508	41.0	208	50	\$593,648	\$70,456	\$423,192	\$3.48
Total					\$5,741,148	\$1,648,506	\$4,092,642	\$3.48

Notes: DYS Population based on Agency Reports; Recidivism rates and effect size based on data from Objective 2 Analysis above. Costs are discounted from 2015 dollars for each year using Bureau of Labor statistics calculator at <https://data.bls.gov/cgi-bin/cpicalc.pl>. and are based on marginal cost calculations.

Table 26. Estimate of Cost Effectiveness for Alternatives to DYS Custody, Probation, 2008-2014

Year	DYS Facility Population	Recidivism Rate (%)	# Recidivists	Potential Reduction Probation $p = -0.30$	DYS Cost Savings	Probation Costs	Net Savings	Savings to Cost Ratio
2008	1735	29.0	503	151	\$1,645,753	\$601,516	\$1,044,238	\$2.74
2009	1430	32.0	458	137	\$1,475,485	\$539,236	\$936,250	\$2.74
2010	1125	28.0	315	95	\$1,026,648	\$375,165	\$651,483	\$2.74
2011	823	31.0	255	77	\$860,834	\$314,652	\$546,182	\$2.74
2012	649	33.0	214	64	\$734,710	\$268,505	\$466,205	\$2.74
2013	535	37.0	198	59	\$690,944	\$252,564	\$438,380	\$2.74
2014	508	41.0	208	62	\$742,060	\$271,181	\$470,879	\$2.74
Total					\$7,176,436	\$2,622,818	\$4,553,617	\$2.74

Notes: DYS Population based on Agency Reports; Recidivism rates and effect size based on data from Objective 2 Analysis above. Costs are discounted for each year using Bureau of Labor statistics calculator at <https://data.bls.gov/cgi-bin/cpicalc.pl>. and are based on marginal cost calculations.

Summary of Objective 4 Analysis

Although limited by available data, the cost analyses carried out here produced three relevant results. First, the expenditures on different aspects of juvenile justice (e.g., subsidies to juvenile courts, facility costs, and parole) shifted along with the progress of the initiative, which reflects the linkage of financial and programmatic components of Ohio's recent juvenile justice initiatives. This occurred within the context of reduced overall budgets and facility closures. The second portion of the Objective 4 analysis blended the comparative analyses in Objective 2 with some conservative estimates of marginal juvenile justice costs. This estimation process suggests several million dollars of savings during the study period based on the relative cost-effectiveness of community-based alternatives. The accompanying savings-to-cost ratios came in above \$2.50 saved for each dollar spent on these alternatives.

DISCUSSION AND CONCLUSIONS

This study was designed to provide added insight on state and local-level juvenile justice reform by obtaining and analyzing existing record and public report data on a series of initiatives undertaken over the course of several years in one U.S. State: Ohio. We pursued four main research objectives. The first two objectives assessed case processing and resultant recidivism rates, respectively. This identified the possible impact of these changes on processing of individual cases in Ohio's juvenile courts and corrections system. The data set included the records of more than 5,000 cases sampled from approximately 280,000 youth processed over 2008 to 2015. We assessed the presumed reductions in the number of youth committed to residential correctional facilities in favor of community-based alternatives and identified the factors influencing the shift in placements. We then assessed the relative effectiveness of residential facilities and community-

based alternatives in terms of youth recidivism with a subsample of 2,855 case records from randomly-selected counties.

To expand the scope of analysis of these reforms—both within Ohio and elsewhere—our third research objective focused on counties. These counties reflect the level of administration for juvenile courts as well as a potentially useful unit of analysis for juvenile arrest rates. Specifically, we formally modeled the longitudinal trends in key juvenile justice inputs and official juvenile crime rates across Ohio’s 88 counties using data from public reports, data collection with counties, and official juvenile arrest data archived by the FBI. Our fourth objective used elements of the previous analyses (especially comparative recidivism rates) and cost data collected from existing sources and public reports to quantify the potential return on investment that accrued from Ohio’s investment in these juvenile justice initiatives.

The final section of the report pulls together the key points identified in each of the previous sections to offer some informed suggestions and conclusions about current and future alterations to juvenile justice policy and practice. First, we build on our methods and results sections to briefly identify relevant limitations in the samples (data), measures, and analytic procedures used in the study. Second, we reiterate and summarize the key findings for each of the four study objectives. In doing so, we reflect on some potential implications of those findings. Finally, we build on the key findings and implications to more formally offer recommendations and conclusions about juvenile justice reform efforts. These are primarily aimed at practice and policy, but we also make some suggestions for future research and evaluation in juvenile justice programming—especially as pertains to the types of initiatives studied here.

Study Limitations

Although this study has several strengths in considering the impact of juvenile justice reform in Ohio, several limitations contextualize its key findings as well. Some of these were investigated and resolved where possible in order to appropriately qualify our key findings, but others require future research. Beginning with Objective 1, our results are based on analysis of a random sample of cases from across the state of Ohio. We used the state youth assessment database as a sampling frame and therefore the interpretation of results is predicated on the coverage of OYAS relative to all cases processed in state juvenile courts during the time period in question. This could be an issue as the OYAS system was still expanding during the early part of the data collection window and not all counties contributed to that database. Courts and probation offices also varied in the degree to which they contributed and the types of cases entered into the system. Nevertheless, that data system provides a central repository that covers a majority of counties of varying sizes and juvenile crime rates across the state and the trends identified in the data generally comport with others identified in other state and local reports.

We also encountered some sample and data retrieval challenges that must be considered in framing the inferences described above. While we had a good deal of control of the sample for Objective 1 analysis, the final sample size for Objective 2 did not reach the targeted number due to non-participation among counties and some item non-response in specific cases that were provided. Despite several efforts over the course of the study period, several juvenile courts did not provide data on the sampled cases. In part this was due to the scope of needed data collection, which covered multiple years when some agencies modified their record-keeping systems (e.g., moved from paper to electronic records, upgraded electronic records systems). This mainly affected our ability to analyze a full sample of cases in understanding different placements and

their impact on recidivism. Different measures were taken to maximize representativeness of the sample, however. For example, we stratified counties based on their size and number of cases processed and were able to include some cases from each stratum even in the most limited subsample. We also assessed the degree to which the analytic sample for the Objective 2 analysis varied from the random draw from the OYAS database and found that the differences were minimal and tended to suggest that our analyses of recidivism reflects more high risk and serious offense youth cases.

This nonresponse also affects the power associated with some statistical comparisons. Although it requires some assumptions, a power analysis for group-based comparisons with the basic sample parameters used in study planning suggested sufficient power ($p > 0.80$) to detect significant effects of interest in Objective 2—even at moderate effect sizes (Cohen, 1992). That generally held in our analyses and in post-hoc analysis of power. Still, some groups (e.g., Targeted Reclaim), time periods (e.g., 2014 and 2015), and combinations of risk, time indicators, and placements had lower effective sample sizes for statistical inference when entered into multivariate models. In those cases, we conducted subgroup analyses and/or considered the size of relationships to draw whatever insight possible from our analyses. Nevertheless, those comparisons have lower data support than for other larger groups described earlier in the report and therefore do not have the same level of strength as some others included in the key findings (Manski, 2007).

We were also limited in a few key measures in analyzing individual case placements and the outcomes of those placements. Recidivism can be defined differently depending on the point of interest across the justice process (Maltz, 1984). We sought to analyze different implications of the reform in reducing new arrests, new referral to court, or commitment to custody, but were unable to access state-level law enforcement data. DYS and local court data were inconsistent in

the detail available for new arrests. In this case therefore we had to develop a “consensus” measure that was generally available across all samples and the only one that fit that criterion was new commitment (see generally Curran & Hussong, 2009). The measure we used in this study, new commitment to DYS, was meaningful in its own way. It encompasses other indicators of recidivism that occur at earlier processes in the system, and implies an involvement in offending seriousness enough that it results in commitment in custody. It is also fundamentally relevant to the main objective of deinstitutionalization. Nevertheless, it is possible that the sensitivity of effects of different placements on recidivism may vary across different recidivism definitions. We faced some limitations at the other end of the evaluation of different placement options as well. Specifically, like other studies of juvenile justice intervention, we also had to contend with the variation within and across jurisdictions in the definition of different types of programs that house and treat justice-involved youths. Inherently, this forces some aggregation of varying interventions—and accompanying imprecision—in assessing the impact of large-scale initiatives such as those studied here.

Although we conducted checks of state adult corrections custody through the Ohio Department of Rehabilitation and Corrections database (ODRC), it is possible that RECLAIM and probation youth were undercounted in the incarceration recidivism measure. Specific treatment indicator information was likewise limited in some data provided in state record systems and local agency submissions. This is reflected in the degree of precision available in specifying exactly what type, dosage, and location of treatment received as alternatives to DYS custody. While we had some data on that, they were limited in scope and precision. Further detail about the impacts of secondary layers of the reforms could likely be found with greater depth on those treatment indicators. The Objective 4 measures are inherently affected by other portions of the study and

therefore absorb those limitations. Additionally, the measures used are based on estimates from public records and therefore are subject to some limitations. Nevertheless, where raw data were available we did opt to calculate some estimates in order to make sure they corresponded with agency reports.

Data retrieval limitations affected the Objective 3 analysis to some degree as well. We could not obtain UCR juvenile arrest rates for 2015 as they were not posted on the Interuniversity Consortium of Political and Social Research (ICPSR) data repository on the same schedule as in years prior and were not present in the September 2018 when we conducted final analyses in those areas. Given the nature of the relationships identified in the results above, it is unclear how much leverage that additional year would have had on the main study conclusions, however. We also retrieved financial information from juvenile courts in the state of Ohio via public reports and contacts with staff in those counties. We were not always successful, however, and therefore the analytic sample is incomplete for that set of analyses. A comparison of the response/non-response samples suggested that counties for which those data were unavailable tended to have lower UCR juvenile crime rates than those analyzed in our sample. Seemingly this nonresponse did not compromise our ability to understand those counties with higher juvenile arrest prevalence as they tended to be part of the sample.

The data analyses were also subject to some limitations. For example, Objective 2 was assessed in a propensity score weighting framework. In addition to the general limitations of this approach (Freedman & Berk, 2008), the robustness of the propensity score development and subsequent regression relies on the extent to which pre-treatment covariates that confound the relationships of interest are included. We were able to include several variables that were significantly related to the outcome variable (recidivism) and which may have also affected

placement. For example, the OYAS measure is a distillation of several different domains that are often related to recidivism (e.g., juvenile justice history, peers and social networks) and therefore is a useful covariate in this context. This seemed to increase balance between the group, but they were still not perfectly aligned. It is also possible that there are other variables associated with the outcome and placement decisions that were not included in those analyses. We used two different diagnostic indicators and doubly-robust estimation in an attempt to reduce bias, but these methods do not inherently fix the potential influence of omitted covariates.

The Objective 4 analysis is subject to some important limitations as well based on a few interrelated considerations. Like any cost analysis, the results are strongly affected by assumptions made about cost estimates and decisions about potential payers and beneficiaries. In this case, we largely confined our analyses to public costs and benefits as they are the primary financial stakeholders in juvenile justice reform efforts. The community alternative costs could vary dramatically depending on individual case dispositions and referrals as well as usage patterns in particularly agencies. Additionally, in the absence of some direct cost data, we utilized estimates that—while credible—may not be totally precise to recent fiscal expenditures in Ohio and local agencies.

We also inherently relied on some extrapolations from individual level study findings (e.g., effect sizes) to aggregate-level cost data. Different costs or benefits might be identified by altering assumptions made in the analysis and/or expanding the scope of possible payees or beneficiaries—especially in the context of juvenile justice where the potential impacts of intervention may radiate outward (see, e.g., Cohen & Piquero, 2009) and the range of possible stakeholders is quite expansive (Howell, 2003). Future research aimed at considering the full array of costs and benefits relevant to long-term public safety, public health, and taxpayer concerns

should incorporate other indirect and intangible costs to a greater degree. In that sense, the potential benefits of reconfiguring juvenile justice may be undersold here.

Overview of Key Findings

The limitations are offered as context for our main findings. Various measures were taken to maximize the robustness of the analysis and to check on assumptions and potential limitations wherever possible. Despite data and analytic limitations, the results of this study offer some additional insight as to the impact of recent changes and trends in juvenile justice policy and practice in Ohio. Ohio is a large and politically diverse state that allows for some local variation in the adoption of non-statutory changes in policy and practice and therefore these findings may also inform policy, planning, and practice in other states with similar governance structures. Until recently its patterns of placement and outcomes of juvenile justice processes were quite similar to those observed elsewhere and, although youth placement is down nationwide, there are still some valuable lessons to be drawn on how to make meaningful and sustainable changes to juvenile justice systems.

The data and analyses allow for several important conclusions relevant to juvenile justice initiatives in the State of Ohio and other U.S. states and localities. Those key findings are summarized in Figure 23 and discussed in more detail in the balance of this section. Overall, they fit with expectations about the beneficial impacts of recent juvenile justice initiatives, but also add some nuances that set the stage for recommendations to policy makers, practitioners, and researchers.

Key Findings: Objective 1

Although there was a downward trend in referrals to the juvenile justice system during this time period, in aggregate, across the random subsample of about 5,500 cases from twenty Ohio

counties in the years 2008 to 2015, we found that the effect of youth risk level on placements varied (e.g., state DYS custody vs. community-based alternatives) over time toward placing youth in better alignment with their risk. That was identified based on a structured assessment process (OYAS). There was a sustained trend in diverting youth from incarceration which also resulted in the shift in the profiles of youth in the available placements. The initiative seemed to divert youths across multiple levels of risk, but the impact was most conspicuous among low risk youths. The composition of low risk youths in DYS facilities decreased gradually over time to the point where it was very rare. The relative composition of moderate and high risk youths did not change as much, but still shifted sufficiently to reflect the intent of the initiative. The DYS population decrease among moderate and high risk groups was largely absorbed by Targeted RECLAIM, which emerged in the middle of our study period and was aimed at providing more intensive community-based alternatives for deeper-end youths. The linkage between overall patterns of risk and placement types suggests that the general case-level trend is in line with what is expected in this type of reform.

Figure 23. Summary of Key Findings Across Study Objectives 1 to 4

Objective 1	Assess Shift in Distribution of Case Placement Over Time
• Statistically significant shifts in placement moving away from DYS placement for low and moderate youths—even controlling for other factors that might affect placement • The risk and time relationship suggests that this relationship strengthened over time for some risk groups • Comparative profile of DYS youth early in the study period looks considerably different in risk and offense seriousness compared to more recent years	
Objective 2	Compare Recidivism across Different Placement Types
• There was a moderate-sized difference between DYS and youth placed in the community when cases were weighted by relevant covariates to effectively create pools of youth with similar characteristics • DYS cases had a greater likelihood of subsequent incarceration	
Objective 3	Assess Impact of Juvenile Justice Reform on Official Crime
• Analysis of county-level time series suggests negligible relationships between aspects of Ohio's recent initiatives and official juvenile crime rates • Where relationships were identified they did not serve to increase county-level juvenile arrests	
Objective 4	Evaluate Benefits and Costs of Juvenile Justice Reform
• The financial footprint of juvenile justice in Ohio has changed along with these other shifts—at least at the state level • Conservative, marginal per-case cost estimates netted savings of several million dollars over the years studied here and savings-cost ratios suggested between \$2.70 and \$3.50 savings per \$1.00 spent on the community-based alternatives	

Interaction effects for risk and year suggest that low risk youths were at increasing odds of being diverted to the community as the reform matured. Some moderate and high risk youth were diverted from the state-residential facilities and stayed in community under the Targeted RECLAIM program and expansion of CCF use as well. The comparisons in the DYS facility case profile in sampled cases from 2008/2009 to 2014 were instructive in showing significant upward shifts in the average risk score and prevalence of high risk and serious offense youths as well as

relatively fewer low and moderate risk youths—even when controlling for other variables like seriousness of focal offense that could affect placement trends.

Although decisions can be further optimized, the reform is helping to better move youth to placements that generally align with how they are assessed at the relevant stage of the juvenile justice process. In short, the efforts in Ohio during this time period show the expected trend, reducing the population in state custody and increasing the degree to which youth were placed in a way that makes more sense based on the juvenile justice system’s objectives of attempting to use the least restrictive placement that will be appropriate and effective for a given youth. The findings suggest that the reforms have generated multifaceted impacts on placement patterns in Ohio juvenile justice.

Key Findings: Objective 2

The analysis of Research Objective 2 began from the foundation of the Objective 1 work in its finding that there was a redistribution of youth cases during the time of interest to this study and we found no strong evidence of rival factors that influenced those trends. Objective 2 sought to determine whether the reforms contributed to reductions in recidivism on a case level as well. We were also able to assess whether there were time trends in that effectiveness. After adjusting for several key covariates (e.g., risk level, seriousness of offense) to make the groups as comparable as possible, a doubly-robust weighted regression analysis indicated that the diverted population would have fared worse if they had been committed to residential facilities. The effect of 0.25 was moderate in size. Analysis of time by placement interactions suggest that these relationships were generally consistent across the time window studied here. The treatment and intervention types experienced by the community-based groups, especially RECLAIM and Targeted RECLAIM youths, suggest that their positive results are likely attributable to several

different types of approaches and modalities. Above all, the average justice-involved youth in Ohio is being processed reasonably well from the standpoint of recidivism as a “bottom line.”

Pairing the Objective 1 and Objective 2 findings reveals that recent initiatives in Ohio were effective in reducing the use of residential facilities, in effect moving youths to various community-based interventions and/or community corrections placements. This shifted the risk-placement profile for youths in the state. The analysis of outcomes in our random sample of roughly 2,800 cases reveals that also had an impact on recidivism rates. So, not only were youth diverted and placements redistributed, but the alternatives used during this time period were generally effective.

Key Findings: Objective 3

Building on these findings with respect to case placement and individual-level recidivism, we sought to understand potential aggregate impacts of those changes. In particular we studied county-level trends in different aspects of the juvenile justice initiatives (e.g., residential placement trends) and aggregate juvenile crime rates, which were points of contention in previous eras of policymaking in juvenile delinquency and juvenile justice.

Several findings emerged from the analysis of county-level trends in crime rates and juvenile justice reform measures. In line with broader trends in the U.S., these analyses identified a significant statewide decrease in the juvenile arrest rates in Ohio from 2008 to 2014. The majority of justice initiative measures included in the analyses decreased as well (e.g., felony adjudications, commitments to state facilities, and transfers to adult court). Not surprisingly, counties differed significantly in their baseline juvenile arrest rates and juvenile justice inputs/outputs, however. Similarly, county-level change (or stability) between 2008 and 2014 tended to vary in its magnitude and direction such that not all patterns looked the same. This suggests that levels and

rates of involvement in juvenile justice reform initiatives varied over time and across local courts. Juvenile arrest rates did likewise.

Between county differences in justice initiative measures tended to be weakly-to-moderately correlated with county juvenile arrest rates (total and violent) in a positive direction, which suggests that those counties with higher arrest rates tend to process more juvenile cases and make decisions to commit or transfer them to adult court more frequently (even when accounting for differential population sizes). For practical purposes these measures were mainly used to account for those differences to set a baseline for understanding change or stability during the 2008 to 2014 period. At the bivariate level, within county change in justice initiative measures, when significant, tended to be negatively associated with county juvenile arrest rates. For example, within county change in aggregate risk was negatively, weakly associated with total juvenile arrest rate. Meanwhile, within county change in county Targeted RECLAIM involvement was negatively, weakly associated with both total and violent county juvenile arrest rates. Similarly, juvenile court budget was negatively, weakly associated with total juvenile arrest rate but not violent juvenile arrest rate.

The multivariate panel regression analyses, which better accounts for potentially-relevant confounding relationships with juvenile arrest rates, identified very limited relationships between aspects of juvenile justice reform and juvenile arrest rates. Commitment rate and aggregate risk showed a negligible impact on juvenile arrest rates within counties, for example. County Targeted RECLAIM involvement and its length was associated with a decrease in the juvenile arrest rates in counties in some models. Specifically, the longer a county was involved in Targeted RECLAIM, the greater the reduction in their juvenile arrest rate. Shifts in county RECLAIM usage was also significantly, but not substantively, associated with juvenile arrest rates. For the most part, no

justice predictor was related to violent juvenile arrest rates. This is likely due in part to the limited variation around the trend in the violent juvenile arrest rate (i.e., it did not change much over time). It could also suggest that this trend is less malleable than some less serious offenses that the juvenile justice system might have more flexibility with (e.g., status offenses).

Overall, there are a few key takeaways from these findings. First, the aggregate shifts that would be anticipated in the juvenile justice processing and decision measures appear at the state and county-level and are frequently statistically significant. This shows the aggregate and potential system-level impact of the findings on placement trends observed in the Objective 1 results. It also helps to formally test those differences over time which can be difficult to do, and maybe even misleading, based solely on a visual plot (Mills & Mills, 1991). Second, there is, however, often significant variation in those trends that may help to drive differential experience of the dividends from juvenile justice reform. Third, at least in the state of Ohio, shifts in youth placements, including those for moderate and high risk youth (see Objective 1 above), have not induced dramatic changes in general juvenile arrest rates or violent crime rates—in either direction. Arguably, there may be additional factors to look at as youth age into adulthood in terms of the timing at which broader crime surges might be experienced, but the trends during this time period suggest little relationship between the reforms and juvenile crime as it is typically measured at the county level. Clearly, based on these analyses, changes in juvenile justice practices have generally not (even unintentionally) affected broader community safety in a problematic way.

Key Findings: Objective 4

Juvenile justice reform initiatives are implemented in a broader political and financial context and therefore monetary inputs and outputs invariably affect the discussion of their usefulness and, by extension, their sustainability. Given that reality, we undertook analyses of the

potential return on investment realized across the several years covered by this study of Ohio's juvenile justice initiatives. The longitudinal description in trends shows that—after some initial uncoupling—the expenditures on community-based relative to institutionally-based spending shifted along with patterns of youth placement and referral. These shifts were fairly substantial in nature as the overall Ohio state allocations total to Facility, Juvenile Court Subsidies, and Parole declined by roughly one-third from 2008 to 2015 (\$237M to \$156M). This was accompanied by large proportional swings in the budget from facilities and parole expenditures to subsidies to juvenile courts. This suggests that the cost of juvenile justice in aggregate was declining, but it was also being redistributed strategically in association with changes in local decision-making and program development. The overall conservative costs savings amounted to several million dollars, which is not trivial in the context of juvenile court and corrections agency budgets. The ratio of savings to those costs—accounting for relative effects—are quite favorable to community-based alternatives to state custody as well. Intensive Probation returned roughly \$2.70 for each dollar spent and RECLAIM about \$3.50 relative to DYS custody.

Lessons for Federal, State, and Local Agencies

Although juvenile arrests, referrals, and state placements have generally shown a downward trend in recent decades, following the flow of cases and assessing county-level patterns offers insight into what has occurred in juvenile justice in Ohio in recent years and its implications for juvenile justice more broadly. These key findings inform several lessons for federal, state, and local agencies involved in implementing system-wide change in juvenile justice or just desirous of improving their current practice in less extensive ways. Generally, these apply to both what is done in the juvenile justice system (e.g., state vs. community-based placement) as well as how it is done (e.g., leveraging financial incentives, gradually introducing different layers). These efforts

typically require both fostering buy-in *and* making logistic details work (Allio, 2005). The seven lessons effectively blend the bigger picture of juvenile justice with conclusions relevant to necessary practical elements of the key initiatives studied here.

First, this study was based on the integration and analysis of existing data and therefore does not provide a good deal of depth on implementation processes.²⁴ This is important because such recommendations are always subject to implementation context (see Aarons et al., 2011). Still, these findings suggest very clearly that *state and local agencies can drastically reconfigure their approach to juvenile justice over a relatively short time window if they are strategic about it*. While we did not capture the entire change in operations for Ohio’s juvenile justice system (which actually started in some sense with RECLAIM in the 1990s), our results suggest that there was tremendous change over about a decade-long time span. Importantly, this involved both system realignment and justice reinvestment such that both youths and resources were redirected with a reasonable degree of correspondence. This is evident in the findings from Objectives 1 and 4 of the study. Additionally, the findings from Objectives 2 and 3 suggest that this can be done effectively at the case level and also without incurring deleterious impacts on broader juvenile crime trends.

Clearly, systems change is possible, especially if multiple stakeholder interests align and states and agencies can adjust incentive structures for local decision-making. In some ways these findings provide more contemporary evidence that the juvenile justice policy and practices from the 1970s to 1990s that were born in part from trends in juvenile crime of that era—which in part contributed to the need for the reforms studied here—are somewhat needless when agencies are given the opportunity to be more strategic about who is placed in locked residential facilities and

²⁴That is part of the recommendations for future research and evaluation offered below.

who is kept in the community. So, the first lesson here is that big changes can be made by integrating local and state priorities around juvenile justice and there is evidence that the upside is greater than the potential costs. That is not to say that the process was easy or happened over night. It also required a commitment to internal assessment and continuous quality improvement. The initial RECLAIM legislation and programming that began in the 1990s was bolstered by other circumstances (e.g., a settlement agreement) and companion initiatives (e.g., Targeted RECLAIM) such that the package of changes showed a strong, pretty-well optimized, impact during the period under study.

Second, it is clear that a strong desire to improve current policy and practice at the federal and state level is necessary, but not sufficient, for effectively reconfigure placement patterns on the type of scale observed in this study. Certainly, these efforts require a good deal of political will and local and state champions for the initiatives at hand. They also require a great deal of *partnership among personnel and agencies inside and outside of the juvenile justice system*. State and federal agencies can be especially effective at seeing the variability in success and failure across different implementation sites. This can then be used to build a juvenile justice reform readiness checklist to help identify the necessary components in implementing the new initiative and to advise local juvenile justice agencies and their partners on what is necessary. In particular, the roster of treatment types noted for both community-based and residential facility youths in the Objective 2 analysis reinforces the number and type of different stakeholders that must be brought together to ensure that broader shifts in placement strategy can be effective. This may be harder to see at the local court or facility-level and this is a particularly important place for support from state or federal- level agencies—whether they are the primary force behind the initiative or not.

Third, *robust informational and intervention resources* are necessary components of the initiatives discussed in this report. Simply put, there is no way to make a complex system like that covered here work without those elements. Many states and local agencies have now implemented assessment systems such as those available in Ohio (see, e.g., Wachter, 2015). The OYAS helped to fuel these changes via the systematic information that is now available and the fact that a shared vocabulary has developed across agencies and between local courts and the state (Gies, 2015). That tool clearly helped in injecting clearer information into local decision-making processes, which is necessary in any successful placement reform. While all such tools have limitations in administration and usage, a solid understanding of each case is necessary to ensure that appropriate placement and treatment decisions become commonplace and are sustained over time.

Effective programming—including appropriate community control options—is another point of support for these reforms. Local agencies are unlikely to embrace a reform if it comes at the expense of community safety. The results of this study suggest that this was not the case. The central feature of the RECLAIM process, and its subsequent variants, is promotion and use of evidence-based treatment programs. The juvenile justice system is marked by distributed and diffuse choice from intake to reentry, with a few key decision-makers holding greater discretion than others (e.g., judges, probation officers). Consequently, full-scale shifts—whether legislatively driven or not—require a comfort level across multiple constituencies. Therefore, it is necessary to have an array of effective, suitable programs for a juvenile justice population with varied risks and needs. Taken together, these elements of Ohio’s reforms are reminders that the various initiatives discussed in this study did not occur simultaneously, but gradually emerged to become part of an interrelated set of parts. Both pieces are essential in generating the type of patterns of placement and outcome observed in this study.

This suggests that the results observed in this study come not from a single abrupt change but rather an evolving series of initiatives which each built on prior work. Juvenile justice agencies are certainly wired toward making changes to benefit the population with whom they work. Those changes are not always beneficial to youths or agencies, however, and they can also lead to some degree of implementation fatigue if handled inappropriately (Sullivan, 2019). Therefore, the fourth lesson is that *juvenile justice systems, agencies (and their partners), and personnel must utilize information on their cases and outcomes to ensure continuous quality improvement and strategic adaptation—no matter the existing state of the system.* The Targeted RECLAIM portion of the set of initiatives is a good example of this approach as it was a necessary step to more fully engage the deinstitutionalization and diversion process across the full scope of cases encountered by juvenile courts—including those that previously would have been remanded to state custody without appropriate alternatives. Very clearly this has shifted the threshold for state residential placement in a way that has not had obvious negative side effects and is likely positively affecting youths' recidivism and developmental outcomes. The broader lesson is that multifaceted problems will likely require multiple iterations of analysis and response on the part of practitioners and policy makers to develop strategies to fine tune existing processes and address new challenges that arise.

This continuous improvement stance can also help with the pace of change problem that may affect those who are being asked to make decisions differently or implement new types of treatment programs. Both of these elements are present in Ohio's initiatives, but different pieces have been phased in as agencies have become more enmeshed in these evolving approaches to doing juvenile justice. This allows agencies an opportunity to adjust their existing practices before moving to other layers of the interrelated changes. The interaction between year and risk level on

change in placement suggests that these shifts were gradual and based in part on the use of OYAS information. In turn, the impact on recidivism identified here—and its reasonable consistency over time—may not have been realized if several different initiatives were introduced at once leading to poor implementation and outcomes. Of course, there is still apt to be variation in the quality and pace of implementation at the local level; part of the continuous improvement and adaptation process should seek to maximize benefits for as many agencies and youths as possible.

Fifth, the evolving process observed in Ohio also illustrates that *full coverage of juvenile justice populations is necessary for effective and sustainable system-level reforms.*²⁵ The population of the juvenile justice system is quite varied in terms of its risk and needs. It is therefore essential that evidence-based changes to juvenile justice policy and practice account for the full range of cases encountered by local and state agencies (Sullivan, 2019). The juvenile justice reform process in Ohio was inherently linked to the risk profile of the juvenile justice population such that the original RECLAIM process provided alternatives to higher-end placements for multiple tracts of youths. Those ranged from secondary prevention and diversion approaches to more intensive community-based treatment aimed at risks and needs. Still, while there was a higher than desired proportion of low risk youths in DYS facilities early in the study period, it was also necessary to develop alternatives that could be safely targeted to more serious cases (moderate and high risk youths). The integration of Targeted RECLAIM and CCF placement helped to further the effective scope of placement reform, exemplifying a wide-scope approach to developing alternatives to placements that are out of alignment with youths' case profiles. While

²⁵To reiterate, these lessons are generally applicable to both routine juvenile justice practice and more concerted reform efforts.

there are still apt to be places where the youth, case, and placement are not aligned, infrastructure and available options to reduce the likelihood that will happen are now in place.

Sixth, a similar principle of scope should apply at the agency and community level. Agencies and personnel who promote and implement reforms must look past the averages to try to *minimize the degree to which positive shifts are not disproportionately experienced by certain agencies, communities, and subgroups of youths*. The initiatives undertaken in Ohio have been heavily subsidized and supported by the state, which gives local agencies—and the youths they serve—the opportunity to experience the benefits. The data, however, suggest that there are some county-level differences in trends from 2008 to 2014 that could affect the degree to which local agencies and the youths and families with whom they interact gain as a result of broader initiatives. State and federal support agencies should develop strategies to effectively promote adoption and identify local obstacles to full assimilation of core practices in the initiatives. They should also measure the degree to which the youth development, public safety, and financial gains of such initiatives vary across place and encourage broader participation to maximize the scope of any potential benefits. For various, sometimes valid, reasons there are always apt to be difficult-to-engage skeptics and holdouts for such initiatives. Nevertheless, those at planning and support levels should measure and judge the impact of these initiatives in part based on the number and variety of agencies that have adopted and effectively implemented them.

Seventh, and finally, *federal, state, and local officials (and researchers) must stay mindful of the broader policy context at work in making impactful shifts in the operations of the juvenile justice system*. This context invariably includes a public and political officials that are apt to be concerned about community safety and fiscal impact. Thus, some stakeholders will inevitably be skeptical of such changes—even if there is research to support them. Concern about possible

downsides of reform was evident in a 2013 article in the *Columbus (OH) Dispatch* that raised these questions about Ohio's efforts to deinstitutionalize (Manning, 2013). After detailing some of the declines in the DYS population described in this report and noting the research on the relative (in)effectiveness of juvenile incarceration, the author quotes skeptical prosecutors, police officers, and community-members with concerns about whether these efforts may lead to the release of serious juvenile offenders. A central feature of this article was a question about whether these initiatives allowed a 17-year old to commit multiple recent shootings.

Inevitably discussions about juvenile crime and justice will continue to follow broader juvenile crime trends and severe, albeit somewhat isolated, cases (see e.g. Singer, 1997). This underscores the need to evaluate novel juvenile justice initiatives from as many stakeholder vantage points and outcomes as possible. Although serious cases will always attract discussion, in this study the estimated models suggest that there was little aggregate relationship between declining DYS placements and local UCR-based juvenile crime and violence rates. This adds a data point to conversations about potential downstream effects of curtailing juvenile secure placement in favor of community-based alternatives, but agency officials must continue to consider the ways in which various groups will view initiatives such as those studied here. On the cost-benefit side of the policy discussion, this requires some consideration of whose costs and benefits may be most pertinent in adopting and sustaining a particular initiative (Cohen, 2000).

The decades-long declines in juvenile arrest rates for higher profile offenses like murder and robbery have seen some leveling off in recent years (Puzzanchera, 2018b). Our estimates of juvenile arrest trends in Ohio suggest some stability in 2013 and 2014 where there were fairly steady declines previously. Consequently, the relative receptivity for these initiatives in the past two decades, which still poses challenges, may not remain indefinitely. Policy and implementation

contexts can change quickly in juvenile justice and it is therefore wise to know as much as possible—in as many ways as possible—about what is working now and that which has been effective in the recent past. While certain evidence-based intervention programs and localized practices can be implemented without such support that is unlikely to be the case for the large-scale, system-level change that is the subject of this report. Indeed, even more mundane aspects of juvenile justice practice can be affected by the vicissitudes of contracts with private treatment providers or judges losing faith with particular disposition options.

Summary of Lessons Learned

Several important lessons can be drawn from the key findings presented above. Notably, the impacts associated with these initiatives tend to be felt at multiple levels and therefore the process that generates them must be multifaceted too. A great deal of effort is required at the state, local, and even individual youth and personnel level in order to make such initiatives work. In that way these are both top-down and bottom-up processes in the sense that there must be statewide support, but also local resolve and decision-making shifts, in order to produce the trends that have been identified in this study and previous research on Ohio’s juvenile justice initiatives (see Fullan, 1994 for more on that distinction in implementation). This is especially evident in Ohio’s case as certain local juvenile courts, and the counties in which they sit, have the ability to engage in these initiatives to different degrees based on a “local rule” system. Seemingly then the lessons drawn from this focused analysis of the state should be at least somewhat useful elsewhere since these initiatives have generally worked in a diffuse implementation context.

Recommendations for Further Research and Evaluation

Although we prioritize suggestions for policy and practice we also identified a few recommendations for research and evaluation. In the context of the research on juvenile justice

system reform this record-based research amounts to a type of case study of relevant aspects of the Ohio experience in changing its system in recent years. Like other case studies there are some notable benefits, such as the depth of focus on a particular place and the ability to study the situation from a multidimensional perspective (Yin, 2017). There are also some specific and general limitations with this type of focus on a single case and our data and methods, however. That in part informs these recommendations as well.

The main impetus for these recommendations comes from the realization that initiatives like this defy simple comparative, group-based analyses of individual case outcomes and there are several questions to be answered in fully learning from them in research and evaluation. So, while comparative impact is one essential step in program evaluation, questions of usage, efficiency, process and mechanism, cost-benefit, and sustainability require as much attention in such policy and practice contexts (see e.g., Sampson et al., 2013). It is important that juvenile justice researchers consider all those dimensions as part of a broader research agenda on system change.

First, system change is complex and involves various important stakeholders who have good ideas, but also different objectives (see, e.g., Howell, 2003). The research base for these reforms is often focused on either end of a spectrum with impressionistic assessments of statewide trends or case-level comparisons of placement, treatment, and recidivism. We attempted to broaden the scope of evaluation inputs/outputs in considering the impact of juvenile justice interventions by focusing on questions not previously covered in evaluating Ohio's reforms, which have seldomly been covered elsewhere either. Thus we incorporated temporal elements in all models and a court-level and crime rate focus in some objectives. This type of holistic approach—even if executed across studies of state and local agencies' efforts—feeds more evidentiary points into policy research because it can accommodate multiple priorities and meet different

stakeholders where they are in terms of their existing views and decision-making preferences (see Sullivan, 2013). For example, the county-level analyses suggest that there was variability in trends over time and that variability sometimes has an impact on crime rates. Decision-makers may consequently see that they could benefit their agency and community in this type of initiative. This might be perceived differently than effects at the youth level or add additional impetus based on the fact that the potential downsides identified by critics do not materialize. These sensitizing points are relevant in any research on policy (Majchrzak, 1984), but are especially important in juvenile justice as history has shown that broader structural forces and political concerns can alter the policy landscape relatively quickly and without much warning (Bernard & Kurlychek, 2010).

Second, building from this point, future research on macro-level (i.e. state, county) effects of juvenile justice reform should aim to understand the temporal patterns associated with implementation and the associated impacts of those phase-in periods. For example, while substantive differences in county-level justice reform effects were not found between concurrent and lagged models in Objective 3, it is possible that implementation phase-in periods take a longer time to show effects. System-wide changes have complex inputs and outputs that could shift over time and therefore cannot be fully understood in discrete time evaluations. As a practical matter, previous large scale changes in juvenile justice have either eroded or been reversed in decades past (see, e.g., Bernard & Kurlychek, 2010; Klein, 1979) and therefore it is important to consider how they look over time in order to inform an understanding of their sustainability.

Third, Objective 3 found significant between and within county variation in uptake of juvenile justice reform initiatives like RECLAIM and associated changes in numbers of cases placed in state custody. This type of variation in adoption and implementation of evidence-based policy and practice initiatives warrants further research—especially in the unique implementation

contexts of juvenile justice systems. The notion of justice by geography in juvenile courts is predicated on the idea that different case decisions may in part be driven by local circumstances and pre-dispositions (Bray et al., 2005). Likewise, distinctions in service availability, access, and referral may also affect youths' case outcomes (see, e.g., Maschi et al., 2010). Although not the main purpose of this study, we identified a continuing disproportionate rate of Non-White youth placement in DYS facilities in the data collection window. Programs like RECLAIM are meant to level the playing field by incentivizing the development and use of such alternatives.²⁶ Future research should explore this variation and the association of certain county characteristics with justice reform usage, implementation, and outcomes. That is, what makes certain counties more amenable to reform efforts and others not? What does that mean for youths, families, and other stakeholders in those different communities? The distribution and diffusion of benefits from these initiatives have important implications for juvenile justice questions pertinent to prevention of further delinquency and beyond.

It would be especially useful to study those agencies in Ohio—as well as in other states and juvenile courts—that opt-in to those initiatives and those who do not. For example, comparative case studies of such agencies focused on their respective contexts and approaches to processing juvenile cases could help in identifying the real obstacles and potential benefits of involvement in order to inform implementation efforts at the federal, state, and local levels. In turn, linking that to individual and aggregate case outcomes would help to better specify the linkages between juvenile justice reform in theory, its practical implications, and its impact on a

²⁶ This relationship is evident in other recent DMC Research in Ohio as well (see Sullivan et al., 2016) and to some degree could reflect differential distribution of community alternatives that are the engine of placement reform. This question awaits further research in the context of Ohio's initiatives and in other states that are simultaneously trying to reduce out-of-community placements and deal with disproportionate minority contact with juvenile justice and deep-end of the system placements.

variety of stakeholders both inside and out of the juvenile justice system. This should also extend to the various initiatives and programs that are embedded in large system changes. This is a complex set of changes and it is difficult to expect that the average effect will hold universally across place and program (Sampson et al., 2013). That variation is an essential piece of the puzzle in a thorough understanding of the effectiveness, transferability and sustainability of these initiatives.

Finally, the types of changes studied here have a material impact on justice-involved youths and the community-based programs that absorb those cases. At the same time, these actions have transformative effects on the scope of institutional corrections for juveniles. Consequently, research attention should be focused on better understanding those facilities, their personnel, and the youths in custody there as a part of expanding the scope of questions that are considered in understanding the impact of juvenile justice reform. For instance, it is possible that these changes could lead to better in-facility and reentry programming for the youth who do end up in state custody depending on the decisions that are made with respect to housing the now smaller population of youths. In turn, does this pay dividends in the justice-based and developmental outcomes for the serious delinquent youth who are now held in locked facilities? The types of changes assessed in this study invariably create ripple effects and therefore wide-scope research on the juvenile justice system should look at the potential diffusion of benefits and unanticipated consequences that may come with these shifts in order to better inform policy and practice. This is underscored by the shifts in programming and other financial resources and therefore it would be valuable to consider how the different aspects of juvenile justice reform might impact justice-involved youths both in terms of direct and indirect impacts. Considering deinstitutionalization in a fiscal context, it is important that this new status for juvenile corrections is a “launching point”

for effective intervention as costs will not be fully recouped from a changed distribution of placement alone.

Conclusion

Many juvenile justice systems across the U.S. have undergone transformations over the last 20 years. This includes integration of evidence on treatment and sanctions, returning to a more developmental framework, and shifting the distribution of adjudicated cases from locked facilities to community-based alternatives. These efforts involve varied inputs at the state and local level, which must then be operationalized by juvenile justice and treatment personnel who are responding to youths' delinquency on the ground. There is a great deal of complexity in fully assessing the processes that lead to change and the subsequent outcomes. These impacts can feasibly be measured in individual youth success, changes in agency practices, and cost savings. Using multiple points of view in evaluation of policy reform that is intended to affect practice is therefore advisable. Different decision-makers might have distinct motivations so it is important to touch on multiple facets and stakeholders in evaluation—particularly in juvenile justice given its collaborative and diffuse nature. Using Ohio's juvenile justice systems as a focal case, this study helps to identify some of the recent impacts of reform efforts and potential future implications while also identifying leverage points where effects at the case, agency, and state level might be maximized.

Certainly there is much work to do in further understanding these system changes. This contribution provides further support for the viability of realignment, reinvestment, and refining intervention strategies as approaches for enhancing youth and system outcomes to make the system function more effectively and fairly to improve youths' lives while maintaining community safety and controlling public costs. At the same time, we offer some ideas for additional ways to assess

changes to juvenile justice and their multilevel impacts that may be useful in the future. Only in understanding current and recent initiatives can we build useful insight for discussion of responses to juvenile crime as trends and contexts of policy and practice inevitably shift in years to come.

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APPENDIX

Table A1. Individual Offense Types Included in Juvenile Arrest Rates.

Offenses Included in Total Juvenile Arrest	Offenses Included in Juvenile Violent Arrest
Murder	Murder
Rape	Rape
Robbery	Robbery
Aggravated Assault	Aggravated Assault
Burglary	Other Assaults
Larceny	
Motor Vehicle Theft	
Arson	
Other Assaults	
Forgery and Counterfeiting	
Fraud	
Embezzlement	
Stolen Property	
Vandalism	
Weapons Violation	
Prostitution and Commerce Vice	
Sex Offense	
Drug Sale/Manufacture	
Drug Possession	
Gambling	
Bookmaking	
Number/Lottery	
Other Gambling	
Offenses against family/child	
Driving Under the Influence	
Liquor Law Violation	
Drunkenness	
Disorderly Conduct	
Vagrancy	
Other - Except Traffic Violations	
Suspicion	
Curfew, Loitering	
Runaway	

Table A2. Programs Funded by Targeted RECLAIM

County	Program
Allen	Cognitive Behavior Therapy
Ashtabula	Cognitive Behavior Therapy
Butler	Cognitive Behavior Therapy
Cuyahoga	Cognitive Behavior Therapy
	Multi-Systemic Therapy (MST)
	Problem Sexual Behavior MST
	Effective Practices in Community Supervision (EPICS)
Franklin	Multi-Systemic Therapy
Hamilton	Cognitive Behavior Therapy
Licking	EPICS
	Sex Offender EPICS
	Family EPICS
Lorain	Multi-Systemic Therapy
	Problem Sexual Behavior MST
	Cognitive Behavior Therapy
Lucas	Cognitive Behavior Therapy
	EPICS
Mahoning	Cognitive Behavior Therapy
	High Fidelity Wraparound
Medina	Multi-Systemic Therapy
Montgomery	Cognitive Behavior Therapy
Stark	Cognitive Behavior Therapy
Summit	Cognitive Behavior Therapy
	EPICS
Trumbull	Cognitive Behavior Therapy
	EPICS