

Estimating the effects of shrinking the criminal justice system on criminal recidivism

Charles E. Loeffler  | Anthony A. Braga 

Department of Criminology, University of Pennsylvania, Philadelphia, Pennsylvania, USA

Correspondence

Charles E. Loeffler, Department of Criminology, University of Pennsylvania, 3718 Locust Walk, Philadelphia, PA 19104, USA.

Email: cloef@upenn.edu

Abstract

Research Summary: We examined the impact of Raise the Age (RTA) in Massachusetts, which increased the maximum jurisdictional age for its juvenile court in late 2013. Using statewide re-arrest data and a difference-in-differences research design comparing affected 17-year-olds to unaffected 18-year-olds, we find that RTA increased recidivism for affected 17-year-olds. The observed increases in recidivism were especially large for 17-year-olds without prior justice involvement. This result may stem from the more extensive use of pre-trial supervision or the diminished deterrence of prosecution within the Massachusetts juvenile justice system.

Policy Implications: This study demonstrates that prosecuting older adolescents as juveniles can exacerbate rather than reduce future justice involvement. This finding highlights the ongoing risk of unanticipated and iatrogenic impacts of criminal justice interventions. It also suggests the need for caution in further expansions of RTA until evidence of anticipated programmatic benefits can be confirmed.

KEYWORDS

Iatrogenic effects, juvenile justice, Raise the Age, recidivism

The single broadest juvenile justice policy initiative currently being enacted in the United States is Raise the Age (RTA)—a move to increase the upper age boundary of the juvenile justice system to 18 years of age in jurisdictions with sub-18 ages of majority. Just over 10 years ago, 14 states had sub-18 ages of majority. If any of the approximately 1 million 17-year-olds residing in these states were arrested by police, they would automatically have their cases handled in the adult justice system (U.S. Census Bureau, 2020). Currently, just three states continue to have sub-18 ages of majority with all three actively considering eliminating this practice. In addition, several states are presently considering moving their ages of majority beyond 18 (NGA, 2021; Young, 2021). Vermont is already in the process of doing so (Albans, 2022). Altogether, this reform has likely already shifted between 50,000 and 135,000 adolescent arrests from the adult justice system into the juvenile justice system (Puzzanchera, 2021; Snyder, Cooper et al., 2021).

The impetus for this rapidly expanding nationwide jurisdictional boundary can be found in a desire for developmentally informed justice policies. Several decades of research have documented the ineffectiveness of tough-on-crime juvenile justice policies, such as juvenile transfer (Bishop, 2000; Bishop et al., 1996; Fagan, 1996; Loughran et al., 2010), juvenile waiver, and juvenile direct file laws (Augustyn & Loughran, 2017). Nearly two decades of research have also highlighted the distinct developmental limitations and needs of justice-involved youth (Cauffman, 2012; Grisso & Schwartz, 2000; Matthews et al., 2018; Steinberg & Cauffman, 1996, 1999). These include limited emotional regulation, reduced capacity for participation in their own defense, and greater amenability for rehabilitation (National Academy of Sciences, 2013). These twin bodies of research have provided a clear case for handling more young adult cases within the more developmentally-focused juvenile justice system. A system with an emphasis on educational programming, automatic sealing of criminal records, and rehabilitative services often administered in community settings rather than custodial facilities.

Given RTA's staggered roll out across the country and its projected reductions in adolescent criminal justice contact as well as exposure to incarceration, it is well-suited for evaluation (Schiraldi, 2016). However, to date, only two of these earliest state implementations have even been partially evaluated with largely insignificant results (Circo & Scranton, 2020; Fowler & Kurlychek, 2017; Loeffler & Chalfin, 2017; Loeffler & Grunwald, 2015a; Robinson & Kurlychek, 2019). This has led to calls for additional studies, especially additional studies examining the impact of RTA policies on recidivism at the individual level (Farrington et al., 2017). The present study examines the experience of RTA in Massachusetts, the third state to adopt the policy in late 2013. Using individual-level re-arrest data to measure recidivism, this study estimates the effects of Massachusetts' 2013 RTA law on a key component of the RTA policy—its impact on future criminal justice contact following the expansion of the juvenile court jurisdiction from 17 years of age to 18 years of age. The results of this evaluation suggest that RTA had an adverse effect on the likelihood of recidivism for 17-year-olds, especially those without prior justice involvement. These results highlight the ongoing risk of heterogeneous and iatrogenic impacts of criminal justice policy changes even when evidence-based policies are adopted. Implications for emerging adult justice policy are discussed.

1 | ADOLESCENT JUSTICE INVOLVEMENT

Studies have repeatedly demonstrated that while biological maturity proceeds in a commonly understood fashion, with physical and intellectual maturity increasing rapidly during the teenage years, psychosocial maturity of adolescents is not fully achieved until much later, oftentimes not

until the mid-20s (Arnett, 2000; Grisso & Schwartz, 2000; Steinberg & Cauffman, 1996, 1999). This research has called into question the commonplace practice of trying older adolescents as adults given the criminal justice system's conventional expectations of mens rea and its frequent embrace of retributive and deterrence-based sentencing policies (Farrington et al., 2012; Nagin, 1998, 2013). By contrast, the juvenile justice system, created at the turn of the 20th century in part to address these shortcomings, is often considered a more developmentally focused judicial system (Platt, 1977; Tanenhaus, 2004). Unlike the criminal justice system, its proceedings are less adversarial and more focused on addressing underlying root causes of crime, redirecting young adults from additional justice system involvement through educational and behavioral programs delivered in predominately noncustodial settings.

Further highlighting this dichotomy between punitiveness in the adult justice system and rehabilitation in the juvenile justice system, early studies examining the probability of recidivism among youth transferred into the adult system during the tough-on-crime period of the 1980s and 1990s often found higher rates of recidivism among affected adolescents (see generally McGowan et al., 2007; Redding, 2010). Whether these higher observed recidivism rates for transferred youth reflect a criminogenic effect of the adult criminal justice system or selection bias in the assignment of higher risk youth to the adult criminal justice system remains an area of active research. Indeed, newer studies suggest that the impact of juvenile transfer may be null (Mears, 2003; Myers, 2016; Zane et al., 2016). Nonetheless, for policymaking proponents of RTA, this evolving evidence base has been interpreted as strongly supporting efforts to limit adolescent contact with the criminal justice system through jurisdictional shrinkage in order to avoid creating a cycle of future justice system involvement (Campaign for Youth Justice, 2018; Farrington et al., 2012; Justice Policy Institute, 2017; Schiraldi, 2016).

However, the assumption that processing all older adolescents as juveniles will lead to improved life-course outcomes rests on an incomplete picture of the differences between the adult and juvenile justice systems (Gibson & Krohn, 2012). The adult justice system is commonly thought of in terms of its most severe punishments, especially incarceration, but a large number of cases begun in the adult system are dismissed or otherwise ended without a finding of guilt, detention, or conditions of community supervision. Close to a third of all felony cases in state courts end in dismissal or acquittal (Cohen & Kyckelhahn, 2010). Similar statistics can be found for adult misdemeanor courts (Heaton et al., 2017), and rates of dismissal for older adolescents are likely far higher. This tendency towards dismissal in the adult justice system represents a potential safety valve from at least some of its consequences, and it is especially relevant for first-time defendants who are most likely to receive this case disposition. Likewise, the juvenile justice system is most often thought of in terms of its most rehabilitative elements and its extensive use of noncustodial community-based resolutions. However, decades of research have documented the additional ways in which the juvenile justice system, consistent with its interventionist identity, can result in greater disruption to the lives of juveniles than might be assumed based on its progressive reputation (Bernard & Kurlychek, 2010). These range from unnecessary use of custodial facilities (Miller, 1991) and inadequate due process procedures (Feld, 1999) to problems with community-based diversion programming (Klein, 1974, 1976, 1986; Lemert, 1981).

Further complicating matters, an emerging literature on nontransfer youth affected by statutory age boundaries has received less attention in the ongoing policy discussions of RTA. The nontransfer literature examines how the processing of juveniles arrested for a range of offenses not limited to cases subject to transfer, waiver or other selective provisions affects their likelihood of criminal recidivism. Generally, nontransfer studies focus on older adolescents arrested within

weeks or months of the jurisdictional age boundaries, on the assumption that in the absence of age sorting, these youth will be indistinguishable prior to their differential processing.

These studies offer two points of differentiation over the larger literature on juvenile transfer. First, they may produce estimators that are subject to fewer concerns of omitted variable bias caused by reverse transfer, insufficient matching due to plea bargaining, or other related issues identified in the transfer literature (Myers, 2003). Second, they provide estimates for a broader population and one which is much closer, in equilibrium, to the one created by the RTA policies being adopted by Massachusetts and other RTA jurisdictions. These policies not only affect youth likely to receive formal adjudications and commitments to custodial facilities but many thousands who will be subject to informal adjudications. In practice, these studies either find no discernable effect of prosecuting older adolescents as juveniles or some evidence of adverse effects of prosecuting them as juveniles. Early studies in this literature reported no discernable difference in the likelihood of recidivism among adolescents processed on either side of the age boundary (Hjalmarsson, 2009; Lee & McCrary, 2009). Subsequent studies have reported small but significant reductions in recidivism for adolescents processed as adults (Hansen & Waddell, 2014; Loeffler & Grunwald, 2015b; Lovett & Xue, 2018).

2 | RTA EVALUATION LITERATURE

Of the many hoped for benefits and feared costs of RTA, two principal domains have been empirically examined after its implementation. These two areas are the effects of RTA laws on the costs of justice system administration and the effects of RTA laws on juvenile crime. Implementation reports examining the costs of administration have repeatedly observed that the costs of handling 17-year-olds and other sub-18-year-olds within the juvenile justice system have turned out to be much lower than projected (Illinois Juvenile Justice Commission, 2013; Justice Policy Institute, 2013). These better-than-expected actual costs stem largely, although not exclusively, from the continuing downward trend in juvenile arrest rates during this period (Puzzanchera, 2018). This trend also being responsible for at least some assessments showing lower aggregate levels of juvenile crime after enactment and implementation (Loeffler & Chalfin, 2017).

By contrast, the scholarly literature examining the effects of RTA on juvenile crime has reported a much more mixed set of findings. An evaluation of the first RTA juvenile justice expansion, which occurred in Connecticut in 2010, found that while there were sizable reductions in the arrests of affected adolescents following RTA enactment and implementation, similar reductions could be observed for adjacent untreated age groups (Loeffler & Chalfin, 2017). A subsequent study, also examining Connecticut, found that recidivism outcomes for 16-year-olds affected by the first half of the state's expansion manifested sizable drops in recidivism after the law took effect (Fowler & Kurlychek, 2017). However, the absence of a control group in this study limits the causal interpretation of this finding, especially in light of similarly sized drops in reported crimes and arrests for adjacent age groups (Loeffler & Chalfin, 2017). A more recent study of Connecticut's implementation, focused on the second phase expansion from 17 to 18 years of age, used a difference-in-differences research design with 18-year-olds as the control group, and found only a marginally statistically significant effect of RTA on recidivism for 17-year-olds (Robinson & Kurlychek, 2019). This finding was also echoed by the most recent study of RTA in Connecticut which examined its impact on motor vehicle thefts and found no discernable change (Circo & Scranton, 2020). Finally, an evaluation that examined the probability of recidivism for

juveniles affected by the first half of Illinois' expansion of the juvenile justice system to cover 17-year-olds charged with misdemeanor offenses found that there were no significant changes in recidivism outcomes for affected juveniles after controlling for changes for untreated juveniles of very similar ages (Loeffler & Grunwald, 2015a).

The absence of discernable beneficial effects in existing evaluations, at least in those studies that employed research designs with control groups, coupled with the existence of multiple sub-literatures that support both beneficial and adverse recidivism predictions for RTA, suggest the value of examining the impact of RTA in additional jurisdictions. However, the partially integrated prior knowledge on the impact of prosecuting adolescents as adults also complicates the formulation of an expected impact of RTA in Massachusetts and beyond. Proponents and analysts of RTA (Campaign for Youth Justice, 2018; Cooper & Klein, 2018; Justice Policy Institute, 2017; Farrington et al., 2012; Schiraldi, 2016) have focused exclusively on the findings from the early transfer literature to project the anticipated benefits of RTA in terms of reductions in recidivism for affected youth. Embedded in this logic is the assumption that a criminogenic adult justice system rather than unaccounted for selection bias in transfer studies accounts for higher recidivism often seen among transferred adolescents. However, accepting this assumption requires ignoring the more recent transfer studies summarized in Zane et al. (2016). Incorporating these more recent studies suggests that a null effect is the most likely impact of RTA on recidivism, at least for transfer-type adolescent populations. This prediction is also the most consistent with the available empirical evidence on the crime impact of RTA in Connecticut and Illinois (Circo & Scranton, 2020; Fowler & Kurlychek, 2017; Loeffler & Chalfin, 2017; Loeffler & Grunwald, 2015a; Robinson & Kurlychek, 2019).

At the same time, recent studies in the nontransfer literature have hinted at the possibility that trying older adolescents as adults can lead to lower levels of future justice involvement (Hansen & Waddell, 2014; Loeffler & Grunwald, 2015a; Lovett & Xue, 2018). Whether these decreased levels of continued justice involvement for adult processed adolescents reflect decreased levels of re-offending or decreased scrutiny by the adult justice system remains an open research question (Levitt, 1998). However, combining these various strands of research suggests that RTA could produce heterogeneous treatment effects with formally adjudicated youth, who most closely approximate the population affected by transfer provisions in other states, experiencing a null impact and informally adjudicated youth, who most closely approximate the population described in the nontransfer literature, experiencing a potentially small adverse impact.

3 | CURRENT STUDY

To measure the causal impact of Massachusetts' RTA law on criminal recidivism, we employ a quasiexperimental research design that uses longitudinal arraignment data to measure changes in recidivism for RTA-affected justice-involved 17-year-olds and comparable unaffected justice-involved 18-year-olds. Specifically, we examine a sample of all 17- and 18-year-olds arraigned in all Massachusetts courts in the 2 years before and after RTA. By measuring changes in recidivism for sample members at the individual-level, this study overcomes previously identified limitations of aggregate-level evaluations of RTA (Farrington et al., 2017; Loeffler & Chalfin, 2017). It also focuses on the possibility of heterogeneous treatment effects for the first time.

Massachusetts became the third U.S. state to raise the age when it raised its maximum age of juvenile court jurisdiction from 17 to 18 years of age on September 18, 2013. Prior to the act's passage

and signing, 17-year-olds, except in limited circumstances, would have their criminal cases handled in the adult justice system. For 2012, this population numbered 3,046 17-year-olds handled in Massachusetts criminal courts (Amelinckx & Redmond, 2013). Like other early adopters, such as Illinois and Connecticut, Massachusetts had long been known for its juvenile justice reforms beginning with its deinstitutionalization of juvenile custodial facilities in the 1970s (Miller, 1991). This may explain why the passage of RTA in Massachusetts occurred with broad bi-partisan support as well as the support of law enforcement officials (Amelinckx & Redmond, 2013).

Like many other early adopting states, Massachusetts retained the option of charging more serious adolescent conduct in the adult criminal justice system. However, this exclusion was relatively limited in scope. The default response for justice-involved 17-year-olds would be the juvenile justice system composed of the Juvenile Court Division of the Massachusetts Trial Court and the Massachusetts Department of Youth Services (DYS). This approach mirrors the approach taken by Connecticut, which included youth facing felony and misdemeanor charges in its initial expansion. It stands in contrast to Illinois, which initially limited its expansion to misdemeanor defendants in 2010 before expanding it to cover most felonies in 2014. Louisiana similarly limited RTA to nonviolent charges in 2019 before expanding it to most charges in 2020. New York, uniquely among U.S. states, adopted a shift in jurisdiction for youth charged with nonviolent felonies while creating a separate adolescent offender sub-division under its criminal court to handle young adults facing felony charges (New York State, 2020).

Following enactment in Fiscal Year 2014, the Massachusetts Juvenile Court handled 2,417 17-year-olds out of a total of 9,899 delinquency petitions and 37,157 total cases filed (SJC, 2015). Most counties saw an increase in their juvenile caseloads either before or just after the passage of RTA. Of the 11 juvenile court locations within Massachusetts, roughly half saw little evidence of an increase in juvenile delinquency caseload after RTA, with the other half seeing a general increase that may or may not be related to RTA. Beginning in Fiscal Year 2015, Massachusetts District Courts saw a steady decline in aggregate caseload after being stable in prior years.

At the time of enactment of Massachusetts' RTA provision, there was little policy discussion of anticipated changes in case handling procedures for the bulk of affected adolescent arrestees. Instead, as in many RTA jurisdictions, policy discussions focused largely on the anticipated benefits of reducing the practice of imprisoning juveniles in adult prisons, increasing access to rehabilitative programming and reducing re-offending through shifting affected youth into a more developmentally appropriate system (Spilka, 2013; The Boston Globe, 2013). Contemporaneous DYS reports suggest integration of newly "juvenile" 17-year-olds presented programmatic and safety challenges that were attributed to a number of differences between 17-year-olds and 16-year-olds, especially their lack of interest in program participation due to their short lengths of stay and rapid aging out of custody (Massachusetts DYS, 2016).

Beyond the experience of committed and/or imprisoned youth, other notable changes in the experience of affected 17-year-olds included the fact that all 17-year-olds would be subject to an even more stringent Criminal Offender Record Information regime limiting access to records of their justice system involvement. The connection between formal labeling and recidivism has repeatedly shown that the more labeled a juvenile offender, the more likely that secondary offending will result (Chiricos et al., 2007; Liberman et al., 2014). This suggests that the practice of de-labeling implicit in sending 17-year-olds into the juvenile justice system could have beneficial effects on recidivism, assuming that the juvenile justice system was equally likely to make a determination of guilt conditional on initial system involvement.

4 | DATA AND METHODS

The data used in this study cover all initial court arraignments for 17- and 18-year-olds between the years of 2011 and 2015 in the Commonwealth of Massachusetts corresponding to a pre-/post-enactment sampling frame window of 2 years from September 18, 2013, the effective date of RTA. This sampling frame provides coverage for all juvenile and criminal cases involving 17- and 18-year-olds during this period whether cases began in the adult or juvenile court divisions of the Massachusetts courts. By relying on an initial arraignment sampling frame across court systems, this study minimizes the risks of nonuniform coverage of 17-year-olds' justice involvement as their cases were shifted from the adult justice system to the juvenile justice system with the arrival of RTA. Arraignment records were requested from the Massachusetts Department of Criminal Justice Information Services (DCJIS) which maintains the criminal history repository for the state. These records generally serve as the default measure of justice system involvement for research purposes (Jackson & Zhao, 2017; Kohl et al., 2008). A total of 29,836 cases were identified as meeting the sampling frame requirements.

To evaluate the impact of RTA on recidivism, a measure of within Massachusetts recidivism was calculated for each case using re-arraignment as the definition of recidivism. Re-arraignment, calculated as a binary measure, was dated to the first new arraignment occurring after the date of initial arraignment leading to case inclusion within the sampling frame for all individuals with a unique fingerprint-based criminal justice identifier. For the purposes of calculating re-arraignment, juvenile and adult re-arraignments were considered as equivalent decisions. Compared to other measures of recidivism (e.g., re-arrest or reconviction), re-arraignment likely corresponds most closely to re-arrest since nearly all arrests lead to filing of charges. A 5-year re-arraignment follow-up measure was chosen as the binary recidivism measure in order to better understand the long-term effects of RTA on recidivism and to overcome the imprecision of previous published estimates (Loeffler & Grunwald, 2015a; Robinson & Kurlychek, 2019).

Additional control variables were calculated from available DCJIS fields. Both count and binary measures for prior justice involvement were calculated using the same fingerprint-based identifier used to link all arraignments involving the same individual in the sample. If sample members had any arraignments prior to entrance into the sample, each such arraignment was counted as a separate instance of prior justice involvement. If sample members had no prior arraignments before entering the sample, they were considered to have no prior justice involvement. Offense codes from the underlying arraignment charges were then used to construct measures of general offense categories based on UCR offense categories. Demographic control variables consisting of sex and race were similarly calculated using corresponding DCJIS fields. Sex information was available for all sample members. Race/ethnicity information was available for 88% of sample members.

Using this information, we estimate a differences-in-differences estimator (DiD) to evaluate the impact of RTA. The DiD is extensively used in evaluation research and has previously been used in three out of four published RTA evaluations. Equation 1 describes the basic model employed in this analysis:

$$\Delta Y_i = \beta_0 + \beta_1 \text{Age17}_i + \beta_2 \text{RTA}_i + \beta_3 (\text{Age17}_i + \text{RTA}_i) + \mu_i, \quad (1)$$

where Y_i is a 5-year binary recidivism measure for the i th observation, β_0 is the average recidivism rate for the control group prior to RTA, Age17_i is a dummy indicating whether the observation

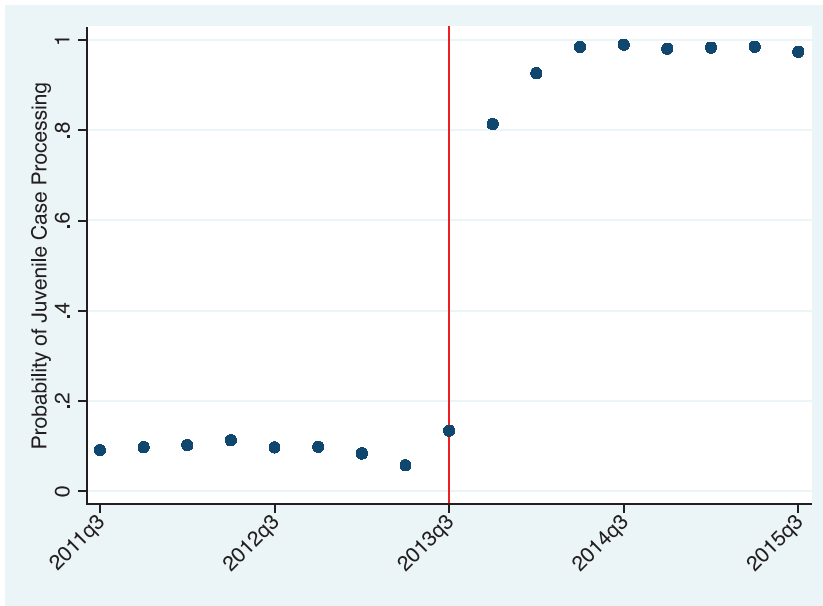


FIGURE 1 Probability of juvenile court processing [Color figure can be viewed at wileyonlinelibrary.com]

was 17-years-old, RTA is a dummy indicating whether the observation was post-RTA-enactment, and $\text{Age17} \times \text{RTA}$ captures the interaction. In substantive terms, β_1 captures the difference in the probability of recidivism between 17-year-olds and the control group composed of 18-year-olds during the preintervention period. β_2 captures the difference between the pre- and post-intervention recidivism probabilities for the control series. And β_3 reflects the DiD estimator itself—the estimated effect of RTA on recidivism for the treated population if its trend had matched that of the untreated population.

The DiD estimator provides an unbiased estimator of the causal effect of RTA if the law was implemented with fidelity, no other contemporaneous changes solely affected 17-year-olds, and 17- and 18-year-olds manifest parallel trajectories prior to RTA (Angrist & Pischke, 2009). This estimator can also be interpreted as a modified regression discontinuity design due to its focus on RTA's impact on a relatively narrow age window. Figure 1 confirms that enactment of RTA led to a rapid change in the processing of justice-involved 17-year-olds from the criminal justice system into the juvenile justice system. Prior to RTA, nearly all 17-year-olds were arraigned in criminal court. After RTA, virtually all 17-year-olds were arraigned in the juvenile court. This rapid re-assignment of 17-year-olds following the passage of RTA serves as confirmation of program implementation.

As an additional check on the comparability of the two populations, Table 1 reports the baseline characteristics of 17- and 18-year-olds arrested in the 2 years prior to the enactment of RTA. Seventeen- and 18-year-olds during this period were arraigned for nearly the same broad set of offenses and shared a similar demographic composition. The most notable differences between these two groups were in the extent of their criminal histories, which is to be expected given the age difference, and in the offense distribution. To further improve comparability between treatment and control groups, we then restricted these comparisons to only those 17- and 18-year-olds who are arrested within 180 days of their 18th birthday. These age-restricted models manifest improved covariate balance and, in conjunction with controls for demographics and offense type, form our

TABLE 1 Average baseline characteristics for 17- and 18-year-olds

Variable	All arraigned cases		Cases arraigned w/180 days of 18th birthday	
	(Seventeen-year-olds)	(Eighteen-year-olds)	(Seventeen-year-olds)	(Eighteen-year-olds)
Male	0.779	0.785	0.776	0.781
White	0.581	0.624	0.597	0.617
Black	0.226	0.189	0.216	0.194
Hispanic	0.052	0.056	0.049	0.058
Other	0.017	0.015	0.018	0.015
Missing	0.124	0.115	0.120	0.117
Any priors	0.438	0.470	0.436	0.464
Violent	0.294	0.251	0.283	0.259
Property	0.275	0.251	0.274	0.263
Drug	0.090	0.103	0.089	0.101
Other offense	0.341	0.395	0.354	0.378
Observations	7357	10,255	3904	4407
				(p-Value)
				0.750
				0.624
				0.296
				0.160
				0.208
				0.882
				0.013
				0.933
				0.383
				0.914
				0.507

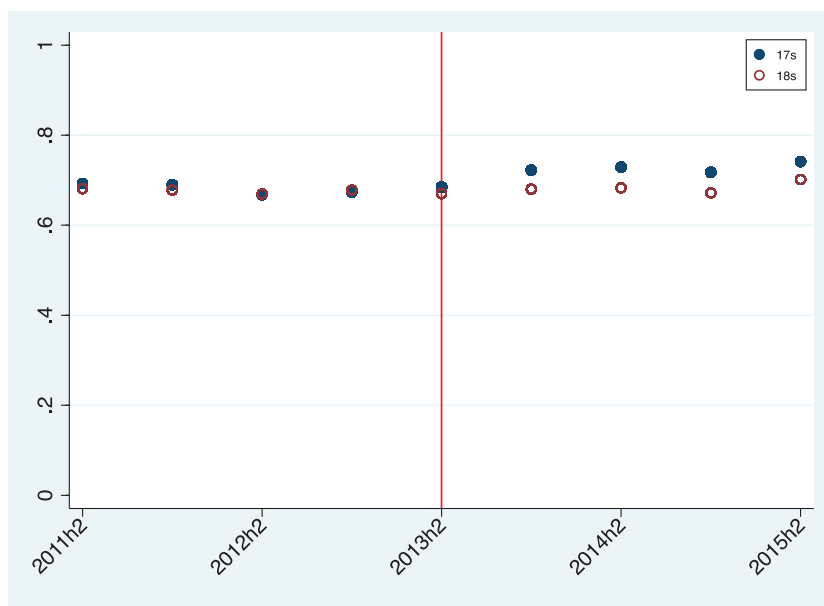


FIGURE 2 Probability of recidivism by age [Color figure can be viewed at wileyonlinelibrary.com]

preferred estimator. All models were run both as linear probability models and limited dependent variable models with linear models reported for interpretability. Figure 2 provides a final check of the parallel trends' assumption by comparing the probability of recidivism in the period preceding and immediately after the enactment of RTA for 17- and 18-year-olds. Both 17-year-olds and 18-year-olds manifest similar and nearly indistinguishable trends in recidivism in the period leading up to RTA, reinforcing the likelihood that observed post-RTA differences between these groups can be attributed to RTA.

After estimating the impact of RTA on recidivism using the DiD and the full sample, we re-use this model to examine the impact of RTA on youth with and without prior justice involvement in order to better understand the heterogeneous effects of RTA. We also use this model to examine intermediate case outcomes including probability of diversion, probability of commitment to juvenile or adult custody as well as probability of case dismissal. These intermediate case outcome models, all estimated with our preferred model specification (i.e., with controls and age restrictions), provide a window into potential mechanisms driving any observed differences in recidivism for affected 17-year-olds.

Finally, we estimate a time-until-failure model for affected 17-year-olds and comparison youth in order to identify the exact timing within the 5-year follow-up window at which any differences in recidivism begin to emerge.

5 | RESULTS

Table 2 reports the results of the DiD model comparing 17-year-olds to 18-year-olds as the former were moved into the juvenile justice system and the latter were retained in the adult justice system. Column 1 provides a baseline estimate of the impact of this shift. The near zero and insignificant coefficient on Age17 indicates the absence of significant baseline differences in recidivism rates between these two groups prior to the implementation of RTA. The similarly near zero and

TABLE 2 Effect of Raise the Age (RTA) on probability of re-arraignment within 5 years

Variable	(1)	(2)	(3)
Age17	0.0046 (0.0071)	0.0085 (0.0067)	0.0004* (0.0094)
RTA law	0.0048 (0.0071)	-0.0308*** (0.0067)	-0.0259** (0.0099)
DiD	0.0379** (0.0111)	0.0488*** (0.0105)	0.0397** (0.0149)
Controls	No	Yes	Yes
Age restrictions	No	No	Yes
Constant	0.6754*** (0.0046)	0.5873*** (0.0058)	0.5918*** (0.0085)
Observations	29836	29836	14532

Note: Standard errors are in parentheses.

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

insignificant coefficient on the dummy variable for RTA Law indicates the absence of a change in recidivism rates for the 18-year-olds retained in the adult system. And the positive and significant coefficient on the interaction between these terms (DiD) indicates that 17-year-olds saw a nearly 4% increase in their probability of recidivism after RTA compared to both their own pre-RTA levels and the near zero difference between pre- and post-RTA levels for 18-year-olds. Column 2 adds controls for prior justice involvement, offense type, as well as demographics to the baseline model. The results of this model are broadly similar although a decline in recidivism for 18-year-olds after RTA leads to a slightly larger estimate of the impact of RTA for 17-year-olds (3.8 without controls versus 4.9 with controls). Column 3 reports the regression results for the model with the addition of an age restriction limiting the sample to 17- and 18-year-olds arraigned within six months of their 18th birthday. These results again largely mirror the other two models but with a coefficient on the DiD that is closer to the results reported in Model 1. Taken together, the results of these regressions indicate that RTA led to a 4–5% increase in the probability of recidivism beyond what would have been expected based on pre-existing trends.

This pattern is also visible in Figure 2 which splits the unadjusted recidivism trends by age at initial arraignment. Both 17-year-olds and 18-year-olds manifest overlapping and nearly indistinguishable trends in recidivism in the period leading up to RTA. Beginning in the period including implementation of RTA, these trends begin to diverge with a visible jump in recidivism rates for 17-year-olds in the first full period after implementation. This jump in 17-year-old recidivism contributes to the formation of a persistent and stable gap in recidivism rates between 17- and 18-year-olds.

To better understand whether the RTA produced uniform or heterogeneous treatment effects, Table 3 reports the results of the re-estimated DiD model for youth with and without prior justice involvement. Column 1 provides a baseline model for youth without prior justice involvement. Before RTA, these 17-year-olds were 2% more likely to be re-arraigned within 5 years compared to 18-year-olds. After RTA, the re-arraignment rate for 18-year-olds went down but the re-arraignment rate for 17-year-olds went up, leading to an estimated increase in 17-year-old recidivism of just over 7%. This estimated change being considerably larger than the estimate for all 17-year-olds reported in Table 2. The DiD model reported in Column 2 adds controls for offense type and demographics. The re-estimated effect is a half a percentage point smaller but

TABLE 3 Effect of Raise the Age (RTA) on probability of re-arraignment within 5 years by prior justice involvement

Variable	Seventeen-year-olds w/o priors			Seventeen-year-olds w/priors		
	(1)	(2)	(3)	(4)	(5)	(6)
Age17	0.0233* (0.0102)	0.0122 (0.0101)	0.0026 (0.0142)	0.0033 (0.0083)	0.0007 (0.0082)	-0.0005 (0.0114)
RTA law	-0.0397*** (0.0109)	-0.0418*** (0.0107)	-0.0351* (0.0157)	0.0006 (0.0078)	0.0003 (0.0077)	0.0019 (0.0114)
DiD	0.0730*** (0.0169)	0.0688*** (0.0166)	0.0654** (0.0238)	0.0084 (0.0125)	0.0094 (0.0123)	-0.0040 (0.0173)
Controls	No	Yes	Yes	No	Yes	Yes
Age restrictions	No	No	Yes	No	No	Yes
Constant	0.532*** (0.0067)	0.517*** (0.0084)	0.515*** (0.0124)	0.838*** (0.0053)	0.837*** (0.0070)	0.847*** (0.0102)
Observations	15298	15298	7460	14538	14538	7072

Note: Standard errors are in parentheses.

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

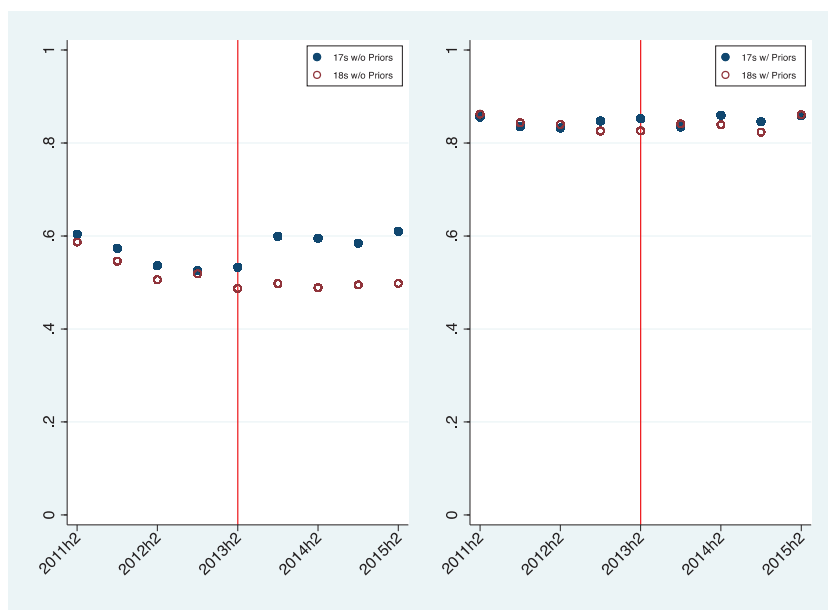


FIGURE 3 Probability of recidivism by prior justice involvement [Color figure can be viewed at wileyonlinelibrary.com]

largely unchanged and still highly significant at conventional levels. The final model reported in Column 3 adds age restrictions so that the comparison is limited to 17- and 18-year-olds without prior justice involvement arraigned within 6 months of their 18th birthdays. These restrictions further improve baseline comparability between 17- and 18-year-olds used in the comparison. The estimated effect of RTA in this model shrinks by a fraction of a percent but remains near the 7% initially estimated in the baseline model. This pattern is also visible in Figure 3 which splits

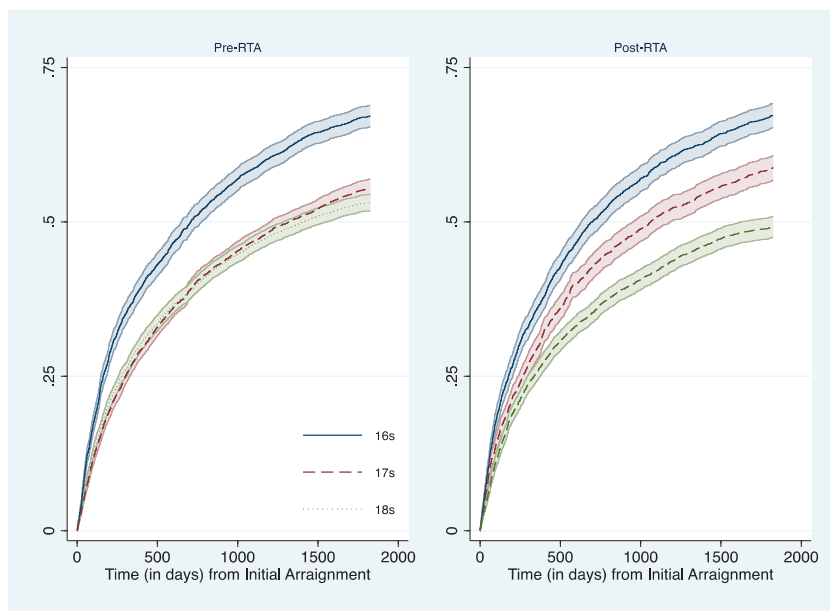


FIGURE 4 Cumulative probability of recidivism for cases w/o priors [Color figure can be viewed at wileyonlinelibrary.com]

the unadjusted recidivism trends by prior justice involvement. Both 17- and 18-year-olds without prior justice involvement manifest similar declining trends in recidivism in the period leading up to RTA. Beginning in the period including implementation of RTA, these trends begin to diverge with a large jump in recidivism rates for 17-year-olds in the first full period after implementation. This jump in 17-year-old recidivism contributes to the formation of a persistent gap in recidivism rates between 17- and 18-year-olds. Taken together, the results reported in Table 3 and Figure 3 suggest that RTA, unexpectedly, contributed to a sizable increase in recidivism for affected youth without prior justice involvement.

Table 3 also reports the results of the DiD estimator applied to 17-year-olds with prior justice involvement. Similar to models for youth without priors, baseline pre-RTA recidivism rates for 17- and 18-year-olds with priors have minimal discernible differences. Unlike the results for youth without prior justice involvement, recidivism rates for youth with prior justice involvement appear to have been unaffected by the introduction of RTA. From the baseline model reported in Column 4 to the final specification in Column 6, 17-year-olds with prior justice involvement are estimated to have had no statistically significant change in their recidivism rates. A visual examination of these patterns can be seen in Figure 3. Unlike youth without prior justice involvement, 17- and 18-year-olds with prior justice involvement have higher baseline recidivism levels that remain stable after RTA is implemented. These secondary results highlight the heterogeneous effects of RTA and indicate the results reported in Table 2 are driven almost entirely by the impact of RTA on youth without prior justice involvement.

Figure 4 reports the results of a cumulative time-until-recidivism model comparing the re-arraignment rates for 17-year-olds to the rates for both 16-year-olds and 18-year-olds originally arraigned just before and just after the introduction of RTA. Prior to RTA, the 17-year-old cumulative re-arraignment rate closely followed the cumulative re-arraignment rate for 18-year-olds, who at the time were also prosecuted in the criminal justice system. Both trends are statistically indis-

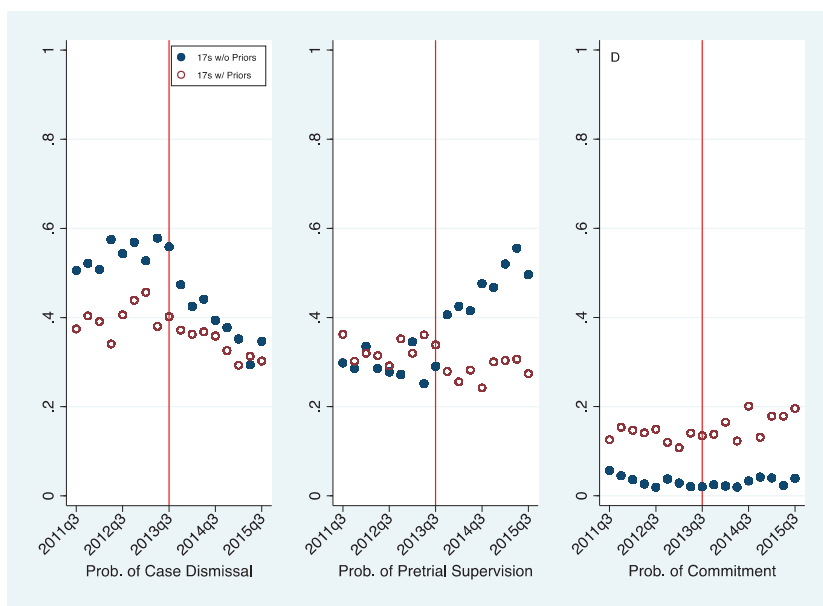


FIGURE 5 Probability of case dismissal and diversion by prior justice involvement [Color figure can be viewed at wileyonlinelibrary.com]

tinguishable from each other. In addition, these cumulative recidivism curves fall well-below the curve for 16-year-olds, who both before and after RTA, were handled in the juvenile justice system. After RTA, 17-year-old re-arrestment rates no longer mirror those of 18-year-olds but instead fall in-between the significantly higher re-arrestment rate for 16-year-olds and the significantly lower re-arrestment rate for 18-year-olds. By as early as 14 months after initial arraignment, 17-year-olds newly processed in the juvenile justice system are significantly more likely to face a second legal case than they were in the pre-RTA period. This pattern confirms that the early post-RTA experience of 17-year-olds included a modified trajectory that included a greater likelihood of continued justice involvement.

Figure 5 explores case processing differences between the adult and juvenile justice systems as they affected 17-year-olds with and without prior justice involvement. This comparison recognizes the fact that the primary results reported in Table 2 are driven exclusively by the estimated impact of RTA on 17-year-olds without prior justice involvement. Examining these trends, the first notable finding is that 17-year-olds without prior justice involvement saw a large increase in the use of pretrial supervision overseen by juvenile probation officers. Outright dismissals dropped from nearly 60% of cases to under 40% within 2 years. Likewise, the use of pretrial supervision and other preadjudication programs jumped from 30% of cases to 55% of cases over the same 2-year period. By contrast, 17-year-olds with prior justice involvement saw a smaller change in the probability of dismissal and a reduction in the use of pretrial supervision. Neither subpopulation saw a large change in their probability of commitment to a juvenile or adult institution, consistent with the low levels of formal adjudication and commitment in both systems, especially for older adolescents. However, 17-year-olds with prior justice involvement saw a small increase in their probability of commitment to a correctional authority.

Table 4 reports a re-estimated DiD model for intermediate case outcomes, again split by prior justice involvement. The large decreases in outright case dismissal and increases in pretrial super-

TABLE 4 Effect of Raise the Age (RTA) on case processing outcomes

Variable	w/o Priors	w/Priors	All cases
Case dismissal	-0.0771** (0.0240)	-0.0692** (0.0233)	-0.0766*** (0.0168)
Pretrial supervision	0.1069*** (0.0223)	-0.0677** (0.0220)	0.0155 (0.0157)
Commitment	0.0052 (0.0085)	0.0459** (0.0175)	0.0294** (0.0098)
Controls	Yes	Yes	Yes
Age restrictions	No	No	Yes
Observations	7460	7072	14,532

Standard errors are in parentheses.

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

vision observed in Figure 5 are confirmed to be robust to the introduction of statistical controls for youth without prior justice involvement. Interestingly, the decreases in case dismissal are also observed for 17-year-olds with prior justice involvement. This suggests that the juvenile justice system, at least in Massachusetts, is less likely to use outright case dismissal than the adult justice system. This result also suggests that probability of case dismissal, at least in of itself, is unlikely to be the mechanism driving elevated recidivism rates for youth without prior justice involvement. Pretrial supervision, however, is estimated to have declined rather than increased for youth with prior justice involvement. Instead, commitment to correctional authorities increased, something not observed for youth without prior justice involvement. This combination of findings could be consistent with the hypothesis that supervision absent support, a hallmark of many preadjudication programs, may either exacerbate re-offending or more closely scrutinize existing levels of re-offending than outright dismissal or program-supported correctional intervention. However, this interpretation must also be balanced against the extremely high baseline levels of continued justice involvement for youth with prior justice involvement as seen in Table 2. Diminished deterrence among first-time individuals is another possible interpretation.

6 | DISCUSSION

After decades of major expansion in the U.S. criminal justice system, many jurisdictions are experimenting with policies that will provide public safety benefits while minimizing the deleterious effects linked to excessive use of criminal justice sanctions. These initiatives range from justice reinvestment programs (La Vigne et al., 2014) to the State of California’s multi-part Realignment Initiative (Lofstrom & Raphael, 2016; Ouss, 2020). RTA represents another of these initiatives in its use of evidence-based policy targeted at reducing the size of the criminal justice system by reallocating potential system entrants into a more developmentally focused alternative justice framework. Unlike these other initiatives, many of which are envisioned and implemented jurisdiction by jurisdiction, RTA represents a largely unified policy which has been adopted in numerous jurisdictions in a broadly recognizable form. States from Vermont to Louisiana have adopted this change and a number of jurisdictions are now contemplating further expansions of their ages

of majority. As such, RTA policy implementations collectively represent the single largest young adult justice policy change currently being enacted in the United States.

In spite of this large and expanding policy footprint, relatively few RTA implementations have been rigorously evaluated and scholars continue to debate what the long-term impact of RTA will be. Proponents argue that the existing evidence base strongly supports the likelihood that raising the age will lead to reduced young adult recidivism due to reduced exposure to a multitude of counterproductive features of the adult justice system (Farrington et al., 2012). Other scholars point out that much about prosecuting young adults as juveniles remains unknown (Gibson & Krohn, 2012). With previous evaluations from the first two adopting jurisdictions of Connecticut and Illinois generating largely inconclusive short-term results, it remains an open question whether RTA will generate its anticipated benefits or instead will lead to results closer in size to those observed in past juvenile justice jurisdictional reforms (Zane et al., 2016).

The present study was designed to examine the impact of RTA in Massachusetts, the third U.S. jurisdiction to adopt RTA in late 2013, with the goal of understanding the long-term impacts of RTA on continued justice system involvement. While broadly similar to other adopting jurisdictions, several features of Massachusetts' implementation of RTA lend themselves to generating new insights about RTA's impact. Massachusetts is notable for implementing RTA at a single point in time rather than as part of a multi-year transition. This feature simplifies its evaluation compared to other jurisdictions that adopted RTA in multi-step processes. Massachusetts also adopted RTA early enough that its long-term impacts can be scrutinized. Finally, Massachusetts implemented RTA with a high degree of fidelity, reducing some of the implementation uncertainty seen in other early adopting jurisdictions (Loeffler & Chalfin, 2017).

After gathering 5-year recidivism outcomes for both RTA affected youth and adjacent RTA unaffected youth both before and after the implementation of RTA, the results of this evaluation suggest that RTA in Massachusetts produced limited public safety benefits and tangible costs. Contrary to expectations (Spilka, 2013), RTA did not lead to reductions in recidivism for affected 17-year-olds. Instead, recidivism for this group actually increased by between 4% and 5% over the 5 years that followed the implementation of RTA. Further analysis also revealed a considerable amount of treatment effect heterogeneity. Seventeen-year-olds without prior justice involvement were found to have a 7% increase in their risk of recidivism over the 5 years that followed the implementation of RTA. Seventeen-year-olds with prior justice involvement were not found to have any significant change in their risk of recidivism.

These results come with a number of limitations. First, since they rely on administrative data rather than self-reported information to measure recidivism, these results can only speak to whether RTA affected continued justice system involvement. The observed increase in justice system involvement could be a product of increased offending by 17-year-olds. It could also be a reflection of differential official handling of 17-year-olds (Klein, 1986). Second, although the results of this evaluation are the strongest available evidence to date of adverse effects from RTA, these results cover only one state's experience with RTA. The effects in more recent adopting jurisdictions could differ due to differences in their juvenile and adult justice systems or features of their RTA laws. Later adopting states also have had the opportunity to learn from early adopting states. Finally, these results evaluate only one of the key dimensions upon which RTA could potentially have programmatic benefits—recidivism. Effects on self-reported offending, effects on school attachment, educational attainment, and labor market participation remain unexplored. Future evaluations of these potential programmatic benefits are needed.

Nonetheless, these results raise the question of why RTA would fail to produce reductions in justice system involvement and why the adverse results observed would be concentrated within

the subpopulation of young adult cases with the least justice system involvement. We consider there to be two competing possibilities.

The first possibility is that RTA is a well-theorized justice reform policy that was poorly implemented within the adopting jurisdiction of Massachusetts. If this explanation is correct, we would expect to see the worst adverse impacts concentrated within the population most closely aligned with target population of the reform—youth with prior justice involvement who would be at risk for the most punitive responses if their cases were handled in the adult justice system. However, while these youth were observed to have no improvements in their recidivism measures, they were also not the group most adversely affected. And while Massachusetts did implement RTA much more rapidly than many other early adopting jurisdictions, its early experience with RTA appears to have been no more problematic and potentially much smoother than other early adopting jurisdictions (CYJ, 2018; Massachusetts DYS, 2016). Therefore, this explanation is currently not well-supported.

The second possibility is that RTA is a well-executed implementation of a poorly theorized justice reform policy. Early discussion of RTA included concerns that at least some aspects of RTA's theory of action were assumed rather than well-grounded in existing empirical literatures (Gibson & Krohn, 2012). These scholars argued that many of the undesirable features of the adult justice system could be correctly characterized by proponents of RTA and yet the impact of switching older adolescents into the juvenile justice system might still not be helpful. This could be the case if the parallel set of assumptions regarding the beneficial features of the juvenile justice system were overestimated or if the deterrent value of trying older adolescents as juveniles was underestimated. In practice, there are two distinct ways of assessing this possibility—an outcome test looking across all dimensions upon which RTA was theorized to be beneficial or a process check to see whether RTA led to predicted changes in justice resource utilization. Future studies that examine RTA's impact on education and employment will help establish whether the adverse impacts of RTA on recidivism reported in this study are matched by similarly poor outcomes across the other dimensions of RTA. Recent work out of the Netherlands suggests that giving adolescents extended access to the juvenile justice system can simultaneously increase their likelihood of continued justice system involvement while improving their educational and labor market attainment (van der Laan Zeijlmans, et al., 2021; van der Laan, Beerthuisen, et al., 2021; Schmidt et al., 2021). The present study, however, provides at least some process-based evidence for assessing this possibility.

Observed results included largescale changes in the probability of intermediate case outcomes that were not theorized mechanisms by which RTA would impact the lives of young adults and much smaller changes in the probability of intermediate case outcomes that were theorized mechanisms. Nontheorized resource utilization included substantial changes in rapid case dismissal and use of pretrial supervision. Theorized resource utilization changes that failed to materialize included large changes in commitments to custody. For 17-year-olds without prior justice involvement, the shifting of their cases from the adult justice system, in which their cases likely would have been dismissed outright, led to increasing rates of pretrial supervision and informal adjudication. For 17-year-olds with prior justice involvement, the shifting of their cases led to both a decrease in outright dismissals and even a small increase in commitments to correctional authorities. Whether or not these changes in intermediate case outcomes are the primary causes of observed recidivism increases remains an open question not fully answered by the foregoing analysis. However, the unexpected nature of these process utilizations is at best only partially aligned with the theory of action of RTA.

Pending completion of studies examining additional outcomes and additional state implementations, there are reasons to think that future studies could conceivably produce results that are consistent with what we have observed in Massachusetts. Previous evaluations of RTA have for some time hinted at the absence of expected programmatic benefits. Two prior studies have reported nonsignificant findings for the effects of RTA on future justice involvement in Illinois and Connecticut (Loeffler & Grunwald, 2015; Robinson & Kurlychek, 2019). And no study with a control group has yet to report decreased justice system involvement (Fowler & Kurlychek, 2017). Added to this set of facts is the similarity between the estimated adverse impacts reported in this study and past estimates of higher rates of re-arrest seen in the juvenile justice system for youth arrested at the boundary between the juvenile and adult justice systems (Hansen & Waddell, 2014; Loeffler & Grunwald, 2015). For some time, it has been clear that handling cases in the juvenile justice system itself can produce heterogeneous effects (Hjalmarsson, 2009; Levitt, 1998; Loughran et al., 2010) and adverse effects (Gatti et al., 2009; Liberman et al., 2014; Smith & Paternoster, 1990). However, discussions of RTA have projected its public safety benefits based largely on a subset of slightly older studies that consistently found benefits from policies that limit transferring juveniles into the adult system (McGowan et al., 2007; Redding, 2010) rather than examining the full range of available scientific evidence showing a more complex portrait of what justice system involvement can mean for adolescents with limited and more extensive prior justice involvement (Zane et al., 2016).

If it turns out that the present results generalize to other jurisdictions, it would not be the first time that a juvenile justice policy that was designed to help youth has produced iatrogenic effects. The history of juvenile policy reform contains multiple prior examples of well-intentioned and well-reasoned policies that still managed to produce adverse impacts on affected populations. The Cambridge-Somerville Youth Study is the best-known example of a juvenile delinquency prevention program that generated unintended harms to its participants. Relative to control subjects, program participants were more likely to have been arrested for a serious crime, died an average of 5 years younger, and more likely to have received a medical diagnosis as alcoholic, schizophrenic, or manic depressive (McCord, 1978, 1981; see also Welsh et al., 2019; Zane et al., 2016). Other prevention programs that grouped delinquent peers have also yielded unanticipated bad outcomes for program participants. A randomized experiment evaluating the effects of a court volunteer program that provided group and individual counseling and tutoring services to juvenile probationers found that treated subjects committed more crimes relative to control subjects (Berger et al., 1975). Two randomized experiments testing the impacts of group interaction training programs designed to improve the social skills of at-risk students by providing them with practice debating issues with well-adjusted peers found increases in delinquency and other problematic behaviors among program participants relative to untreated counterparts (Gottfredson, 1987; Dishion & Andrews, 1995). A randomized controlled trial of healthful recreation programming for delinquent adolescents found that treated youth significantly increased recidivism after the program stopped relative to control youth (Dufty & Richards, 1978).

“Scared Straight” and other juvenile awareness programs, designed to stop offending by directly exposing groups of delinquent youth to stressful prison experiences (i.e., during a brief prison visit, adult inmates intimidate the youth in an effort to scare them straight), have been found to increase recidivism among treated youth relative to control youth (Lewis, 1983; Petrosino, Petrosino, & Buehler, 2005). And gang outreach worker programs, commonly called “streetworker” programs, have been found to strengthen group identity, increase gang cohesion, and, as a result, generate higher levels of antisocial behavior among gang members (Klein, 2011). These unintended harmful effects have been found in classic studies of gang streetworker programs (Klein, 1971), and

modern program evaluations of streetworker programs are designed to reduce serious gang violence (Hureau et al., 2014; Wilson & Chermak, 2011). Considering this policy history, as well as early concerns about the theoretical model behind RTA (Gibson & Krohn, 2012), it is necessary to consider the possibility of harmful as well as beneficial RTA policy impacts.

For this reason, we recommend taking a cautious approach to future expansions of RTA until evidence of projected benefits can be confirmed. If future studies confirm that RTA provides benefits on noncriminal justice outcomes but recidivism remains elevated, a cost-benefit analysis can be conducted to make sense of whether the trade-offs across these dimensions are justified. Alternatively, it is conceivable that RTA or RTA-like policies can be recrafted to accomplish programmatic benefits while minimizing observed harms. However, pending completion of these additional studies, the results of the present investigation suggest that any pending or future implementations of RTA must grapple with the expanding evidence base that RTA policies, while well-intentioned, have produced limited evidence of programmatic benefits to affected populations and growing evidence of iatrogenic harms in the form of increased future justice involvement.

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CONFLICT OF INTEREST

The authors confirm that they have no conflict of interest to declare.

ORCID

Charles E. Loeffler  <https://orcid.org/0000-0001-7712-6734>

Anthony A. Braga  <https://orcid.org/0000-0002-5815-3734>

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AUTHOR BIOGRAPHIES

Charles E. Loeffler is currently an associate professor in the Department of Criminology at the University of Pennsylvania. His research primarily focuses on the life-course effects of criminal justice involvement. His recent research has appeared in the *Journal of Criminal Law and Criminology*, the *Journal of Quantitative Criminology*, and the *Annals of Applied Statistics*. He received his Ph.D. in sociology from Harvard University.

Anthony A. Braga is the Jerry Lee Professor of Criminology and the Director of the Crime and Justice Policy Lab at the University of Pennsylvania. He is a Fellow of the American Society of Criminology and the 2021 recipient of its August Vollmer Award.

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