Detention Risk Assessment Instrument (DRAI) Validation Study: 2025 Update

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Introduction

In accordance with Maryland statute, secure detention is defined as, "the temporary care of children who, pending court disposition, require secure custody for the protection of themselves or the community, in physically restricting facilities" (Md. Code, Courts and Judicial Proceedings, 3-8A-01(n)). When law enforcement requests that a youth who has been arrested also be detained, Department of Juvenile Services (DJS) intake staff are tasked with balancing these youth and community safety-related factors with the potential harms caused by detention. They are empowered to exercise their discretion in making the best decision given the individual circumstances of a young person. To aid decision-making regarding the appropriateness of secure detention, DJS uses a Detention Risk Assessment Instrument (DRAI), with scored items based on research evidence, to assess the degree to which youth pose a risk to themselves or others and/or is a flight risk.

Validation Requirement

By law, the DRAI must be validated every five years to ensure its risk factors are both accurate and predictive (Md. Code, Courts and Judicial Proceedings, 3-8A-15(2)). In August 2022, a new study was initiated to examine the predictors of pre-adjudication re-offending, particularly in the context of evolving youth crime patterns. This study aimed to assess the predictive validity of the 2017 DRAI and determine necessary revisions.

Research Overview

- **Timeline**: Research planning began in late 2022, with analysis delayed to include data from the full fiscal year 2023 (FY23; July 2022 - June 2023).
- **Goals**:
    1. Assess the effectiveness of the 2017 DRAI in predicting outcomes.
    2. Identify new scored items for a newly validated statewide instrument.

➢ Most prior detention risk assessment validation studies exclude from their analyses young people who were initially detained, who are typically at a higher risk to re-offend. By using a methodology called survival analysis, this study was able to include initially detained youth and create a tool based on a more representative sample of detention requests than previous validation studies.

Methodology

- **Statistical Method: Survival Analysis (Cox Regression)**
- **Sample**
    - 603 youth with completed DRAIs in FY22 and FY23.
- **Outcomes**
    - New Arrest: DJS complaint or adult arrest for a felony or misdemeanor before adjudication.
    - New Crime of Violence Arrest: DJS complaint or adult arrest for a Crime of Violence (CR 14-101) before adjudication.
    - Failures to Appear (FTAs) in Court prior to adjudication.

Developing a New Instrument

Validation results showed that the 2017 DRAI's items performed better than chance; however, neither the risk level nor the risk score strongly predicted recidivism. An exploratory approach analyzed around 250 potential predictors of re-arrests/FTAs. Because one of the overall aims of the validation process is to ensure that a revised instrument functions equitably across

demographic groups and regions, only items that were statistically significant (at the $p<.05$ level) predictors of at least one study outcome in Baltimore City and the rest of the state were included.

The newly validated DRAI includes the six scored items shown in the box below alongside the 2017 DRAI items for comparison.

2017 DRAI Items (Factors Predictive of New Arrest/FTA)	2025 DRAI Items (Factors Predictive of New Arrest/FTA)
Prior Charges Pending Adjudication	**1. Age at DRAI**
Prior Sustained Adjudications and Current Supervision Status	**2. Current Most Serious Alleged Offense is Auto Theft**
History of Failure to Appear for a Court Hearing (within past 12 months)	**3. Current and Pending Category III Offenses**
History of Escape/AWOL (within past 12 months)	**4. Prior Misdemeanor Offenses in the Last 3 Months**
Prior Detentions (within past 6 months)	**5. Prior Detention Alternatives in the Last 2 Years**
Age of First Felony Referral (≤16)	**6. Failures to Appear in Court/Writs/Warrants/AWOLs/Escapes in the Past Year**

Key Findings

- The updated DRAI better predicts re-arrests and FTAs compared to the 2017 tool.
- Data analysis established risk classifications (low, moderate, high) with progressive relations to re-offending. For instance, 28% of youth classified as moderate risk had a new arrest compared to 11% of low-risk youth.
- The new DRAI indicates a significant shift in risk classifications, with double the number of youth classified as moderate risk compared to the 2017 tool (36% vs. 16%). This may lead to more youth receiving detention alternatives and secure detention, at least at the initial decision point before a detention hearing has been held on the next business day.
- Being charged with an auto theft as the most serious alleged offense (Item 2) and a Category III offense (Item 3) were the only current offense-related factors, out of many that were tested, that were predictive statewide of short-term re-offending and/or FTAs.

Policy and Implementation

- Unlike detention risk assessment instruments in some other states, the youth's current offense is not automatically scored in Maryland's DRAI. Only items that are predictive of short-term re-offending and/or FTAs are factored into the DRAI risk score. Consistent with the 2017 DRAI, this new version incorporates DJS policies dictating how the current offense should impact detention decisions.
- DJS policies continue to reflect the consensus that certain serious offenses require additional focus and oversight to ensure that decisions are made in the best interest of young people and the community.

    - Consistent with past policy, DJS continues to require detention for youth charged with Category I offenses.
    - For non-Category I offenses, the intersection between risk level and whether a youth was charged with a firearm or crime of violence (COV) determines the options available to intake officers. For example, detention is the default response for moderate and high-risk youth charged with firearm offenses. For youth not charged with COVs or firearm offenses, the default response varies based on the risk level.
- Intake officers retain the flexibility to adjust decisions based on individual youth factors, with supervisor consultation sought as necessary. To assist intake officers in exercising their discretion, the 2025 DRAI contains a revised and expanded list of override down/mitigating (e.g., "No prior facts sustained") and override up/aggravating factors (e.g., "Alleged offense was particularly severe or violent").
- The new DRAI does not alter decision-making for court-required holds (e.g., writs/warrants).

Monitoring Implementation

- Active monitoring of the new DRAI implementation is crucial to ensuring that risk levels and policy factors effectively guide decisions alongside individual case specifics.
- Data on detention decisions and recidivism outcomes should be regularly reviewed.

Introduction

In accordance with Maryland statute, secure detention is defined as, "the temporary care of children who, pending court disposition, require secure custody for the protection of themselves or the community, in physically restricting facilities" (Md. Code, Courts and Judicial Proceedings, 3-8A-01(n)). Although typically a relatively short-term step in juvenile justice system processing, secure detention is often associated with long-term consequences. Detention disconnects youth from their families, schools, and social systems, and it increases their exposure to delinquent peers (Holman & Ziedenberg, 2006). Detention often fails to reduce future delinquent behaviors and can actively harm neurological development during a crucial developmental period (Orendian et al, 2022). Despite the high costs of detention, educational and other resources tend to be limited, and youth are more vulnerable to violence-related injuries (Smith & Yarussi, 2013). Pre-hearing detention may also indirectly increase youths' odds of experiencing the negative consequences of longer-term custodial confinement; research has shown that youth who are held in detention prior to adjudication often receive harsher dispositions (Rodriguez, 2010; Jordan, 2012).

While the use of pre-hearing secure detention should be minimized for these reasons, detaining a youth is sometimes necessary. Maryland statute (Maryland Code 3-8A-15) states that the intake officer or the court may authorize detention or community detention prior to a court hearing if: 1) it is required to protect the child or others; or 2) the child is likely to leave the jurisdiction of the court. When law enforcement requests that a youth who has been arrested also be detained, the Department of Juvenile Services (DJS) intake staff are tasked with balancing these youth and community safety-related factors with the potential harms caused by detention. They are empowered to exercise their discretion in making the best decision given the individual circumstances of a case. To aid decision-making regarding the appropriateness of secure detention, DJS uses a Detention Risk Assessment Instrument (DRAI), with scored items based on research evidence, to assess the degree to which youth pose a flight risk and/or a risk to themselves or others. Since 2003, some version of the DRAI has helped inform the discretionary decisions made by DJS intake officers; for a timeline of DJS' DRAI implementation, see Figure 1 on page 6.

The current version of the DRAI, implemented in July 2017, assigns points based on six items shown to be correlated with risk for reoffending and/or failing to appear in court, and it categorizes youth as being at low, moderate, or high risk for experiencing these outcomes. These research-based risk levels serve as a starting point for intake officers as they make decisions about whether to: (1) not authorize secure or community detention and release the young person to a caregiver, (2) authorize community detention (with or without electronic monitoring), or (3) authorize secure detention. All community detention and secure detention decisions made by DJS are reviewed by the court on the next business day.

Following its rollout, the 2017 DRAI underwent several rounds of revision through December 2022. Many of these changes were meant to revise language used in the tool to be more consistent with DJS policies and to reduce unnecessary detention admissions.[1] The COVID-19 pandemic provided an

[1] In October 2017, modifications clarified the language related to rationales listed for youth with adult court involvement. More substantial changes occurred in July 2021, after analyses completed by the Institute for Innovation & Implementation suggested that raising the cut points between the low, moderate, and high risk categories by 1 point would increase the proportion of youth classified as low-risk, reduce the proportion of youth classified as high-risk, and have negligible impacts on community safety if fewer youth were detained. In addition to this 1-point shift, several policy changes were also reflected in the July 2021 updates to the instrument. Mandatory holds for youth alleged to have committed Category II offenses were eliminated, and DJS revised its policy such that

additional imperative for DJS to reduce detention usage as an immediate way to contain the spread of the coronavirus. Beginning in the latter part of 2022, large increases occurred in certain categories of violent youth offending, such as carjacking and auto theft, prompting greater scrutiny of detention decisions. Importantly though, for most offense categories, crime rates have remained lower than before the pandemic (Maryland Department of Juvenile Services, 2023).

Figure 1. Timeline of DRAI Implementation, Detention Policies, and Significant Events

2000	An offense-based system targeted both serious offenses (e.g., murder) and those particularly concerning to stakeholders (e.g., car theft). This approach failed to adequately account for youth's flight risk or threat to public safety.
2003	A statewide DRAI was implemented after a review of other states' tools. Input was provided by a stakeholder workgroup composed of members of the police, the State's Attorney's Office, the Office of the Public Defender, DJS staff, and others.
2006	The Institute for Governmental Service and Research (IGSR) completed validation analyses of the 2003 DRAI. Based on the results and guidance from the Juvenile Detention Alternatives Initiative (JDAI), DJS implemented six locally validated instruments, which included variations in items and scoring. As a result of stakeholder influence, each DRAI also included locally determined lists of override reasons resulting in mandatory detention. Rather than predictive risk, these "special decisions" reflected regional attitudes about the delinquent acts that warranted detention.
2011	A new executive leadership team, led by Secretary Sam Abed, started at DJS.
2013	A new, statewide version of the DRAI was implemented. Local variations in items and scoring were eliminated, as were "special decisions." Items and scoring were determined based on a review of other states' instruments. Non-scored detention "rationales" were added to track various "doors" to detention (i.e., policy reasons for detention, such as writs/warrants, adult court involvement, etc.).
July 2017	Based on the Institute for Innovation & Implementation's validation study of the 2013 DRAI, a revised version of the DRAI was implemented. The 2017 DRAI included: six scored items that were shown to predict risk of recidivism/FTA; a list of rationales for completing the DRAI, including reasons that may require mandatory court and policy holds; sections to document aggravating or mitigating factors that influenced staff to override the DRAI's recommendations; and items allowing workers to specify whether the police requested detention, to indicate whether the DRAI was completed by Centralized Intake, and to name specific shelters and/or ATDs that refused youth. The 2017 DRAI did not score the most serious new alleged offense, but serious offenses (Category I and II) triggered mandatory detention.
2020	● March – The COVID-19 pandemic began. Referrals to DJS declined as policing practices were impacted, and DJS Community staff worked virtually. As courts closed, juvenile dockets were put on hold, delaying adjudication and disposition hearings. DJS worked to reduce spread of the virus in facilities by transitioning youth home as quickly as possible. ● May 25 – George Floyd was killed by police officers. Amidst protests across the country, policing/arresting practices were impacted, contributing to additional declines in referrals to DJS.
July 2021	The 2017 DRAI was modified to align further with front-end reforms and reflect new and emerging practices (see footnote #1 for details).
June 1, 2022	JJRA Legislation went into effect. It required courts to consider a validated risk assessment and implement a court review every 14 days. It also required DJS to develop a community release plan within 10 days of a decision to detain a child. The legislation also prohibited detention for misdemeanor offenses, except handgun violations and repeat misdemeanor offenses (2 prior adjudications within a year of the current charge), and it prohibited the use of detention for technical violations of probation.
December 2022	The 2017 DRAI was further modified to make the tool more consistent with policy. References to mandatory holds and overrides were updated.
March 2023	A new executive leadership team, led by Secretary Vincent Schiraldi started at DJS.

youth charged with firearm possession were no longer subject to mandatory holds either, so long as decisions not to detain these youth were approved by supervisors.

By law, the DRAI must be validated every five years to ensure that the assessed risk factors remain both accurate and predictive (Md. Code, Courts and Judicial Proceedings, 3-8A-15(2)). For these reasons, a new study examining the predictors of pre-adjudication re-offending was needed to assess the predictive validity of the 2017 DRAI and to determine whether revisions were necessary. Planning for this research began in late 2022, though the analysis was delayed to allow for data from all of fiscal year 2023 (FY23; July 2022 - June 2023) to be included. A DRAI workgroup, consisting of DJS leadership, consultants from the Annie E. Casey Foundation, and researchers (the authors of this report) from the University of Maryland Baltimore School of Social Work, was formed in December 2023. Key study analyses were completed by April 2024, and revisions to the instrument were finalized in December 2024.

This report is presented in four parts. Part One presents the methodology section, which situates this study's analytical approach in the context of prior research on detention risk assessment and the instruments currently being used by other states and jurisdictions. This section also provides details on the study outcomes being analyzed—pre-adjudication arrests, crime of violence arrests, and failures to appear in court (FTAs)—and the process of selecting the validation sample for this report. Part Two assesses how well the 2017 instrument's risk score, risk levels, and scored items perform as predictors of study outcomes and explains the rationale for making significant changes to the DRAI. Part Three details the analyses used to identify six new items to score on a newly validated statewide instrument. Unlike detention risk assessment instruments in some other states, the youth's current offense is not automatically scored in Maryland's DRAI, which only includes empirically validated predictive items as scored components. However, as Part Four explains, DJS has established separate policies for how the offense severity of the current charge should influence detention decisions. Part Four also examines how the reclassification of youth by risk level—with a greater proportion assessed as moderate risk—might affect system penetration. The report concludes with a summary of study limitations.

Part One: Methodology

Background

The past two decades have seen a growth in the number of states and jurisdictions using research-based risk assessment tools in the juvenile and adult criminal justice systems to inform discretionary decisions (Vincent, Guy & Grisso, 2012). Research on risk assessments in criminal justice has, in turn, expanded, leading to instruments that consider a wider array of factors than in the past. These include a greater selection of dynamic factors that measure attitudes and behaviors that change over time, such as "attitudes towards breaking the law" and recent drug use.[2]

Still, research on detention risk assessment has remained relatively stagnant when compared to instruments used for other decision-making stages (Dr. Gina Vincent, University of Massachusetts, personal communication).[3] The detention decision making stage has proved particularly difficult to research.[4] Perhaps for this reason, many detention risk assessment tools currently in use were developed

[2] Incorporation of dynamic risk factors helps to partially address concerns about racially biased static measures of criminal history, such as the number of prior arrests, which may reflect the influence of implicit bias in discretionary policing decisions, such as which neighborhoods to patrol or whom to arrest versus warn and release (Applegarth, Lewis & Rief, 2023).

[3] The risk assessment field has evolved to incorporate more advanced statistical methodologies such as decision tree analyses and machine learning. However, there has been little published research on or statistical advances in juvenile detention risk assessment tools (conversation with Dr. Gina Vincent**)**.

[4] It is difficult, for example, to include dynamic risk factors in detention risk assessments due to the lack of information available to decision makers at this early stage in the court process. There are also specific methodological barriers to predicting short-term re-offending - the outcome of interest for detention risk assessment

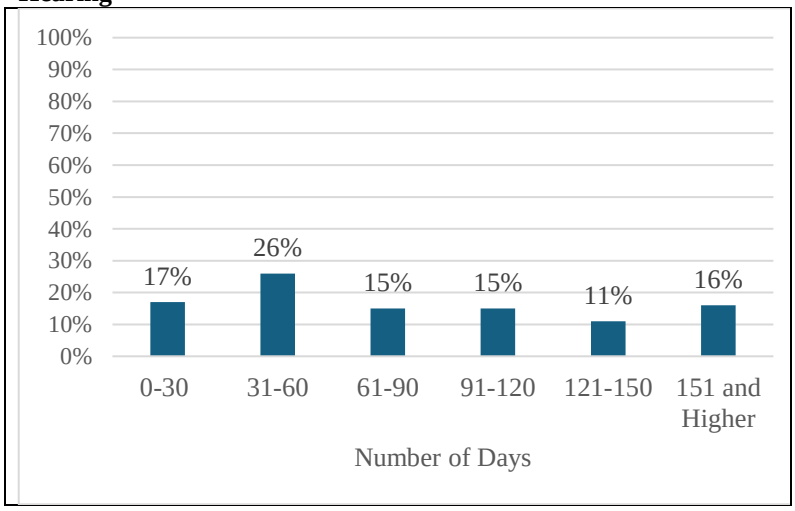
based on stakeholder consensus about which factors to include rather than on a rigorous analysis of predictors of short-term re-offending specific to the jurisdiction of focus (Maloney & Miller, 2015).

Existing research-based tools, including Maryland's 2017 DRAI, are often informed by risk assessment validation studies that limit their samples to youth who were never detained or were detained only briefly (three or fewer days) prior to their detention hearings. This methodological approach permits youth to experience sufficient exposure time (i.e., time not detained) to analyze re-offending and failure to appear (FTA) in court outcomes, which are typically defined as occurring within 30, 60, or 90 days after the initial detention decision. Detained youth are typically excluded from analyses because many are not at risk of re-offending in the community for at least some portion of the follow-up period, though many detained young people are eventually released prior to their adjudication hearing.[5] Excluding those who are likely at a higher risk to re-offend can lead to methodological problems that are hard to overcome. Low re-offense rates resulting from their exclusion can reduce researchers' ability to identify short-term recidivism predictors due to a lack of statistical power—and this proved to be a problem at an earlier stage of this study. Most importantly, the skewing of the sample toward lower risk youth can result in a tool that is not representative of the full range of actual risk factors for short-term re-offending and can lead to inaccurate cutoff scores for determining risk levels.[6]

Survival Analysis

To overcome these methodological hurdles, and after consulting with pioneering researchers in the juvenile justice risk assessment field, we opted to employ survival analysis, a statistical technique commonly used in criminological research, which allowed us to include in sample youth who were detained for some period following their detention risk assessment.[7] Typically, detention validation studies utilize logistic regression analyses, which seek to predict a binary outcome (e.g., whether a youth recidivated or stayed arrest-free) within a set period following detention screening (e.g., 60 days was used in the previous MD validation study). By contrast, the current study used Cox Regression, a form of survival

Figure 2. Number of Days Between DRAI and Adjudication Hearing



- that are not as problematic for analyses of longer-term re-offense outcomes used to develop intake and post-adjudication decision-making tools.

[5] The adjudication or adjudicatory hearing is defined as: "A proceeding before a juvenile judge or magistrate to determine whether allegations made against a youth are true. If the allegations concerning the commitment of a delinquent act are found to be 'facts sustained,' the youth may be adjudicated delinquent" (Maryland DJS Data Resource Guide, FY23).

[6] This is based on a conversation with Dr. Gina Vincent, Professor of Psychiatry at the University of Massachusetts Chan Medical School

[7] We are deeply grateful to Dr, Edward Mulvey, Professor Emeritus of Psychiatry at the University of Pittsburgh, and Dr. Gina Vincent, Professor of Psychiatry at the University of Massachusetts Chan Medical School. Though the studies are unpublished, Dr. Vincent's work in developing detention risk assessment instruments in two other states, and her consultation related to survival analysis, heavily influenced the course of this study. We also benefited from

analysis in which the dependent variable analyzed is *time to study outcome*—in this case, not just whether a re-offense occurred but how quickly it occurred. Cox Regression is a useful methodology for studying predictors of re-offending when there is substantial variation in the time youth are in the community and "at risk" to recidivate. As Figure 2 shows the number of days between detention screening and a youth's adjudication hearing varies greatly, making this a situation well suited for survival analysis.[8,9]

Outcomes

Outcomes relevant to the validation include:

1. **New Arrest** - defined as a new DJS complaint or adult arrest for a felony or misdemeanor offense prior to the youth's adjudicatory hearing. This measure excludes DJS complaints that were disapproved at intake or missing a case forwarding decision.

2. **New Crime of Violence Arrest** - defined as a new DJS complaint or adult arrest for a Crime of Violence as defined by Maryland statute (CR 14-101) occurring before a youth's adjudicatory hearing. See the Maryland DJS Data Resource Guide, FY23 for a list of those offenses (p. 231).

3. **Failures to Appear (FTAs) in Court** - operationalized as a new ASSIST alert for either an FTA or for a writ/warrant prior to a youth's adjudicatory hearing.[10]

Note: This report sometimes refers to re-offense/re-offending/re-offenders to describe whether any of the three study outcomes occurred. When referring specifically to (#1) new DJS complaints or adult arrests, the term "new arrests" will be used.

Consistent with other recent validation studies (Fratello, Salsich, & Mogulescu, 2011; Vincent, Guy & Grisso, 2012; Vincent, n.d.), this study analyzes new pre-adjudication arrests and FTAs as separate outcomes for several reasons. From a public safety perspective, receiving a new arrest is objectively more serious than failing to appear in court, which could also be caused by other factors aside from a youth's behavior. For example, if a family moves and court officials send written notification to the old address, the youth may FTA simply due to not receiving the notification. Separating new arrest, new crime of violence arrest, and FTA outcomes enabled us to make more nuanced decisions about the weight given to the tool's ability to predict each outcome when revising the instrument. The decision to further differentiate between felony/misdemeanor arrests and arrests specifically for crimes of violence was driven by the recent upsurge in certain violent offenses (e.g., carjackings) and our desire to report on arrest outcomes in a manner

statistical consulting from Dr. Roderick Rose, a professor and statistician at the University of Maryland Baltimore School of Social Work.

[8] In this study, for youth who did not experience a pre-adjudication arrest or FTA, "time at risk" was operationalized as the number of days between the detention risk assessment and the youth's adjudication hearing minus the number of days they were in detention during this time. For youth who had a new arrest or FTA, "time at risk" was operationalized as the number of days between the detention risk assessment and the arrest/FTA date minus the number of days they were in detention during this time.

[9] The median number of days between the DRAI administration and first adjudication hearing dates was 71 days, while the mean was 92 days. It was just as common for youth to have an adjudication hearing within the first 30 days of the DRAI as it was for that hearing to occur 5 months or longer after the DRAI.

[10] ASSIST stands for the Automated Statewide System of Information Support Tools and is DJS' main database. "Alerts" are a platform within ASSIST for tracking and highlighting for other workers a wide range of youth behaviors/characteristics, including whether they fail to appear in court or receive a writ or warrant. Our discussion with DJS stakeholders led us to broaden our definition of FTAs to include writ/warrant alerts to better capture how this outcome might be tracked by some DJS staff.

consistent with DJS reporting (Maryland Department of Juvenile Services, 2023). Our goal was to create a tool that could effectively predict all three study outcomes.

Finally, as mentioned above, one of the advantages of using survival analysis is that youth who are initially detained, and who may be more likely to re-offend, are included in our sample. Likewise, rather than measuring study outcomes within a finite period (e.g., 60 days), we examined whether these events occurred prior to the youth's actual adjudication date. As a result, re-offense rates were higher for our final sample, allowing us to maintain more statistical power than would have been possible if we had used a fixed follow-up period for all youth in the sample.[11]

Sample

To create the study sample, we started with all DRAIs completed in Maryland in FY22 (n=1,464) and FY23 (n=1,733). From this group, we selected cases that: 1) had DRAIs administered in response to a new DJS complaint (64%, 2,058/3,197); and 2) were pre-adjudication (51%, 1,636/3,197) and for which the adjudication date occurred more than 7 days after their DRAI, following the approach of a recent study (Vincent, n.d.).[12] We identified 931 DRAIs that met these criteria. Then, we eliminated youth who were in detention the entire time between their DRAI and adjudication hearing and were therefore not at risk to re-offend; youth were kept in the sample so long as they spent at least 7 days in the community before their adjudication hearing. From the remaining 724 DRAIs, we randomly selected one DRAI per youth and eliminated six cases where the current most serious DRAI offense was missing, leaving 603 youths in the final validation sample.

Figure 3 displays the descriptive characteristics of validation sample youth. It shows that African American/Black youth were disproportionately represented in our sample (85%), as were males (90%). The overrepresentation of African American/Black youth in our sample is partly a result of the disproportionate share of DRAIs where the county of jurisdiction was Baltimore City. While Baltimore City accounted for 7% (744/10,782) of complaints to DJS in FY22, they comprised 42% of the

Figure 3. Validation Sample Characteristics (FY22-FY23)

Number of Youth	603
Male	544 (90%)
Female	59 (10%)
Black/African American	511 (85%)
White/Caucasian	54 (9%)
Other (including Hispanic/Latino)	38 (6%)
Age at DRAI – Mean (Standard Deviation [S.D.])	15.3 (1.4)
Western Region	20 (3%)
Eastern Shore Region	42 (7%)
Capital South Region	159 (26%)
Central Region	125 (21%)
Baltimore City	252 (42%)
Washington, D.C./Out of State	5 (1%)
New delinquent complaint or adult arrest	116 (19%)
New complaint or arrest for crime of violence	42 (7%)
New FTA or writ/warrant alert	60 (10%)

[11] An earlier sample for this study, which sought to replicate the methodology used in the previous Maryland DRAI validation study (Betsinger, Farrell, and Irvine, 2019), excluded detained youth and used a fixed follow-up period for all youth. Using that methodology, only 8% of youth had new arrests within 60 days. The final study sample used for this report, which included detained youth and assessed recidivism prior to adjudication, resulted in a 19% re-arrest rate.

[12] Youth whose first adjudication hearing came more than a year after their DRAI were excluded due to the possibility that there was a data entry error, and the adjudication hearing was for a different case.

validation study sample.[13] Conversations with DJS stakeholders underscored that Baltimore City's heavy overrepresentation in the statewide sample is a result of distinctive practices by the Baltimore City Police Department to request detention for—and bring to the Baltimore City Juvenile Justice Center (BCJJC)—most arrested youths who, in other jurisdictions, would have received "paper charges"[14] and not had a detention request/DRAI.

The proportion of youth in the sample with a new arrest (i.e., new delinquency complaint or adult arrest for a felony or misdemeanor) while awaiting adjudication was 19%. A much lower percentage (7%) of the sample had a new arrest for a crime of violence offense, and 10% failed to appear in court (FTA). Most new offenses were juvenile complaints, while only 2% (n=12) of youth had an adult arrest.[15]

Part Two: Assessing the 2017 DRAI

The 2017 DRAI assigns points based on six items that, based on the previous validation study, were shown to be correlated with risk for reoffending and/or failing to appear (FTA) in court (Betsinger, Farrell, & Irvine, 2017). Youth with 0-8 total points are assessed as at a *low risk* to re-offend/FTA, while youth with 9-13 points are considered *moderate-risk*, and youth with 14 or more points are considered to be at a *high risk* to experience these outcomes (Figure 4).

Figure 4. 2017 Detention Risk Assessment Instrument (DRAI) Scored Items

Predictive Risk Items:

1. Charges Pending Adjudication
   - Two or more prior charges pending adjudication for Category I or II Offenses: 8 Points
   - One or more prior charge pending adjudication for a Category III, IV, or V Offense: 4 Points
   - One prior charge pending adjudication for a Category I or II Offense: 2 Points
   - No additional pending charges: 0 Points

2. Prior Sustained Adjudications/Current Supervision
   - One prior sustained adjudication for a Category III or IV Offense OR Probation Supervision: 5 Points
   - One or more prior sustained adjudication for a Category V Offense OR Pre-Court or ATD Supervision: 3 Points
   - One or more prior sustained adjudications for a Category I or II Offense OR Intensive Supervision: 1 Point
   - Two or more prior sustained adjudications for Category III or IV Offenses OR Aftercare Supervision: 1 Point
   - NO prior sustained adjudication AND no current supervision: 0 Points
3. History of Failure to Appear for a Court Hearing (**within past 12 months**)
   - One or more writs/warrants for failure to appear in past 12 months: 5 Points
   - NO writs/warrants for failure to appear in past 12 months: 0 Points
4. History of Escape/AWOL (**within past 12 months**)
   - One or more instances of escape/AWOL in the past 12 months: 4 Points
   - No escapes/AWOLS in past 12 months: 0 Points

[13] Baltimore City comprised 43% (1,371/3,197) of all DRAIs completed in FY22 and FY23.

[14] "Paper charges" refer to arrests resulting in DJS complaints that do not involve the young person being physically taken into custody by law enforcement and making a detention request. Instead, complaint details are forwarded to DJS following the arrest, and the incident results in no immediate physical contact between DJS intake staff and the police and the young person.

[15] Two-thirds (8/12) of youth with an adult arrest also had a delinquency complaint.

5. Prior Detentions (**within past 6 months**)
   - One or more prior detention in the past 6 months: 2 Points
   - No prior detentions in the past 6 months: 0 Points
6. Age at First Felony Complaint
   - 16 or under: 4 Points
   - Over 16 or no prior felony complaint: 0 Points

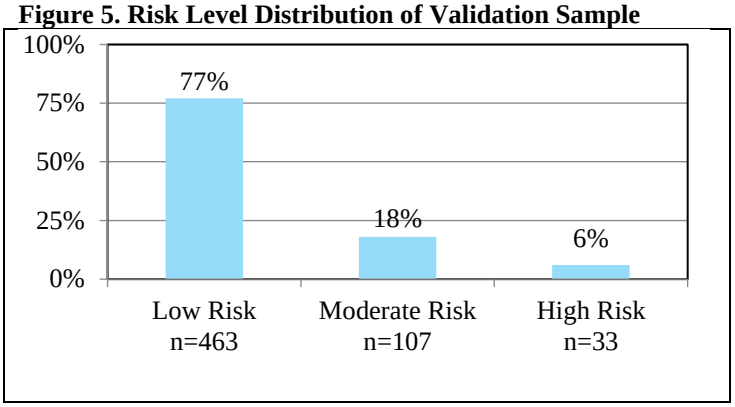
DRAI Risk Level: _____ DRAI Risk Score: _____
Low Risk: 0-8 points | Moderate Risk: 9-13 points | High Risk: 14+ points

While the 2017 DRAI was not designed to be prescriptive, and intake officers are still able to consider other factors besides risk level when arriving at a decision, data from FY22-23 show that risk levels and decision-making are highly correlated ($r(1,463)=.49$, $p<.001$).[16] Though more variability in decision-making is associated with moderate-risk youth, more than three-quarters (77%) of low-risk youth were not authorized for secure detention or community detention, and 82% of high-risk youth were placed in secure detention.[17] Given that intake officers are clearly using DRAI to help make detention decisions, it is important to regularly reexamine the tool's predictive validity.

Examining the Statistical Relationship Between the DRAI Risk Level and Re-Offending

Effective risk assessment instruments should sort youth into different risk levels based on their risk of re-offending or failing to appear for court, without overloading one group. Figure 5 shows that, throughout the study period, the 2017 DRAI sorted the largest portion of youth into the low-risk category (77%), the second largest portion into the moderate- risk category (18%), and the smallest portion into the high-risk category (6%). While over three-quarters of youth were concentrated in one category (low-risk), this may be merited if those youth are truly at much lower risk to re-offend than the other groups.

Figure 5. Risk Level Distribution of Validation Sample



Outcome distributions should also be aligned with risk so that risk levels are progressively related to re-offending (e.g., youth classified as the highest risk should have the highest proportions of new arrests and/or FTAs). As Figure 6 shows, there was not a clear separation between the low, moderate, and high-risk groups in terms of their re-arrest rates. Supporting this, the DRAI risk level showed no significant correlation with either new arrests ($r(601)=.04$, ns) or new arrests for crimes of violence ($r(601)=.03$, ns). Although a clearer relationship exists between DRAI risk levels and FTA rates (Figure 7; $r(601)=.10$,

[16] This data is specific to FY22-23 new complaint DRAIs for which there was not a court hold and where DJS has discretion.

[17] In FY22-23, 27% of moderate-risk youth were not authorized for secure detention or community detention, while 40% were authorized for community detention, and 33% were authorized for secure detention. Note that all community detention and secure detention decisions made by DJS are reviewed by the court on the next business day.

p<.05), the 2017 DRAI was no longer doing an adequate job of sorting youth into appropriate risk levels based on the outcomes most relevant to public safety: re-arrests.

Figure 6. Re-Arrest Outcomes Prior to First Adjudication Hearing

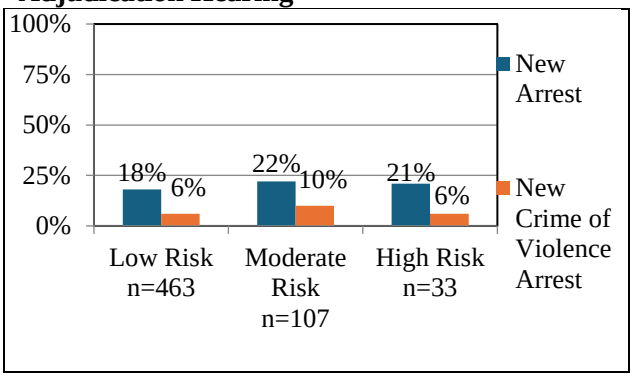
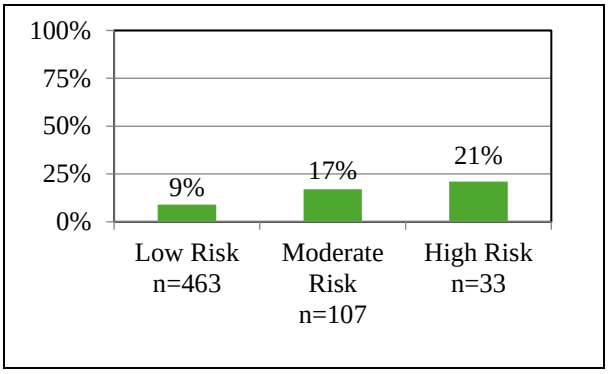


Figure 7. FTA in Court Prior to the First Adjudication Hearing



Area Under the Curve Analyses: Using Risk Score to Assess the DRAI's Predictive Validity

It is possible that, despite the evidence presented above, the DRAI risk score was doing a good job at predicting study outcomes but the cut points for determining risk level were misspecified and needed to be adjusted. Area under the curve (AUC) statistics were calculated to further probe how well the DRAI risk score distinguished between re-offenders and non-re-offenders. The AUC value indicates how well the model is able to distinguish events and non-events, in this case whether a youth had a pre-adjudication arrest or FTA. As the DRAI risk score goes up, the tool should be identifying more cases of new arrests than for youth who have lower risk scores. There will necessarily be false positives where, though the DRAI risk score is high, there is no arrest. A good tool can adequately predict new arrests when they do happen (the true positive rate) while minimizing predictions of new arrests when they do not occur (false positive rate). An AUC of 0.50 means that the tool is doing no better than chance at predicting the outcome while minimizing false positives. An AUC of 0.60 and up is considered acceptable for a risk assessment tool, though 0.65 and higher is preferred (Vincent, n.d.).

Figure 8 presents the AUC values of the three study outcomes broken down by region. The statewide AUC for new arrests was 0.573 and this value was lower for Baltimore City—0.537, not much better than chance. The value for the rest of the state (i.e., areas other than Baltimore City) was just below 0.60 (0.597). The AUC was higher for Crimes of Violence than for new arrests or FTAs (0.618 statewide). However, the DRAI risk score was a much better predictor of violent crime for other areas of the state (0.667) than it was for Baltimore (0.618). The AUC was 0.585 when looking at FTAs, consistent for both Baltimore and the rest of the state, but still below the desired level.

Figure 8. Area Under the Curve by Study Outcome

	New Arrest	New Crime of Violence Arrest	FTA in Court
Statewide	.573	.618	.585
Baltimore City	.537	.562	.588
Rest of State	.597	.667	.589

Examining the Relationship between Scored Items and Re-Offending

We next examined whether there was a statistical relationship between each of the 2017 DRAI items and the study outcomes. We first tested the bivariate relationship between each of the six scored items and the three outcomes of interest using Cox Regression analyses (Figure 9). Three DRAI items stood out as correlated with at least one re-offending measure: 1. Charges Pending Adjudication (correlated for arrests); 4. History of Escape/AWOL (past 12 months) (correlated for arrests, violent crime arrests, and FTAs); 6. Age at First Felony Complaint (correlated for arrests and violent crime arrests). We flagged these three items for further testing using multivariate analyses (described in Part Three).

In sum, the 2017 DRAI, developed using data now close to a decade old, is performing better than chance,[18] but neither the risk level nor the risk score functions as a strong predictor of recidivism. The cut points for risk levels could be adjusted, and this would improve the functioning of the tool. However, given the relatively low AUC and the fact that only three of the six items were significantly related to the study outcomes, there is good reason to conduct additional analyses to explore how the tool should be revised so that it may provide better guidance to DJS intake officers.

Figure 9. 2017 DRAI Items as Bivariate Predictors of Time to Study Outcome

DRAI Item	New Arrest			New Crime of Violence Arrest			FTA in Court		
	Hazard Ratio	t	p	Hazard Ratio	t	p	Hazard Ratio	t	p
1. Charges Pending Adjudication	1.20	4.53	p<.05	1.12	0.62	ns	1.12	0.62	ns
2. Prior Sustained Adjudications/ Current Supervision	1.10	2.52	ns	1.12	1.38	ns	1.12	1.38	ns
3. History of Failure to Appear (last 12 mos)	1.80	1.00	ns	3.04	2.32	ns	3.04	2.32	ns
4. History of Escape/AWOL (last 12 mos)	2.26	6.55	p<.05	2.63	4.08	p<.05	2.63	4.08	p<.05
5. Prior Detentions (last 6 mos)	1.45	1.87	ns	1.65	1.40	ns	1.65	1.40	ns
6. Age at First Felony Complaint	1.97	6.97	p<.01	3.20	4.88	p<.05	3.20	4.88	p<.05

Part Three: Developing a New Instrument

Identifying Potential Scored Risk Items

Because detention risk assessment is an underdeveloped research field, we took an exploratory approach geared toward comprehensively analyzing a variety of potential alternative items related to recidivism. Although some of the tested items appear in other states' detention risk assessments, we also wanted to look beyond the usual sets of variables found in such assessments given that many were developed using samples that exclude youth who were initially detained.

Notably, unlike detention risk assessment instruments in some other states, Maryland's 2017 DRAI does not score the youth's current offense. This decision was based on the prior Maryland DRAI validation study (Betsinger et al., 2019), which, consistent with some empirically-based criminological studies (Mulvey, Schubert, & Piquero, 2014; Fratello, Salsich, & Mogulesco, 2011), found that current offense

[18] This conclusion is also supported by the fact that there is a statistically significant correlation (p<.05) between the DRAI risk score and all three outcomes.

severity was not predictive of re-offending.[19] The current validation study re-examined the relationship between current offense and re-offending by operationalizing the current offense in a variety of different ways, including based on the specific offense (e.g., robbery without a deadly weapon), offense type (e.g., felony), and DJS offense category (e.g., Category III). Finally, rather than only analyzing prior and current offense separately, we also created combined variables (e.g., number of current and prior felonies in the last 6 months) to assess whether we could identify distinctive offense trajectories that were statistically related to new arrests or FTAs.

Below are the broad categories of variables that we analyzed, along with examples of each. In total, we examined over 250 potential predictors of pre-adjudication re-offending. See Appendix A for a comprehensive list of the variables we analyzed.

- **Offense History and Current Offenses**-Prior carjacking offenses (Last 3, 6, 12 months, 2 years, or ever); current most serious offense was a crime of violence; age at first crime of violence offense
- **Case Processing Factors**-Adjudications, detentions, placements, successful/unsuccessful completions of DJS supervision (Last 3, 6, 12 months, 2 years, or ever); whether a youth was transferred from the adult system
- **Demographics**-Race/ethnicity, sex, age at DRAI

Bivariate and Multivariate Analyses of Potential Scored Risk Items

Similar to the process followed in Part Two for the six scored 2017 DRAI items, we initially assessed the bivariate statistical relationships of approximately 150 alternative factors with re-offending.[20] Next, we examined all variables that were statistically significant at the $p<.05$ level – starting with the three significant 2017 DRAI items identified in Part Two (i.e., Charges Pending Adjudication, History of Escape/AWOL, and Age at First Felony Complaint) – using multivariate Cox Regression analyses.[21] This approach allowed us to investigate whether the array of variables that had statistically significant bivariate relationships with our three study outcome measures remained predictive of these outcomes once other factors were considered.[22] These multivariate models also included controls for demographic variables (race/ethnicity, sex, age, and region) and fiscal year.[23] Predictors were introduced one-by-one in order of their statistical significance levels. Items that failed to reach the $p<.05$ level of significance and did not contribute to improving the predictive validity of our regression model (based on AIC statistics[24]) were

[19] However, see Swayze (2018) for a validation study that found that the current alleged offense severity was a predictor of FTA and re-offense in a multiple regression analysis.

[20] At a later stage, we analyzed the statistical relationships of approximately 75 additional factors with re-offending.

[21] Fifty-two alternative variables were statistically related to time to re-arrest, while 23 were related to time to violent re-arrest, and 52 were related to time to new FTA.

[22] The well-known "third variable" problem in statistics means that there may be other factors that explain the apparent statistical relationship between two variables. For example, our analyses showed that, both being under DJS supervision (pre-court, probation, or aftercare) at the time of the DRAI (HR=1.69, $p<.05$) and the number of offenses in the last 3 months (HR=1.12, $p<.001$) were both correlated with new arrests. However, when both variables were included in the same model, only the number of prior offenses in the last 3 months was a statistically significant predictor (HR=1.44, $p<.01$), while current supervision status was rendered non-significant (HR=1.10, $p=.13$).

[23] Separate descriptive analyses showed that youth in the sample whose DRAI assessments were completed in FY23 were significantly more likely ($p<.01$) to be re-arrested compared to youth whose assessments were completed in FY22.

[24] The Akaike Information Criterion (AIC) statistic is commonly used to assess whether the addition of a variable contributes to the prediction of an outcome in a statistical model (https://stanfordphd.com/AIC.html).

dropped before the next item was added. Multicollinearity[25] was tested using Variance Inflation Factors (VIF) as variables were added. For variables that were highly correlated,[26] with a VIF of 4 and higher, separate regression models were run for the correlated variables. In these cases, the variable with the stronger effect size (measured by hazard rates) was kept and the variable with the weaker effect size was dropped before subsequent variables from the bivariate predictors list were tested.

Figures 10-12 present a crosswalk of which factors at this stage were significant predictors of each of the study outcomes. For each, distinctions are made between findings for Baltimore City versus the rest of the state, as our analyses showed little consistency in the factors that were significant in Baltimore City when compared to the rest of the state. For example, the number of prior misdemeanor handgun complaints was a statistically significant predictor of new arrests for Maryland's 23 counties but not for Baltimore City (Figure 10). Conversely, being age 13 or under at the time of a youth's first auto theft complaint was a significant predictor of FTAs for Baltimore City but not for the rest of the state (Figure 12).

Figure 10. Statistical Significance of Tested Factors, Multivariate Cox Regression Model – New Arrests

	State of Maryland n=603	Baltimore City n=252	23 Maryland Counties n=351
History of Escape/AWOL (last 12 mos)	ns	ns	ns
Age at First Felony Complaint	ns	ns	ns
Prior Misdemeanor Offenses (last 3 months)	**	*	**
Prior Misdemeanor Handgun Offenses	*	ns	**
Auto Theft on Current Offense	**	ns	**
Age at DRAI	*	ns	ns
Sex (Female=0)	ns	ns	ns
Baltimore City (Rest of the State=0)	ns	N/A	N/A
Fiscal Year FY23 (FY22=0)	**	*	**

**=Significant at the p<.01 level; *=Significant at the p<.05 level; ^=Significant at the p<.10 level; ns=Not significant

Figure 11. Statistical Significance of Tested Factors, Multivariate Cox Regression Model – New Crime of Violence Arrests

	State of Maryland n=603	Baltimore City n=252	23 Maryland Counties n=351
Prior Misdemeanor Offenses (last 3 months)	*	ns	**
Prior DRAIs (past 6 months)	ns	ns	^
Charged with an Auto Theft on Current Offense	^	ns	*
Prior or Current Child Welfare Involvement	ns	^	ns
Age at DRAI	**	*	ns

[25] Multicollinearity is a "statistical phenomenon that occurs when two or more independent variables in a regression model are highly correlated, indicating a strong linear relationship among the predictor variables. This issue complicates regression analysis by making it difficult to accurately determine the individual effects of each independent variable on the dependent variable" (Bhandari, 2025).

[26] For example, some variables were simply different operationalizations of the same offense/case processing factor (e.g., prior offenses in the last 3 months vs. prior offenses in the last 6 months), and those factors needed to be analyzed separately due to multicollinearity.

Sex	ns	ns	ns
Baltimore City	ns	N/A	N/A
Fiscal Year FY23	ns	ns	ns

**=Significant at the p<.01 level; *=Significant at the p<.05 level;
^=Significant at the p<.10 level; ns=Not significant

Baltimore City's disproportionate representation in the sample, driven largely by local policing practices that result in more frequent requests for detention, in combination with the fact that Baltimore City youth are more likely to be arrested and referred to juvenile court for violent crimes and firearm possession misdemeanors (Maryland DJS Data Resource Guide, FY23: p. 107), highlights the importance of creating a DRAI that is valid for the large number of youth being processed for detention there. The value of providing consideration to Baltimore City's unique place in the state's overall picture of detention screening is further enhanced by the fact that 97% of Baltimore City youth in our sample were Black. Accordingly, because one of the overall aims of the validation process is to ensure that a revised instrument functions equitably across demographic groups and regions, subsequent steps in the validation and revision process considered for scoring only those items that were statistically significant (at the p<.05 level) predictors of at least one study outcome in Baltimore City *and* the rest of the state.[27]

Figure 12. Statistical Significance of Tested Factors, Multivariate Cox Regression Model – FTA in Court

	State of Maryland n=603	Baltimore City n=252	23 Maryland Counties n=351
Prior Auto Theft Complaints (last 3 months)	**	ns	^
Auto Theft on Current Offense	^	ns	ns
Current and Pending Category III Offenses	^	ns	^
Age 13 or Under at First Car Theft Complaint	*	*	ns
Age 13 or Under at First Crime of Violence Complaint	ns	ns	^
Prior ATD Unsuccessful Completions (last 2 years)	ns	^	ns
Prior or Current Child Welfare Involvement	*	*	ns
Age at DRAI	ns	ns	ns
Sex* (Female=0)	ns	ns	ns
Baltimore City (Rest of the State=0)	^	N/A	N/A
Fiscal Year (FY22=0)	ns	ns	ns

**=Significant at the p<.01 level; *=Significant at the p<.05 level; ^=Significant at the p<.10 level; ns=Not significant

Separate analyses showed that pre-adjudicatory re-arrest rates were 82% higher in FY23 than in FY22 (HR=1.82, p<.01). We assumed FY23 is more relevant to the present, in part because data from FY22 was potentially impacted by the COVID-19 pandemic. For this reason, significant predictors of an outcome in FY23 for Baltimore City or the rest of the state, but not in the combined model, counted toward inclusion as a scored DRAI item. For example, we included age at the time of DRAI, which was a

[27] Factors that were statistically significant at the p<.10 level and contributed to the regression model's ability to predict study outcomes based on AIC statistics were also chosen for inclusion, so long as they predicted outcomes in Baltimore City and the rest of the state.

statistically significant predictor of new arrests (p<.01) for Baltimore City and the rest of the state in FY23 only.[28]

At this stage, three factors were identified as statistically significant predictors of at least one of the study outcomes for Baltimore City and the rest of the state: (1) Number of prior misdemeanor complaints in the last 3 months (New Arrests), (2) Age at time of DRAI (New Arrests, FY23 only), and (3) Motor Vehicle theft was most serious current complaint (New Arrests, FY23 only for Baltimore City). They would be included as scored items in the new DRAI.

Informed by insights provided by the DRAI workgroup in response to our findings thus far, we assessed approximately 100 additional factors using bivariate Cox regression methods (see Appendix A).[29] From these analyses, we identified three additional factors for scoring: (1) Current and Pending Category III Offenses,[30] (2) Prior Detention Alternatives (ATDs) in the Last 2 Years, and (3) Failures to Appear in Court/Writs/Warrants/AWOLs/Escapes in the Past Year.[31] Further testing of these items was completed based on suggestions from members of the DRAI workgroup. For a breakdown of Category III offenses in the sample, see Appendix B.

Optimizing DRAI Item Scoring and Points Allocation

With six items identified, we determined optimal scoring and point allocation based on each item's statistical relationship to study outcomes. This was done by testing mockups of each item with different response thresholds in the Cox regression models.[32] We next used the findings from our final regression models (see Appendix C) to develop point allocations based on the effect size of each predictor (as measured by hazard ratios).[33] For example, the hazard ratio for Prior Misdemeanor Offenses in the Last 3

[28] Our later analyses indicated that youth 17 and older were significantly less likely to have an arrest and crime of violence arrest than younger youth. This was one of the strongest effects and was not limited to a specific fiscal year.

[29] At this point, we removed from further consideration any non-demographic variables that were shown to be non-significant in previous regression models (e.g., age at first felony complaint).

[30] Upon conducting region-specific bivariate and multivariate analyses, we discovered that this variable helped predict crimes of violence in Baltimore (p<.05), although it had not shown up in Step 2 when analyzing predictors for the entire state. Current and Pending Category III offenses had shown up as a significant predictor of FTAs for the rest of the state, though only at the p<.10 level, in Step 3. When we reanalyzed Current and Pending Category III Offenses in paired down Cox Regression models (i.e., non-significant variables had been eliminated), it was a significant predictor of FTAs for the rest of the state at the p<.05 level—and we also found that it was predictive of new arrests for the rest of the state at the p<.10 level, just missing achieving statistical significance at the p<.05 level (HR=1.56, p=.051). We concluded that there was enough statistical support to merit including this item in the DRAI and subsequent analyses provided further justification for this decision.

[31] Although FTA/Writ/Warrant/AWOL Alerts in the Past Year was only significant at the p<.10 level for Baltimore City, our analyses using the Akaike Information Criterion (AIC) found that this variable improved how well the statistical model predicted all three outcomes in Baltimore City. We included this item in the DRAI but reduced the number of points to 1 because it was not significant at the p<.05 level.

[32] For example, in deciding how to create response categories for Prior Misdemeanor Offenses in the Last 3 Months, we first looked at whether youth with 1 or more were more likely to have re-arrests than youth with no prior misdemeanor offenses during that period. Then we analyzed whether youth with 2 or more prior misdemeanor offenses in the last three months were re-arrested and had FTAs at a higher rate than youth with 0 or 1 prior misdemeanors. We ended up using neither mockup, as we learned, through further testing that this item's effect on new arrests was driven completely by youth who had 3 or more prior misdemeanors over the last 3 months.

[33] We occasionally deviated from this methodology with the goal of maximizing the predictive validity and functioning of the overall tool. For instance, for Current and Pending Category III Offenses, even though the effect sizes in our outcome-specific regressions supported allocating 2 points, we allocated 3 points based on further analyses that showed that this adjustment, in combination with a reduction in the points allocated for Prior

Months was 1.62 (p<.001) for re-arrests (recall that it was a significant predictor of re-arrests for both Baltimore and the rest of the state). In general, we rounded up (to 2 points in this case) and this decision was further supported by the item also being a predictor of crimes of violence in Baltimore (HR=1.93, p<.01). Figure 13 shows the final version of each scored item and how points are distributed in the new version of the DRAI coming out of this study.[34]

Figure 13. New DRAI Items and Scoring

Item	Options	Scoring
1. Age at DRAI	13 and under	1 pt
	14 – 16	0 pts
	17 and older	-1 pt
2. Current Most Serious Alleged Offense is Auto Theft	No	0 pts
	Yes	2 pts
3. Current and Pending Category III Offenses	0 – 1	0 pts
	2 or more	3 pts
4. Number of Prior Misdemeanor Offenses in the Last 3 Months	0 – 2	0 pts
	3 or more	2 pts
5. Prior Detention Alternatives (ATDs) in the Last 2 Years	No	0 pts
	Yes	2 pts
6. Failures to Appear in Court/Writs/Warrants/AWOLs/Escapes in the Past Year	No	0 pts
	Yes	1 pt

DRAI Risk Level: _____ DRAI Risk Score: _____

Low Risk: -1 to 1 points | Moderate Risk: 2 to 4 points | High Risk: 5 or more points

Assessing the New DRAI's Predictive Validity

The next step was to test how well the revised overall DRAI risk level predicted study outcomes. Using AUC statistics, we found that the newly validated tool either exceeded or was very close to achieving the preferred standard of an AUC of 0.65 for all outcomes by region (Figure 14).[35]

Misdemeanor Offenses (last 3 months) from 3 points to 2 resulted in an improvement in the tool's ability to distinguish between moderate- and high-risk youth.

[34] Statewide, youth 17 and older were 40% less likely than younger youth to have a new arrest (p<.001), and 20% less likely to have a new crime of violence arrest (p<.05). Youth 13 and younger were over twice as likely as other age groups to have a new crime of violence arrest, though this effect was only significant at the p<.10 level; this group was also descriptively, though not significantly, more likely than older youth to have any new arrest. We decided to subtract one point for older youth (17+), assign zero points for youth ages 14-16, and add one point for youth 13 and under at the time of their DRAI. This decision allowed us to incorporate age as a scored item, while accounting for the weaker evidence showing that youth 13 and under were at greater risk to recidivate. Had we given older youth 0 points, those 14-16 years old 1 point and those 13 and under 2 points, this would have weakened the predictive validity of the DRAI. This is because the statistical evidence supporting other items we assigned 2 points was stronger than the evidence in favor of youth 13 and younger being more likely to re-offend.

[35] The exceptions were new arrests for Baltimore City (AUC=0.625) and FTAs for the rest of the state (AUC=0.637).

Figure 14. Area Under the Curve Statistics, Revised vs. 2017 DRAI

	Revised DRAI			2017 DRAI		
	Arrest	Crime of Violence Arrest	FTA or Warrant	Arrest	Crime of Violence Arrest	FTA or Warrant
Statewide	.668	.733	.651	.573	.618	.585
Baltimore City	.625	.704	.678	.537	.562	.588
23 Maryland Counties	.695	.753	.637	.597	.667	.589

Compared to the 2017 DRAI, the AUC was substantially higher for all three study outcomes, statewide and for both Baltimore City and the other 23 Maryland jurisdictions. The new DRAI was especially good at predicting new crime of violence (COV) arrests, with an AUC of .733 for the state, and .704 and .753, respectively, for Baltimore City and the rest of the state.

While AUC and correlation statistics allow for comparison with past validation studies and instruments used in other states and jurisdictions, neither takes into account time-at-risk, which, as shown earlier, varied for sample youth (Vincent, n.d.). Accordingly, we estimated Cox regression models using the overall risk score to predict the three study outcomes, both statewide and separately by region (see Figure 15). These findings suggest that a one-point increase on the new DRAI increased the odds of a new arrest by 36% (HR=1.36, p<.001), a crime of violence arrest by 46% (HR=1.46, p<.001), and an FTA by 35% (HR=1.35, p<.001). The overall DRAI score was predictive for all but one study outcome in Baltimore City and the rest of the state at the p<.001 level, supporting its utility as a decision-making tool with applicability throughout Maryland.[36]

Figure 15. Cox Regression Models Predicting Study Outcomes Using DRAI Overall Risk Score, by Region

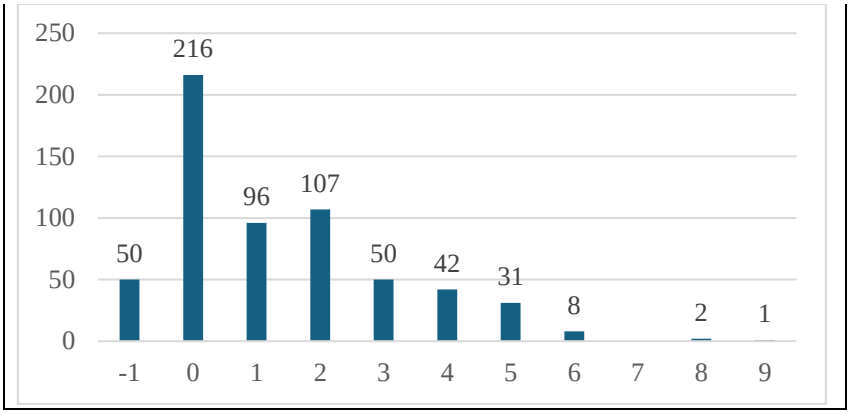
Statewide (n=603)	**Hazard Rate**	**t**	**p**
Arrest	1.36	46.88	<.001
Crime of Violence Arrest	1.46	27.61	<.001
FTA	1.35	23.29	<.001
Baltimore City (n=252)			
Arrest	1.26	11.35	<.001
Crime of Violence Arrest	1.49	15.99	<.001
FTA	1.39	9.87	<.01
23 Maryland Counties (n=351)			
Arrest	1.44	38.79	<.001
Crime of Violence Arrest	1.49	16.19	<.001
FTA	1.37	15.97	<.001

[36] The exception was FTAs for Baltimore City, for which the overall risk score was still a statistically significant predictor (HR=1.39, p<.01).

Determining Cut Points for New DRAI Risk Levels

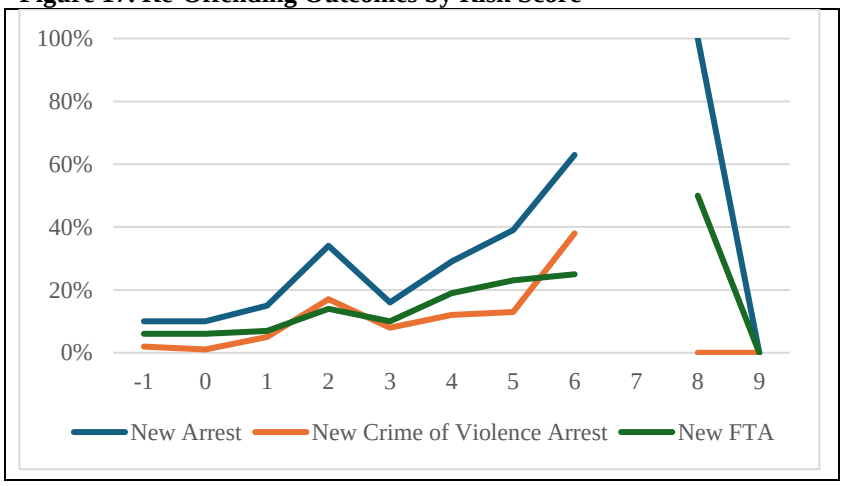
Based on these findings, our final step was to analyze data patterns to determine appropriate cut points to classify youth as at a low, moderate, or high risk to re-offend. Risk levels should ideally group youth progressively according to their recidivism risk, with moderate-risk youth re-offending at a higher rate than low-risk youth, and high-risk youth re-offending at the highest rate (Vincent, Guy, & Grisso 2012).

Figure 16. Distribution of Risk Scores, Based on New DRAI Items



There should also be a meaningful number of youth in each risk level category for the tool to be useful for guiding detention decisions. Accordingly, we first examined the distribution of cases based on risk score. Figure 16 shows that, though the six scored items could result in a minimum score of -1 and a maximum score of 11, no youth in the study sample scored more than 9 points, and three-quarters (78%, n=469) scored two points or fewer.

Figure 17. Re-Offending Outcomes by Risk Score



We next turned to the distribution of re-offending rates for the three study outcomes, again based on DRAI risk scores (Figure 17). In general, the trend lines for each outcome increases as the number of points increases.[37] Based on the generally low re-offending rates across outcomes for youth who scored between -1 and 1 points, we assigned these youth to the "low-risk" group. Because patterns did not always align across the three outcomes, especially in the upper scoring range, we based moderate- and high-risk categorizations largely upon new arrests and new FTAs, which are much more frequent outcomes. Accordingly, "moderate-risk" was defined as scoring 2 to 4 points, and "high-risk" as scores of 5 and higher.

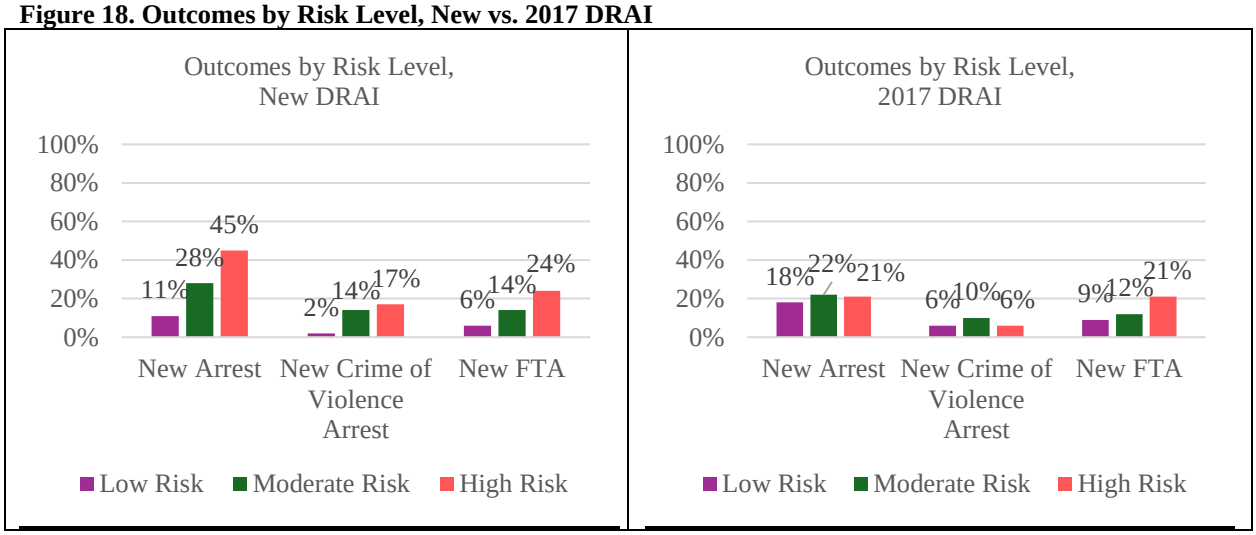
Figure 18 shows the three outcomes based on these assigned risk levels for the new DRAI, along with the same outcomes based on the 2017 DRAI risk levels. For both new arrests and new FTAs, the new low, moderate, and high groupings progressively sort young people by their re-offense rates. In other words,

[37] No youth in the sample scored 7 points, and only a small number of youth who scored 8 or 9 points, making these findings less easily interpretable.

high-risk youth have substantially higher re-offending rates than moderate-risk youth, who have substantially higher re-offending rates than low-risk youth. These categorizations represent an improvement over the 2017 DRAI; in particular, under the earlier instrument, youth have similar new arrest rates regardless of risk level, suggesting that the 2017 version is no longer appropriately sorting youth according to their risk for reoffending.

Notably, for new arrests for crimes of violence, the new DRAI does a better job at identifying low-risk youth than it does distinguishing between moderate- and high-risk youth. However, it is worth remembering that new arrests for crimes of violence are generally rare for this sample overall (7%), so such differentiations in risk level based on this outcome are more limited due to less variability within the data.

Figure 18. Outcomes by Risk Level, New vs. 2017 DRAI



Part Four: Policy and Implementation

The newly validated version of the Maryland DRAI accounts for both short-term risk as well as policy considerations to assure fairness and public safety. Consistent with past DRAIs, this new version incorporates DJS policy priorities that may influence the detention decision, separate from the validation study research into the predictors of re-offending. Unlike detention risk assessment instruments in some other states, Maryland's DRAI does not automatically score the youth's current offense—though *Item 2. Current Most Serious Offense is Auto Theft* was incorporated as a scored item after statistical analyses showed that youth charged with auto theft were more likely to re-offend and fail to appear in court. Likewise, *Item 3. Current and Pending Category III Offenses* scores current Category III offenses because it was predictive of short-term re-offending and FTAs. These were the only current offense-related factors, out of the many we tested, that were predictive statewide of short-term re-offending and/or FTAs. While only predictive items are included as scored items in the new DRAI, DJS articulates separate policies incorporating the current offense into decisions governing the use of secure detention and ATDs.

As shown in Figure 19, DJS has developed a structured framework for decision making that identifies a default decision based on the youth's DRAI risk level and the seriousness of the alleged offense. The options intake officers making detention decisions have to choose from are: (1) Secure Detention/Community Detention Not Authorized, (2) Community Detention Authorized (with or without Electronic Monitoring), or (3) Secure Detention Authorized. Category I offenses always require secure

detention—this is a non-negotiable policy regardless of DRAI score. For other offense types, the default decision is based on both the youth's DRAI risk level and their current offense type. For youth charged with firearm offenses, detention is automatically authorized if the young person scores moderate or high risk on the DRAI, while the default decision for youth who score low risk is Community Detention Authorized with Electronic Monitoring (EM). Likewise, for Crimes of Violence (COVs), the default decision varies by risk level –for low and moderate risk children, the default is Community Detention with EM, while for high risk children, the default is Secure Detention. For youth not charged with COVs or firearm offenses, the default response for low and moderate risk youth is to not authorize secure detention or community detention. Meanwhile, the default decision is to authorize community detention—with or without EM—for high risk youth.

Figure 19. Default Decisions (DJS Policy as of March 2025, Subject to Change)

DJS Intake Officers consider a child's DRAI score to guide their decisions on whether or not to authorize Secure Detention or Community Detention upon police request. Per DJS Policy, default decisions of the Intake Officer may also be guided by seriousness of offense to protect public safety.

FIREARM OFFENSES **	• Low Risk child placed on Community Detention with Electronic Monitoring (EM) by default • Moderate Risk child detained by default • High Risk child detained by default
CRIMES OF VIOLENCE **	• Low Risk child placed on CD with Electronic Monitoring (EM) by default • Moderate Risk child placed on CD with Electronic Monitoring (EM) by default • High Risk child detained by default
OFFENSES THAT DO NOT INVOLVE CRIMES OF VIOLENCE OR FIREARMS **	• Low Risk children are not authorized for secure or community detention by default • Moderate Risk children are not authorized for secure or community detention by default • High Risk children placed on Community Detention by default

** The DJS Intake Officer may consider aggravating or mitigating factors that heighten or lessen the restrictiveness of custody, which overrides the default decision. For example, a low or moderate risk score that does not involve a crime of violence or firearm may be placed in secure detention if there are presenting conditions that reduce the likelihood of the youth's ability to be safely supervised in the community under Community Detention supervision or the care/custody of a parent or guardian. This is discretionary decision-making of the Intake Officer and/or a supervisor.

While the default decisions ensure that the offense seriousness and DRAI risk score are considered in a consistent and intentional way, state law also empowers intake officers to weigh aggravating or mitigating factors that may not be fully captured by the DRAI risk score and DJS policy. To this end, the 2025 DRAI contains a revised and expanded list of mitigating (e.g., "No prior facts sustained") and aggravating factors (e.g., "Alleged offense was particularly severe or violent").[38] See Figure 20. When intake officers select an option that varies from the default decision, this is considered an override and they are required to select one of these factors to explain their decision to deviate from the default choice; supervisor

[38] The UMB researchers compiled a list of mitigating/aggravating factors, organized into overarching categories (e.g., Prior Behaviors While Under Community Supervision), from 8 state/county DRAIs that were available on the internet. A subgroup of DJS state intake leadership, regional intake directors, DJS' research department, and UMB researchers met to review the factors used by other states/jurisdictions and decided which factors to add and, in some cases, how to refine the language used for existing factors.

approval may also be required. For example, a low or moderate risk youth not charged with a crime of violence or firearm offense may be placed in secure detention if there are presenting conditions (e.g., "Prior unsuccessful discharge from community detention/ATD (last 6 months)" that reduce the child's likelihood of being safely supervised in the community.[39] Thus, consistent with past DRAIs, the overall risk level, the seriousness of the alleged current offense, and certain mitigating and aggravating factors may all inform the detention decision.

Figure 20. Override Down/Mitigating and Override Up/Aggravating Factors

Override Down/Mitigating Factors	Override Up/Aggravating Factors
● Youth is under 13 ● Current complaint or alleged offense occurred at least 30 days or more prior to request date ● No prior facts sustained ● Prior successful community detention/ATD completion (last 6 months) ● Available adult/release resource willing to support and supervise youth ● Youth has strong community ties/support (e.g., goes to school regularly, has a job, attends a house of worship, etc.) ● Youth marginally or indirectly involved in the offense ● Offense less serious than indicated by charge ● Youth has significant mental health problem or limited mental capacity and is being referred to services provided by another system or in the community ● Other (please specify, required):	● Prior unsuccessful discharge from community detention/ATD (last 6 months) ● Youth has violated conditions of a detention alternative resulting in court hearing (last 6 months) ● Alleged offense was particularly severe or violent ● Current complaint contains multiple events ● Two or more additional complaints in the previous 30 days ● Serious threat to victim or witness ● Other (please specify, required):

[39] While these factors provide intake staff with discretion to override the DRAI score when appropriate, their presence does not mandate an override.

The DRAI's Potential Impact on Decision Making

To assess the potential impact of changes to the DRAI risk score on decision-making, it is important to understand how the new tool is expected to change the distribution of DRAI risk levels. Figure 21 shows the risk level breakdown for the new DRAI compared to the 2017 version. Under the new DRAI, more than twice as many youth are assessed as moderate-risk (36% vs. 16%) and substantially fewer as low-risk (59% vs. 81%).[40] The increase in youth classified as moderate risk under the new DRAI is of a substantially greater magnitude for Baltimore City youth (14% under the 2017 version vs. 40% under the new version), females (8% vs. 26%, respectively), and youth ages 13 and under (8% vs. 29%, respectively). See Appendix D for a look at changes in risk level distributions by race, sex, region, and age.

While the adoption of the new DRAI risk levels may increase system penetration for some youth who score low risk on the 2017 DRAI and will now be assessed as moderate risk, DJS policies and the intake officer's use of aggravating and mitigating factors will also influence the new DRAI's impact in ways that are hard to predict. In general, the DRAI's implementation should be actively monitored to ensure that overall risk level and DJS policies are guiding decisions, in combination with case-specific factors relevant to community safety and youth wellbeing. Data on detention decisions and recidivism outcomes by DRAI risk level should be regularly reviewed. Specifically, detention decisions and outcomes for the now much greater portion of youth being classified as moderate risk should be given special scrutiny given the potential for disparate outcomes by race, sex, region, and age (see Appendix D). Likewise, data on override reasons should be regularly reviewed to ensure that case-specific information is being integrated into decision-making in a thoughtful and purposeful way that ensures community safety and minimizes unnecessary use of detention.

Figure 21. Risk Level Distributions, New vs. 2017 DRAI

Risk Level	New DRAI n (%)	2017 DRAI n (%)
Low Risk	860 (59%)	1,183 (81%)
Moderate Risk	528 (36%)	228 (16%)
High Risk	77 (5%)	54 (4%)
Total	1,465 (100%)	1,465 (100%)

Limitations

Methodological Limitations

This study was able to address a major limitation of most prior detention risk assessment validation studies. By using survival analysis and analyzing time to re-arrest and FTA, we were able to create a tool derived from data patterns of a more representative group of youth with DRAIs. By using the youth's adjudication hearing date, rather than a uniform post-DRAI period (e.g., 60 days), we were also able to more directly measure the outcomes of interest and account for individual variation in case processing times.

Nevertheless, there are several important limitations to this study's methodology that are worth keeping in mind, and understanding them is key to appreciating how the DRAI should be used.

- Youth who were detained for the entirety of their pre-adjudication period (22% of new complaint DRAIs) were not included in the sample. This decision is justifiable given that these youth were not at risk of re-offending in the community. However, by not including the youth who were detained for

[40] This is specific to new complaint DRAIs for which there was not a court hold and where DJS has discretion.

the longest periods, the new instrument cannot account for potential re-offending by these youth, who may represent the highest risk to themselves and the community.

- Although we were thorough in our testing process, we cannot rule out the influence of other factors on study outcomes. Certain factors might have been predictive of study outcomes but were not testable given how rarely they occurred.[41] It is also quite likely that, while extensive, our list of tested predictor variables did not include every potential factor that may be related to short-term re-offending. However, it is also worth remembering that, by necessity, the DRAI must provide decision-making guidance in situations in which intake officers have little to no information about the youth before them, and we can be confident that the six scored DRAI items we identified are predictive of pre-adjudication arrests and FTAs in Maryland.
- Our study did not examine the efficacy of, or role played by, DJS or court-mandated interventions (e.g., stricter monitoring, specific community-based programming, etc.). We cannot rule out the possibility that DJS/court interventions reduced the likelihood of re-arrests and FTAs—and that without those interventions, other factors might emerge as predictive of study outcomes.[42]

Other Study Limitations

While we examined existing override reasons and their relationship to study outcomes, we found that the most common response for cases with overrides was "Other" (75%, 193/258) and the text answers were either blank or not informative (e.g., Supervisor X approved ATD). Given the changes to risk scoring and the incorporation of a broader array of override reasons, it will be important going forward to have more accurate data to analyze the reasons intake officers deviate from default decisions specified by DJS policies. This is key both for researching/monitoring the tool's implementation, regionally and statewide, and to assist DJS supervisors and administrators in reviewing cases to ensure that thoughtful decisions are being made.

A final study limitation pertains to the overrepresentation of Baltimore City youth in the DRAI—accounting for 42% of DRAIs during FY22-23. This study adapted to Baltimore City's overrepresentation in DRAIs, and its implications for Disproportionate Minority Contact (DMC), by specifying that the tool items must be valid for predicting at least one study outcome in both Baltimore City and the rest of the state. In this way, the overrepresentation of youth – and, particularly, youth of color - from Baltimore City in police requests for detention was at least considered in our methodology for creating a new DRAI. Still, having a distinctive process in Baltimore City governing police decision making as to when to request detention (and, by extension, have a DRAI administered), meant that there were core differences in the samples of youth selected for DRAIs in Baltimore City versus the rest of the state. These different selection mechanisms for DRAI completion likely exaggerated other differences between Baltimore City and the rest of the state samples, making it harder to identify factors that were predictive across regions.

The overrepresentation of youth from Baltimore City, who are disproportionately Black, in police requests for detention (and DRAIs) is an issue distinct from validating the DRAI that is, nevertheless, highlighted by this study's data patterns. Due to longstanding police practices, it appears that living in Baltimore City exposes youth charged with crimes to a much greater likelihood of receiving the DRAI

[41] For example, while we did not find that youth with 10 or more prior complaints in the last year were more likely to have a new arrest or FTA, only 28 youth in our sample had 10 or more complaints in the last year, which reduced our ability to detect a statistically significant effect.

[42] For example, it is possible that we would have found that being charged with armed carjacking was a predictor of study outcomes had DJS/court responses (e.g., community detention) not been effective at reducing those youths' likelihood of re-offending.

and, thus, also, to the possibility of being detained or placed on an ATD. This is a cause for concern from the perspective of fairness in the administration of justice.[43]

Conclusion

In sum, this study identified six items that, when considered together, substantially improve the DRAI's ability to identify youth with a higher or lower likelihood of having a pre-adjudication arrest or FTA—both in Baltimore City and the rest of the state. As prior research has established, using validated, though imperfect, risk assessments to inform caseworker decisions achieves better outcomes for youth, families, and communities than ignoring research evidence and basing decisions on gut feelings, the availability of detention beds, or media narratives and political concerns of the moment (Applegarth, Lewis, & Rief, 2023; Annie E. Casey Foundation, 2017; Mulvey & Iselin, 2008). Still, risk assessments are meant to inform, not substitute for, case-by-case judgments by trained decision makers who must consider many factors in a case (Vincent, Guy, & Grisso, 2012). Consistent with the results and limitations of this validation study, successful implementation of this new version of the DRAI will depend on DJS intake officers carefully exercising their discretion—guided by the overall risk level and DJS and court policies, while also accounting for case-specific factors.

[43] It appears that there have been recent changes, and the Baltimore City Police Department has started to issue substantially more "paper charges" as an alternative to physically taking all arrested youth to the Baltimore City Juvenile Justice Center for processing. This data should be tracked and analyzed, and patterns presented publicly and discussed, every year.

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Appendix A. Variables Analyzed

Variable Name
Adult transfer that requires detention
Adult transfer case where detention was not mandated
Adult transfer case, whether mandatory detention or not
Age at DRAI
Age at first auto theft complaint
Age at first Category I or II complaint
Age at first COV offense
Age at first felony offense
Age at first formaled (petitioned) offense
Age at first misdemeanor or felony offense
Baltimore City case or not
Black/African American or White/Caucasian
Category I policy hold
Category II Offense
Charges (felony or misdemeanor) pending adjudication
Charges pending adjudication for auto theft
Charges pending adjudication for felony
Charges pending adjudication for misdemeanor offense
Charges pending adjudication for Category I offense
Charges pending adjudication for Category 2 offense
Charges pending adjudication for Category 3 offense
Charges pending adjudication for Category 3 or 4 offense
Charges pending adjudication for Category 4 offense
Charges pending adjudication for Category 5 offense
Complaints with multiple offenses in the past 10 days
COV or person felony offense and prior 2nd degree assault charges in the past 6 months
Current and pending car theft offenses (#)
Current and pending Category 3 offenses (#)
Current and pending Category 3 offenses minus those for robbery (#)
Current and pending Category 3, 4, or 5 offenses (#)
Current and pending felony offenses (#)
Current and pending offenses (#)
Current and pending robbery offenses (#)
Current and prior felonies (#)
Current and prior misdemeanor handgun offenses (#)
Current detention alternative (ATD) supervision at the time of the DRAI
Current electronic monitoring (EM) supervision at the time of the DRAI
Current felony offense with 2 prior felonies and not under DJS supervision
Current felony offense with prior misdemeanors in the last 6 months
Current felony offense with 3 prior felonies and not under DJS supervision

Current felony offense with 3 or more prior felonies and not under DJS supervision, and not detained
Current felony offense with 3 or more prior felonies and 16 and under
Current felony offense with 3 or more prior felony offenses and age 13 or under at first felony complaint
Current felony offense and 3 or more prior felony offenses
Current felony offense with prior felonies and age 16 or under at time of DRAI
Current felony offense with prior felonies and age 16 or under at time of DRAI AND no court or DJS policy holds
Current felony offense with prior felony offense and no DJS or court holds
Current felony offense and any prior felony offenses
Current felony offense and any prior felony offenses in the last 6 months
Current felony offense and prior 2nd degree assault charges
Current felony offense and prior 2nd degree assault charges in the past 6 months
Current felony offense and prior 2nd degree assault charges in the past year
Current felony offense and prior misdemeanor complaints in the last 3 months
Two or more current or prior felony offenses and no current DJS supervision
Six or more offenses in the last 10 days at least 2 of which were felonies
Current most serious offense is an auto theft
Current most serious offense is a carjacking complaint
Current most serious offense is for a Category I charge
Current most serious offense is for a Category II charge
Current most serious offense is for a Category III charge
Current most serious offense is for a Category IV charge
Current most serious offense is for a Category V charge
Current most serious offense is a Crime of Violence
Current most serious offense is a felony charge
Current most serious offense is a first-degree assault charge
Current most serious offense is a misdemeanor charge
Current most serious offense is a misdemeanor handgun charge
Current most serious offense is a misdemeanor person charge
Current most serious offense is a person offense felony charge
Current most serious offense is a robbery charge
Current most serious offense is a youth's first felony and there is no current supervision
Current offense is the youth's first felony charge
Current offense includes a property felony charge
Current offense includes a firearm charge
Current Category I offense (not necessarily most serious offense)
Current Category II offense (not necessarily most serious offense)
Current Category III offense (not necessarily most serious offense)
Current Category III or IV offense (not necessarily most serious offense)
Current Category IV offense (not necessarily most serious offense)
Current Category V offense (not necessarily most serious offense)
Current or past dual involvement with child welfare system
Current or prior crime of violence offense
DJS ranking of the current offense severity

DRAI Item 1 - Charges Pending Adjudication (excluding charges pending at intake)
DRAI Item 2 - Prior Sustained Adjudications/Current Supervision
DRAI Item 3 - History of Failure to Appear for a Court Hearing (within past 12 months)
DRAI Item 5 - Prior Detentions (within past 6 months)
DRAI Item 6 - Age at First Felony Complaint
Fiscal year (FY22 or FY23)
Four or more current offenses and no current supervision
Has one offense past and present combined
Has one felony offense past and present combined
Has one misdemeanor offense past and present combined
Has two or fewer misdemeanor offenses past and present combined
In top 10% of prior adjudications
In top 10% of prior adjudications for Category 1 and 2 offenses
In top 10% of prior adjudications for Category 3 and 4 offenses
In top 10% of prior adjudications for Crime of Violence offenses
In top 10% of prior adjudications for felony offenses
In top 10% of prior detentions
In top 10% of prior detentions and not under DJS supervision
In top 10% of prior felony offenses
In top 10% of prior misdemeanor offenses
In top 10% of prior misdemeanor offenses (last 2 years)
In top 10% of prior misdemeanor offenses (last year)
In top 10% of prior offenses
In top 10% of prior offenses (last year)
In top 10% of prior petitions
In top 25% in prior felony offenses and no current supervision
In top 25% in prior misdemeanor offenses and no current supervision
In top 25% of prior Crime of Violence offenses
In top 25% of prior felony offenses
In top 25% of prior misdemeanor offenses
In top 25% of prior misdemeanor offenses (last 2 years)
In top 25% of prior misdemeanor offenses (last 6 months)
In top 25% of prior misdemeanor offenses (last year)
In top 25% of prior offenses
In top 25% of prior offenses (last 2 years)
In top 25% of prior offenses (last 2 years)
In top 25% of prior offenses (last year)
In top 25% of prior petitions
Open alert (in the ASSIST database) for an FTA, Writ, Warrant, AWOL, or Escape
Open alert for FTA, Writ, or Warrant
Open AWOL alert
Prior adjudications
Prior adjudications for Category 1 or 2 offenses

Prior adjudications for Category 3 or 4 offenses
Prior adjudications for Category 5 offenses
Prior adjudications for Crimes of Violence
Prior adjudications for misdemeanor or felony offenses
Prior adjudications for misdemeanor offense
Prior adjudications for felony offense
Prior adjudications for property offenses
Prior ATD supervision with a successful termination (2 years)
Prior ATD supervision with an unsuccessful termination (2 years)
Prior aftercare supervision with a successful termination (2 years)
Prior aftercare supervision with an unsuccessful termination (2 years)
Prior pre-court supervision with a successful termination (2 years)
Prior pre-court supervision with an unsuccessful termination (2 years)
Prior probation spell with a successful termination (last 2 years)
Prior probation spell with an unsuccessful termination (last 2 years)
Prior probation supervision episodes
Prior alerts for a FTA, Writ, Warrant, AWOL, or Escape - ever
Prior alerts for a FTA, Writ, Warrant, AWOL, or Escape - last 6 months
Prior alerts for a FTA, Writ, Warrant, AWOL, or Escape - last 3 months
Prior AWOL alerts - ever
Prior AWOL alerts - last 6 months
Prior AWOL alerts - last 3 months
Prior and current offenses (#)
Prior and current auto theft offenses (#)
Prior and current car theft offenses (#) (last year)
Prior and current car theft offenses (#) (6 months)
Prior and current car theft offenses (#) (3 months)
Prior ATDs
Prior ATDs (last 2 years)
Prior ATDs (last year)
Prior ATDs (last 6 months)
Prior ATDs in the past 2 years and has a prior COV
Prior post-adjudication ATDs
Prior post-adjudication ATDs (last 2 years)
Prior post-adjudication ATDs (last year)
Prior post-adjudication ATDs (last 6 months)
Prior pre-adjudication ATDs
Prior pre-adjudication ATDs (last 2 years)
Prior pre-adjudication ATDs (last year)
Prior pre-adjudication ATDs (last 6 months)
Prior Assault II offenses last 2 year
Prior auto theft offenses
Prior auto theft offenses (last year)

Prior auto theft offenses (6 months)
Prior car theft offenses (3 months)
Prior carjacking offenses
Prior carjacking offenses (6 months)
Prior carjacking offenses (3 months)
Prior CINS offenses
Prior CINS offenses (last year)
Prior CINS or ordinance offense offenses (last year)
Prior CINS, ordinance or unspecified misdemeanor offenses (last year)
Prior complaints (last two years)
Prior complaints (last year)
Prior Crime of Violence offenses
Prior Crime of Violence offenses (3 months)
Prior Crime of Violence offenses (6 months)
Prior detention admissions (total)
Prior DRAIs (1 year)
Prior DRAIs (6 months)
Prior DRAIs for adult transfer cases, whether mandatory holds or not
Prior DRAIs for firearm policy hold cases
Prior DRAIs for writs, warrants, ATD first infraction and GPS violations
Prior DRAIs total
Prior felony adjudications
Prior felony offense only - 13 or younger at that time
Prior felony offense only - 16 or younger at that time
Prior felony offenses
Prior felony offenses (6 months)
Prior felony offenses (3 months)
Prior felony re-offense within 60 days of start of DJS supervision
Prior felony re-offense within 90 days of start of DJS supervision
Prior first-degree assault offenses
Prior first-degree assault offenses (last 2 years)
Prior first-degree assault offenses (last year)
Prior first-degree assault offenses (last 6 months)
Prior first-degree assault offenses last 3 months)
Prior first infraction alerts
Prior first infraction alerts (last year)
Prior FTA alerts
Prior FTA alerts (last 6 months)
Prior FTA alerts (last 3 months)
Prior FTA or warrant alerts
Prior FTA or warrant alerts (last year)
Prior FTA or warrant alerts (last 6 months)
Prior FTA or warrant alerts (last 3 months)

Prior misdemeanor handgun offenses
Prior misdemeanor handgun offenses (last year)
Prior misdemeanor handgun offenses (6 months)
Prior misdemeanor handgun offenses (3 months)
Prior misdemeanor offenses
Prior misdemeanor offenses (last 2 years)
Prior misdemeanor offenses (last year)
Prior misdemeanor offenses (6 months)
Prior misdemeanor offenses (3 months)
Prior misdemeanor re-offense within 60 days of start of DJS supervision
Prior misdemeanor re-offense within 90 days of start of DJS supervision
Prior offenses
Prior offenses (6 months)
Prior offenses (3 months)
Prior ordinance or unspecified misdemeanor offenses
Prior ordinance or unspecified misdemeanor offenses (last year)
Prior person offense misdemeanors
Prior person offense misdemeanors (last year)
Prior person offense misdemeanors (last 6 months)
Prior person offense misdemeanors (last 3 months)
Prior petitions
Prior petitions (6 months)
Prior petitions (3 months)
Prior placements
Prior probation violation offenses
Prior probation violation offenses (1 year)
Prior probation violation adjudications
Prior property felony offense
Prior property felony offense (6 months)
Prior property felony offense (3 months)
Prior property felony adjudications
Prior re-offense while under DJS supervision
Prior re-offense within 60 days of start of DJS supervision
Prior re-offense within 90 days of start of DJS supervision
Prior re-offense while under DJS supervision within 1 year of DRAI
Prior re-offense while under DJS supervision within 2 years of DRAI
Prior re-offense while under DJS supervision within 1 year of DRAI, new offense within 90 days of supervision start
Prior re-offense while under DJS supervision within 2 years of DRAI, new offense within 90 days of supervision start
Prior re-offense (felony) while under DJS supervision within 1 year of DRAI
Prior re-offense (felony) while under DJS supervision within 2 years of DRAI

Prior re-offense (felony) while under DJS supervision within 1 year of DRAI, new offense within 90 days of supervision start
Prior re-offense (felony) while under DJS supervision within 2 years of DRAI, new offense within 90 days of supervision start
Prior robbery with weapon offenses
Prior robbery with weapon offenses (last 2 years)
Prior robbery with weapon offenses (last year)
Prior robbery with weapon offenses (last 6 months)
Prior robbery with weapon offenses (last 3 months)
Prior robbery without weapon offenses
Prior robbery without weapon offenses (last 2 years)
Prior robbery without a weapon offense (last year)
Prior robbery without weapon offenses (last 6 months)
Prior robbery without weapon offenses (last 3 months)
Prior robbery without a weapon offense and a current robbery without a weapon offense
Prior second-degree assault offenses
Prior second-degree assault offenses (last year)
Prior second-degree assault offenses (6 months)
Prior second-degree assault offenses (3 months)
Prior unspecified misdemeanor offenses
Race/Ethnicity
Sex
Total number of Category 2 offenses in current complaint
Under DJS supervision (aftercare, pre-court, or probation) at the time DRAI
Under aftercare supervision at the time DRAI
Under pre-court supervision at the time DRAI
Under probation supervision at the time DRAI

Appendix B. Frequency Distribution of Category III Offenses in Validation Sample

Most Serious Alleged Offense	
Robbery	49 (56%)
Possession of a Controlled Substance with Intent to Distribute	13 (15%)
Unspecified Felony	8 (9%)
Burglary (1st Degree)	7 (8%)
Conspiracy to Commit Any Felony Offense	5 (6%)
Involuntary Manslaughter	2 (2%)
Removing Firearm from Possession of Law Enforcement	1 (1%)
Sexual Solicitation of a Minor	1 (1%)
Felony Theft ($100,000 or greater)	1 (1%)
Total	**87 (100%)**

Appendix C. Final Model Cox Regression Hazard Ratio Estimates by Region

Parameter	Entire State (n=603)			Baltimore City (n-252)			Rest of the State (n=351)		
	Arrests	COV Arrests	FTAs	Arrests	COV Arrests	FTAs	Arrests	COV Arrests	FTAs
1. Age at DRAI	1.80 (0.16)***	2.92 (0.28)***	1.28 (0.23)	1.70 (0.26)*	2.35 (0.41)*	2.10 (0.42)†	1.95 (0.22)**	3.14 (0.38)**	1.02 (0.30)
2. Current Most Serious Alleged Offense is Auto Theft	1.47 (0.10)***	1.51 (0.17)*	1.27 (0.15)	1.04 (0.16)[a]	1.19 (0.27)	0.81 (0.25)	1.90 (0.14)***	1.67 (0.25)*	1.71 (0.18)**
3. Current and Pending Category III Offenses	1.27 (0.10)*	1.47 (0.15)**	1.30 (0.12)*	1.13 (0.14)	1.54 (0.20)*	1.17 (0.20)	1.37 (0.15)*	1.27 (0.27)	1.44 (0.16)*
4. Prior Misdemeanor Offenses in the Last 3 Months	1.62 (0.14)***	1.44 (0.24)	0.97 (0.26)	2.21 (0.26)**	2.69 (0.36)**	0.81 (0.37)	1.53 (0.19)*	1.52 (0.33)	1.05 (0.28)
5. Prior Detention Alternatives (ATDs) in the Last 2 Years	1.36 (0.11)**	1.31 (0.18)	1.38 (0.14)*	1.18 (0.15)	1.17 (0.26)	2.10 (0.25)**	1.54 (0.16)**	1.77 (0.26)*	1.18 (0.20)
6. FTAs/Writs/Warrants/AWOLs/ Escapes in the Past Year[b]	1.01 (0.31)	1.20 (0.47)	2.33 (0.35)*	1.87 (2.27)	2.37 (1.83)	2.55 (0.54)†	0.57 (0.53)	0.58 (0.83)	2.92 (0.46)*
Fiscal Year (*reference: FY22)*	1.89 (0.19)**	1.18 (0.33)	0.95 (0.26)	1.71 (0.28)†	1.03 (0.49)	0.50 (0.49)	1.95 (0.27)*	1.33 (0.46)	1.39 (0.34)
Sex (*reference: Female)*	1.41 (0.34)	1.81 (0.61)	2.37 (0.60)	2.32 (0.63)	2.64 (1.10)	--	0.92 (0.42)	2.74 (1.04)	1.57 (0.61)

Notes: [a] Current Most Serious Alleged Offense is Auto Theft was significant at the p<.05 level (*HR*=1.54, SE=0.22) as a predictor of new arrests for Baltimore City in FY23 (n=118), which is why it was included as a scored item; [b] Although Failures to Appear in Court /Writs/Warrants/AWOLs/Escapes in the Past Year was only significant at the p<.10 level for Baltimore City, our analyses using the Akaike Information Criterion (AIC) found that this variable improved how well the statistical model predicted all three outcomes in Baltimore City. We included this item in the DRAI but reduced the number of points to 1 because it was not significant at the p<.05 level.

****p<.001 **p<.01, *p < .05, †p < .10*

Appendix D. Risk Level Distributions for New DRAI Compared to 2017 DRAI by Demographics

Risk Level	New DRAI % (n)	Current DRAI % (n)
Low Risk (-1-1)	57% (712)	81% (1,007)
Moderate Risk (2-4)	38% (469)	16% (194)
High Risk (5+)	5% (67)	4% (47)
Total	100% (1,248)	100% (1,248)

Risk Level	New DRAI % (n)	Current DRAI % (n)
Low Risk (-1-1)	64% (84)	79% (104)
Moderate Risk (2-4)	31% (41)	17% (22)
High Risk (5+)	5% (6)	4% (5)
Total	100% (131)	100% (131)

Risk Level	New DRAI % (n)	Current DRAI % (n)
Low Risk (-1-1)	73% (53)	82% (60)
Moderate Risk (2-4)	23% (17)	15% (11)
High Risk (5+)	4% (3)	3% (2)
Total	100% (73)	100% (73)

Risk Level	New DRAI % (n)	Current DRAI % (n)
Low Risk (-1-1)	56% (698)	79% (981)
Moderate Risk (2-4)	38% (470)	17% (209)
High Risk (5+)	6% (71)	4% (49)
Total	100% (1,239)	100% (1,239)

Risk Level	New DRAI % (n)	Current DRAI % (n)
Low Risk (-1-1)	72% (162)	89% (202)
Moderate Risk (2-4)	26% (58)	8% (19)
High Risk (5+)	3% (6)	2% (5)
Total	100% (226)	100% (226)

Risk Level	New DRAI % (n)	Current DRAI % (n)
Low Risk (-1-1)	56% (440)	83% (654)
Moderate Risk (2-4)	40% (311)	14% (111)
High Risk (5+)	5% (37)	3% (23)
Total	100% (788)	100% (788)

Risk Level	New DRAI % (n)	Current DRAI % (n)
Low Risk (-1-1)	62% (420)	78% (529)
Moderate Risk (2-4)	32% (217)	17% (117)
High Risk (5+)	6% (40)	5% (31)
Total	100% (677)	100% (677)

Risk Level	New DRAI % (n)	Current DRAI % (n)
Low Risk (-1-1)	64% (103)	91% (146)
Moderate Risk (2-4)	29% (47)	8% (13)
High Risk (5+)	7% (11)	1% (2)
Total	100% (161)	100% (161)

Risk Level	New DRAI % (n)	Current DRAI % (n)
Low Risk (-1-1)	54% (570)	80% (847)
Moderate Risk (2-4)	41% (431)	16% (167)
High Risk (5+)	6% (60)	4% (47)
Total	100% (1,061)	100% (1,061)

Risk Level	New DRAI % (n)	Current DRAI % (n)
Low Risk (-1-1)	77% (187)	78% (190)
Moderate Risk (2-4)	21% (50)	20% (48)
High Risk (5+)	3% (6)	2% (5)
Total	100% (243)	100% (243)