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# 2020 Review and Revalidation of the First Step Act Risk Assessment Tool

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# 2020 Review and Revalidation of the First Step Act Risk Assessment Tool

## Introduction

On December 21, 2018, President Donald J. Trump signed into law the First Step Act (“FSA” or “the Act”) after it passed both houses of Congress with bipartisan support. Pursuant to Section 101 of the Act (codified in relevant part in 18 U.S.C. § 3631(b)(4)), the Attorney General shall “on an annual basis, review, validate, and release publicly on the Department of Justice website the risk and needs assessment system” required by the Act. Section 3631(b)(4) further provides that such a review shall include:

- (A) any subsequent changes to the risk and needs assessment system made after the date of enactment of [the FSA];*
- (B) the recommendations developed under paragraph (2) [of 18 U.S.C. § 3631], using the research conducted under paragraph (3);*
- (C) an evaluation to ensure that the risk and needs assessment system bases the assessment of each prisoner’s risk of recidivism on indicators of progress and of regression that are dynamic and that can reasonably be expected to change while in prison;*
- (D) statistical validation of any tools that the risk and needs assessment system uses; and*
- (E) an evaluation of the rates of recidivism among similarly classified prisoners to identify any unwarranted disparities, including disparities among similarly classified prisoners of different demographic groups, in such rates ...”*

## Executive Summary

This document summarizes the activities and accomplishments of the Department and the National Institute of Justice (NIJ) in carrying out the mandates required under 18 U.S.C. § 3631(b)(4). Pursuant to the FSA, 18 U.S.C. § 3632(a), the Attorney General was charged with developing and releasing a risk and needs assessment system for use in the Federal Bureau of Prisons (BOP). The risk assessment tool, the Prisoner Assessment Tool Targeting Estimated Risk and Needs (PATTERN), was released in July 2019. Amendments to PATTERN were subsequently made and PATTERN was finalized in January 2020.

## **I. Overview of PATTERN**

As previous reports detail,<sup>1</sup> NIJ contracted with Dr. Grant Duwe, Dr. Zachary Hamilton, and Dr. Alex Kigerl in April 2019 to develop PATTERN. As required by the Act, the new risk and needs assessment system was to be developed and released 210 days after enactment of the Act. Due to the partial government shutdown in December 2018 and January 2019, the timeline to perform this work was significantly truncated.<sup>2</sup> After soliciting public and stakeholder feedback, the development team worked with the Independent Review Committee (IRC) to identify ways to improve PATTERN, while maintaining its high level of predictability.<sup>3</sup> As part of this process, the development team spent an extensive amount of time addressing questions and concerns raised by the IRC. Many statistical analyses were performed in response to these questions and concerns, and the IRC then provided recommendations about refinements to PATTERN, most of which the development team adopted. Given the complexity of developing a new risk assessment system, the Department established a process for independently reviewing and revalidating PATTERN.

As detailed in the 2020 Annual Report,<sup>4</sup> NIJ contracted with Dr. Rhys Hester and Dr. Ryan Labrecque in August 2020 to serve as independent consultants to conduct the annual review and revalidation of PATTERN.<sup>5</sup> Upon the consultants' initial review of the data, syntax files, and other supporting documentation used to develop PATTERN, several scoring, coding, and specification discrepancies were identified. These discrepancies were discussed with staff from the BOP's Office of Research and Evaluation (ORE) and the PATTERN development team.

This summary describes the results of this review and outlines recommendations to improve PATTERN. Additionally, the report will detail how the Department plans to proceed with the annual review and revalidation of PATTERN.

### **Development of PATTERN**

PATTERN was released in July 2019 in response to Title I of the Act.<sup>6</sup> PATTERN is designed to predict the likelihood of general and violent recidivism for all BOP inmates three years postrelease. PATTERN contains both static (e.g., criminal history) and dynamic (e.g., participation in education or drug treatment) factors that are associated with one's risk of recidivism. The PATTERN assessment tool provides predictive scores, developed and validated for males and females separately.

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<sup>1</sup> See USDOJ (2019) and (2020a).

<sup>2</sup> See pages 12 and 23 of USDOJ (2019).

<sup>3</sup> The IRC is a statutorily mandated body of at least six experts on risk and needs systems. The IRC is charged with assisting the Attorney General in carrying out his responsibilities under 18 U.S.C. §§ 3631(b), 3632, and 3633. See USDOJ (2019, pp. 8-9).

<sup>4</sup> See USDOJ (2020c).

<sup>5</sup> For more information about the Department's efforts to fulfill the review and revalidation requirement and the selection of the independent consultants, see USDOJ (2020c, p. 6 and pp. 34-35).

<sup>6</sup> See USDOJ (2019; 2020a; 2020b; 2020c).

As documented in prior Departmental reports,<sup>7</sup> PATTERN was developed and validated using a dataset of inmates released from BOP custody to the community between Fiscal Year (FY) 2009 and FY 2015. The dataset included rearrest data collected during a three-year follow-up period.<sup>8</sup> The initial dataset omitted inmates who were transferred to jail or Immigration and Customs Enforcement (ICE) custody for deportation upon release. Because PATTERN sought to incorporate several items from the Bureau Risk and Verification Observation (BRAVO) classification instrument, the development team further excluded inmates who did not have an initial and subsequent BRAVO assessment under the most recent version of the instrument.<sup>9</sup> The final sample included 149,269 individuals in the training dataset who were released between FY 2009 and FY 2013, and 73,701 individuals in the validation sample who were released between FY 2014 and FY 2015.<sup>10</sup>

The development team used an empirical approach to determine whether potential risk factors were predictive of the recidivism outcomes. Boosted regression with a k-fold validation procedure was used to identify the best combination of variables to predict general and violent recidivism separately for males and females in the training sample.<sup>11</sup> This process identified 17 measures across four scales: (1) general recidivism for males, (2) violent recidivism for males, (3) general recidivism for females, and (4) violent recidivism for females.<sup>12</sup> The coefficient values from the boosted regression results were also used to determine the integer weights for each included item.<sup>13</sup> In other words, the regression technique not only helped identify which risk factors to include, but also how much weight to assign for each item score. When evaluated on the validation sample, the predictive performances of the four PATTERN risk scales were

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<sup>7</sup> See USDOJ (2019; 2020a).

<sup>8</sup> For more information, see USDOJ (2019, p. 42).

<sup>9</sup> These criteria reduced the analytic sample from 280,588 to 222,970 for the six-year cohort, which was largely due to the exclusion of inmates admitted prior to September 2006 who did not have initial BRAVO assessment information available on the most recent version of the tool (i.e., 5100.08; see BOP, 2006). Although the USDOJ (2019, pp. 42-43) report indicated that inmates who died during the three-year follow-up period were also excluded, these inmates were inadvertently retained in the sample. While currently there is no comprehensive data source fully capturing the death of releasees, the BOP dataset does include several FBI indicators of known death. One of these variables accounts for the difference in the full BOP sample of 280,588 and the sample N published in USDOJ (2019, p. 42) of 278,940 allowing exclusion of known deaths. However, these 1,618 individuals were retained in the final sample of 222,970.

<sup>10</sup> For more information on the training and validation sample datasets, see USDOJ (2019, p. 49).

<sup>11</sup> General recidivism was defined as a return to BOP custody or a rearrest within three years of release from BOP custody, excluding all traffic offenses except driving under the influence (DUI) and driving while intoxicated (DWI). Violent recidivism was defined as a rearrest for a suspected act of violence within three years of release from BOP custody. See USDOJ (2019, pp. 49-50).

<sup>12</sup> These included: Age at first conviction, age at time of assessment, infraction convictions (any), infraction convictions (serious and violent), number of programs completed (any), number of technical or vocational courses, federal industry employment (UNICOR), drug treatment while incarcerated, noncompliance with financial responsibility, instant offense violent, sex offender (Walsh), BRAVO initial: criminal history score, history of violence, history of escapes, voluntary surrender, and education score. See USDOJ (2019, pp. 46-48).

<sup>13</sup> For example, the age at time of assessment item consisted of six ordinal age categories, which were operationalized as 0-5 in the regression models. For the general male instrument, the boosted regression results returned a coefficient value of .07; consequently, the categories of 0, 1, 2, 3, 4, and 5 were assigned points using a multiplier of 7 to achieve point values of 0, 7, 14, 21, 28, and 35. See USDOJ (2019, pp. 53-56). See also Hamilton et al. (2016) and Mehta et al. (2016).

shown to surpass what has been commonly found for risk assessment tools in U.S. correctional populations.<sup>14</sup>

Following the release of the July 2019 report, *The First Step Act of 2018: Risk and Needs Assessment System*,<sup>15</sup> NIJ, on behalf of the Department, facilitated two listening sessions with criminal justice stakeholders, advocates, and interested citizens to encourage discussions on a wide range of perspectives on PATTERN.<sup>16</sup> Based on the feedback from these forums and with guidance from the IRC, the Department instituted several recommended changes to the tool.<sup>17</sup>

These modifications resulted in a revised version of PATTERN (known as version 1.2) with accompanying changes to the scoring criteria.<sup>18</sup> PATTERN 1.2 continued to demonstrate high predictive validity<sup>19</sup> and appeared to be well-calibrated in terms of race and ethnic neutrality.<sup>20</sup> Based on these findings, the BOP developed a field manual and scoring sheet for the 15 static and dynamic factors in PATTERN version 1.2. Appendix A includes a list of the variables in PATTERN and how they have been operationalized by BOP.

Version 1.2 of PATTERN was the approved version that the Department of Justice implemented in January of 2020 after approval from the Attorney General and in consultation with the IRC.

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<sup>14</sup> More specifically, the general male scale had an Area Under the Curve (AUC) value of .80, the violent male scale had an AUC value of .78, the general female scale had an AUC value of .79, and the violent female scale had an AUC value of .77. See USDOJ (2019, p. 57). See also Monahan and Skeem (2016).

<sup>15</sup> See USDOJ (2019).

<sup>16</sup> For more information, see USDOJ (2020a, p. 3).

<sup>17</sup> See pages 7-9 of USDOJ 2020a for information on the changes made to PATTERN.

<sup>18</sup> For a full description of the item and scoring differences between the initial and revised versions of PATTERN, compare USDOJ (2019, pp. 53-56) and USDOJ (2020a, pp. 37-39).

<sup>19</sup> The general male scale had an AUC of .79, the violent male scale had an AUC of .78, the general female scale had an AUC of .78, and the violent female scale had an AUC of .77. See USDOJ (2020a, p. 11).

<sup>20</sup> The AUC values for the four PATTERN scales ranged between .75 and .80 across the racial subcategories of White, African American, Hispanic, and Other. See USDOJ (2020a, p. 11).

## II. The NIJ Independent Consultant Review of PATTERN

Following their initial review of PATTERN in the fall of 2020, the independent consultants identified three scoring errors with PATTERN 1.2<sup>21</sup> and a risk level category (RLC) cut-point error<sup>22</sup> published in prior Departmental reports.<sup>23</sup>

- First, the point values for the *infraction-free (serious and violent) item* for the violent male risk instrument were reported as 0, 2, 4, and 6.<sup>24</sup> The item should have been listed as 0, 1, 2, and 3.
- Second, the point values for the *infraction-free (serious and violent) item* for the general female risk instrument were reported as 0, 1, 2, and 3.<sup>25</sup> The item should have been listed as 0, 2, 4, and 6.
- Third, the *criminal history score* for the violent female risk scale was reported as 0, 4, 8, 12, 16, and 20.<sup>26</sup> The item should have been listed as 0, 2, 4, 6, 8, and 10.
- Fourth, the **cut-points for the general male tool** were described to include “<11” for minimum risk and “11-30” for low risk.<sup>27</sup> However, the cut-points used in the empirical analyses actually included “<9” for minimum risk and “9-30” for low risk.

The corrected scores and risk level category cut-points from the developmental analyses are displayed in Appendix B and Appendix C, respectively. Although the correct weights were applied to the PATTERN scores and risk levels in the analyses presented in the previous Department report, as implemented by BOP, PATTERN contained slight coding errors, making the implemented version of PATTERN 1.2 slightly different from the approved version of PATTERN 1.2 that was detailed in the January 2020 report, The First Step Act of 2018: Risk and needs assessment system – Update. The coding errors identified in the revalidation will be corrected immediately and implemented as soon as possible, and BOP will ensure that no inmates will be negatively impacted by these errors. Specifically, and as documented in the Recommended Next Steps section of this report below, BOP will rescore inmates whose risk score on PATTERN may have been impacted by these errors. The reclassification will occur immediately.

The consultants also identified several issues related to data coding and item specification. For example, the prior FSA reports defined the *age at time of assessment* variable as one’s age at time of assessment.<sup>28</sup> This variable, however, was operationalized in the developmental models as one’s age at time of release. The BOP has been properly implementing this item as age at time of assessment. Since the models were based on a different definition of the variable, the empirical models captured the relationship between recidivism and age at release rather than assessment, which may have impacted the item weights assigned.

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<sup>21</sup> See USDOJ (2020a).

<sup>22</sup> See USDOJ (2020b).

<sup>23</sup> See USDOJ (2020a; 2020b).

<sup>24</sup> See USDOJ (2020a, p. 37).

<sup>25</sup> See USDOJ (2020a, p. 37).

<sup>26</sup> See USDOJ (2020a, p. 38).

<sup>27</sup> See USDOJ (2020b, p. 2).

<sup>28</sup> See USDOJ (2019, p. 45) and USDOJ (2020a, p. 11).

Additionally, the *infraction convictions (any) current incarceration, infraction convictions (serious and violent) current incarceration, infraction-free (any), infraction-free (serious and violent), number of programs completed (any), work programming, drug treatment while incarcerated, noncompliance with financial responsibility, criminal history score, history of violence, and history of escape* measures were defined for the empirical analyses using an inmate's release date, instead of their most recent assessment date, which is how these 11 variables must be scored in practice. Because the empirical models were estimated using different versions of these variables, it may have influenced the coefficients obtained and the item weights assigned.

Discrepancies were also found between how the *infraction convictions (any) current incarceration* and *infraction convictions (serious and violent) current incarceration* variables were modeled to develop PATTERN and how these measures have been operationalized in practice. In the first version of PATTERN, these two items possessed a decay function where incidents occurring 10 or more years prior were not included in the count.<sup>29</sup> In the revised version of PATTERN, however, these two items included all infractions from the current incarceration period regardless of how long ago they occurred.<sup>30</sup> According to the scoring form created by the BOP, only infractions that occurred within the last 120 months are currently being counted. Additionally, BOP currently counts incidents occurring during pretrial and holdover, which were not included in these two infraction measures in the development of PATTERN. This means that as BOP is implementing PATTERN 1.2, they are currently scoring these infraction variables differently than were modeled in the reported PATTERN 1.2, which may have an impact on the utility of these two measures.

In the development of PATTERN, the *number of programs completed (any)* item was inadvertently operationalized using a record of program participation rather than program completion.<sup>31</sup> This item was also described to include drug education programming,<sup>32</sup> but this type of program was not included in the measure. The *work programming* item also inadvertently counted each day of participation in UNICOR as the completion of a separate work program, rather than treating participation in UNICOR (regardless of number of days worked) as only one program.<sup>33</sup> The code used to construct the *drug treatment while incarcerated* item inadvertently gave individuals who completed both residential and nonresidential programming credit only for completing nonresidential programming, not residential programming.<sup>34</sup> The BOP has been properly implementing these measures according to the descriptions published in the prior reports. Given that the empirical models were estimated using different constructs of the variables, the factor selection and weighting may have resulted in a scoring and risk assessment scheme that would be different if the correct versions of these variables were included.

Overall, the consultants identified errors or inconsistencies with a number of factors in PATTERN. While these errors do not undermine the overall approach used to develop

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<sup>29</sup> See USDOJ (2019, p. 7).

<sup>30</sup> See USDOJ (2020a, Appendix II, p. 35).

<sup>31</sup> See USDOJ (2019, p. 45).

<sup>32</sup> See USDOJ (2020a, p. 8).

<sup>33</sup> See USDOJ (2019, p. 45).

<sup>34</sup> See USDOJ (2019, p. 47).

PATTERN, some do require correction and reestimation of the regression models. When a regression model includes variables with coding errors, or when the wrong measure is included in a regression, all other measures can be affected—and the coefficient weights can change due to the errors. Due to the identified errors or inconsistencies found, the revalidation of the risk assessment tool will be deferred until corrections to the risk tool are made.

### **Preliminary Impact Analysis**

As part of the review, preliminary analyses were conducted to assess if the number of inmates in current BOP custody would be classified in a different RLC between PATTERN version 1.2 (as BOP has been implementing it) and a revised version with the corrected coding and weighting applied (hereafter referred to as provisional version 1.3). Using the same methodological procedure adopted by the developers, the boosted regression models were reestimated on the original training sample with the corrected versions of the variables. The results indicated that when the corrected variables were modeled in the regressions, the coefficient weights differed across 37 of the 60 item possibilities. The risk scores for the provisional version 1.3 were then converted into RLCs by replicating as closely as possible the population distributions and recidivism rates across the RLCs in version 1.2.<sup>35</sup>

The independent consultants and staff from BOP ORE independently calculated the risk scores and RLC designations using the criteria for version 1.2 and provisional version 1.3 with the population of inmates incarcerated on November 28, 2020. After confirming that all parties obtained the same results, the RLC ratings between version 1.2 and provisional version 1.3 were compared to assess for similarities and differences in the male and female samples.<sup>36</sup> An inmate's RLC is determined as the highest of the two ratings on the general *or* violent recidivism scale. There were approximately 10.9 percent of males and 9.8 percent of females who were rated in different RLCs between the two versions of PATTERN.

Table 1 presents the specific cross-tabulations of RLCs between PATTERN version 1.2 and provisional version 1.3 for males. From this table, the most important issues of note are the number of inmates who are classified differently across the low-medium threshold, as this distinction influences one's ability for earned time credits and decisions to be released early on community supervision.

Results in Table 1 suggest:

- 2,337 (or 6.3 percent) of the 36,804 inmates identified as low risk by version 1.2 were rated as medium or high risk in the provisional version 1.3.
- 2,793 (or 7.3 percent) of the 38,422 inmates identified as low risk by provisional version 1.3 were rated as medium risk by version 1.2.
- In total, 5,130 (or 4.2 percent) of males were classified differently across the low-medium RLC threshold as a result of the coding errors identified by the revalidation.

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<sup>35</sup> See USDOJ (2020b).

<sup>36</sup> Appendix D further compares the RLC ratings between version 1.2 and provisional version 1.3 across the four gender/outcome variants of PATTERN.

**Table 1. Crosstab of PATTERN Version 1.2 and Provisional Version 1.3 Highest RLC in Male General or Violent Model**

	Minimum (1.3)	Low (1.3)	Medium (1.3)	High (1.3)
Minimum (1.2)	16,723	1,807	0	0
Low (1.2)	645	33,822	2,335	2
Medium (1.2)	0	2,793	18,782	2,536
High (1.2)	0	0	3,292	40,154

Note. The crosstab reflects data from a sample of 122,891 male inmates in BOP custody on November 28, 2020. The shaded cells reflect the number of inmates whose classification remains the same.

Table 2 presents the specific cross-tabulations of RLCs between PATTERN version 1.2 and provisional version 1.3 for females. From this table, the most important issues of note are the number of inmates who are classified differently across the low-medium threshold, as this distinction influences one’s ability for earned time credits and decisions to be released early on community supervision.

Results in Table 2 suggest:

- 248 (or 6.4 percent) of the 3,847 inmates identified as low risk by version 1.2 were rated as medium risk in the provisional version 1.3.
- 100 (or 2.7 percent) of the 3,682 inmates identified as low risk by provisional version 1.3 were rated as medium risk by version 1.2.
- In total, 348 (or 4.5 percent) of females were classified differently across the low-medium RLC threshold as a result of the coding errors identified by the revalidation.

**Table 2. Crosstab of PATTERN Versions 1.2 and 1.3 Highest RLC in Female General or Violent Model**

	Minimum (1.3)	Low (1.3)	Medium (1.3)	High (1.3)
Minimum (1.2)	1,848	105	0	0
Low (1.2)	122	3,477	248	0
Medium (1.2)	0	100	1,204	85
High (1.2)	0	0	100	489

Note. The crosstab reflects data from a sample of 7,778 female inmates in BOP custody on November 28, 2020. The shaded cells reflect the number of inmates whose classification remains the same.

As detailed in the 2020 Annual Report, due to the COVID-19 global pandemic, the amount of BOP programming activities available hindered inmates’ ability to successfully complete programs.<sup>37</sup> Although a number of inmates would be classified differently under a revised version of PATTERN, their ability to earn time credits has not been impacted due to their inability to participate in recidivism reduction programming and productive activities. An

<sup>37</sup> See USDOJ (2020c, pp. 48-53) for details on the impact of COVID-19 on BOP programming.

inmate's PATTERN risk score was one of several factors used by BOP to determine which inmates were suitable for home confinement during the COVID-19 pandemic.<sup>38</sup>

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<sup>38</sup> See Memorandum from the Office of the Attorney General to the Director of the Bureau of Prisons dated March 26, 2020.

### III. Recommended Next Steps

**Immediate Steps.** The item and RLC scoring issues described above and identified during this review will be addressed in the immediate future. The BOP PATTERN field manual and scoring sheets will be updated with the values presented in Appendix B and Appendix C, respectively. Moving forward, BOP will make the appropriate scoring and RLC cut-point corrections to the current version of PATTERN 1.2 and then assess inmates using this corrected version of the risk tool. Additional areas of improvement to PATTERN will be considered holistically and after further analysis by the independent consultants and in consultation with the IRC. The areas for improvement will be presented to the Attorney General for approval. In the interim, BOP will reassess the 1,745 inmates who were classified differently between the current and corrected version of PATTERN 1.2.<sup>39</sup> The inmates' reassessment of risk will be completed by February 28, 2021.

**Short-Term Steps.** This summary presents findings from preliminary analyses. In the short-term, NIJ's independent consultants will engage in additional analyses with oversight by the BOP and IRC. The independent consultants will collaborate with staff from NIJ, BOP, and the IRC to revise PATTERN following the same empirical boosted regression procedures used in the development. Based on preliminary analyses, it is anticipated that the revisions will not result in a substantively dissimilar tool in terms of predictive accuracy and racial neutrality. NIJ will endeavor to make a report available on its website by midyear 2021 that documents these results and the Department's plan for moving forward. NIJ will also collaborate with BOP to ensure that all changes to the tool are feasible and can be implemented quickly.

**Long-Term Steps.** Future reports will evaluate the predictive validity, racial neutrality, and dynamic validity of PATTERN as required in Section 3631 of the FSA mandate. In addition, the independent consultants will collaborate with DOJ subject matter experts, BOP staff, and the IRC to explore if further refinements to items and the scoring scheme of PATTERN may help improve the equitability, efficiency, and predictive validity of the risk assessment system. **All additional recommended refinements to the risk assessment tool will be submitted to the Attorney General for review and consideration.**

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<sup>39</sup> In the initial version of the report released on January 20, 2021, the original text read, "In the interim, and with the understanding that no changes will be made by BOP to the Risk Level Categories and Scores published in the First Step Act implementation: Fiscal year 2020 90-day report, BOP will reassess the 14,170 inmates who were classified differently between PATTERN 1.2 and provisional PATTERN 1.3." Provisional PATTERN 1.3 described in the current report has not been recommended to or approved by the Attorney General. For this reason, BOP will revise only the scoring typos identified in the previous FSA reports and reassess the 1,745 inmates whose risk category has been classified differently.

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## Appendix A

### Operationalization of PATTERN variables

1. **Age at time of assessment.** Age is defined as the number of years between the assessment date and the inmate's date of birth, rounded down. Age is then converted into one of six ordinal categories: 25 and younger, 26 to 29, 30 to 40, 41 to 50, 51 to 60, or 61 and older.
2. **Infraction convictions (any) current incarceration.** Infraction convictions are defined as the number of guilty incident reports<sup>40</sup> within the last 120 months. These include incident reports occurring during pretrial or holdover, but not incidents from prior BOP incarcerations. The number of incidents is then converted into four ordinal categories: No incident, 1 incident, 2 incidents, or 3 or more incidents.
3. **Infraction convictions (serious and violent) current incarceration.** Serious and violent convictions are defined as the number of guilty 100- or 200-level incident reports<sup>41</sup> within the last 120 months. These include incident reports occurring during pretrial or holdover, but not from any prior BOP incarcerations. The number of incidents is then converted into four ordinal categories: No incident, 1 incident, 2 incidents, or 3 or more incidents.
4. **Infraction-free (any).** Time since last incident report is defined as the number of months between the assessment date and prisoner's last guilty incident report, rounded down. Only incidents from current incarceration (including pretrial and holdover) are counted. The months are then converted into four ordinal categories: 12+ months or no incident, 7 to 12 months, 3 to 6 months, or less than 3 months.<sup>42</sup>
5. **Infraction-free (serious and violent).** Time since last serious or violent incident report is defined as the number of months between the assessment date and prisoner's last 100- or 200-level guilty incident report, rounded down. Only incidents from current incarceration (including pretrial and holdover) are counted. The months are then converted into four ordinal categories: 12+ months or no incident, 7 to 12 months, 3 to 6 months, or less than 3 months.
6. **Program completions.** Includes the number of successfully completed Adult Continuing Education (ACE), Parenting, Life Connections Program, Brave, Challenge, Skills, Sex Offender (residential or nonresidential), Stages, and Step-Down courses completed during the current incarceration. This number is then converted into five ordinal categories: No program, 1 program, 2 to 3 programs, 4 to 10 programs, or 11 or more programs.
7. **Work programming.** Includes the number of technical and vocational courses completed during the current incarceration. In this measure, federal industry employment (UNICOR) is counted as a program completion as long as the prisoner worked at least

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<sup>40</sup> This includes only incident reports, not acts. For example, if an incident report included multiple acts occurring at the same time (e.g., serious assault and possession of a weapon), it would only be counted as one incident, not two.

<sup>41</sup> According to the program statement on the inmate discipline program, the BOP considers 100 and 200 level offenses to represent the most serious prohibited acts (e.g., killing, serious assault, arson, weapon possession, rioting, fighting, threatening, extortion; for more information see BOP, 2011).

<sup>42</sup> More precisely, BOP operationalizes the infraction-free categories as 0 to 91 days, 92 to 212 days, 213 to 365 days, and 366 days or more.

one day. This number is then converted into three ordinal categories: No program, 1 program, or 2 or more programs.

- 8. Drug treatment while incarcerated.** This measure uses the BRAVO drug/alcohol abuse item to determine if the prisoner has a substance abuse problem. It also assesses whether the prisoner has completed residential or nonresidential drug programming during the current incarceration. This variable is then converted into four ordinal categories: No drug need indicated, completed residential drug treatment, completed nonresidential drug treatment, or need indicated but no drug treatment completed.
- 9. Noncompliance with financial responsibility.** This measure represents a prisoner's willingness to use income earned during their incarceration for payment toward victim restitution and dependents. This measure is not included in the violent female model.
- 10. Instant offense violent.** Any current conviction for an offense that is violent, including but not limited to firearms violations, homicide, child abuse, robbery, sex trafficking, and sexual assault.<sup>43</sup> This item is not scored in the general female model.
- 11. Sex offender (Walsh).** Anyone who is identified as a sex offender based on the Adam Walsh Act criteria.<sup>44</sup> This item is not scored in the general female model.
- 12. Criminal history score.** Criminal history points from the most recent BRAVO classification form available. This variable is then converted into six ordinal categories, following the federal Sentencing Guidelines Criminal History Categories: 0 to 1 point, 2 to 3 points, 4 to 6 points, 7 to 9 points, 10 to 12 points, or 13 or more points.
- 13. History of violence.** Violent history is defined as the number of years between the assessment date and the last act of violence by seriousness. It is taken from the most recent BRAVO classification form available. This variable is then converted into eight ordinal categories: None, greater than 10 years minor, greater than 15 years serious, 5 to 10 years minor, 10 to 15 years serious, less than 5 years minor, 5 to 10 years serious, or less than 5 years serious.
- 14. History of escapes.** Escape history is defined as the number of years between the assessment date and last escape attempt by seriousness. It is taken from the most recent BRAVO classification form available. This variable is then converted into four ordinal categories: None, greater than 10 years minor, 5 to 10 years minor, or less than 5 years minor or any serious.
- 15. Education score.** Education is defined as the highest grade level completed at the time of the assessment. It is taken from the most recent BRAVO classification form available. This variable is then converted into three ordinal categories: High school degree or GED - verified, enrolled and progressing in GED/unknown educational status (for new inmates only), or no verified degree and not participating in GED program.

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<sup>43</sup> See BOP (2020*b*).

<sup>44</sup> See 34 U.S.C. Section 20911, *et seq.*

**Appendix B**  
**Corrected Points Assigned in the PATTERN 1.2**  
**Risk Assessment Models**

Item	Category	General Male	Violent Male	General Female	Violent Female
1. Age at time of assessment	<i>≥61</i>	0	0	0	0
	<i>51-60</i>	7	4	5	1
	<i>41-50</i>	14	8	10	2
	<i>30-40</i>	21	12	15	3
	<i>26-29</i>	28	16	20	4
	<i>≤25</i>	35	20	25	5
2. Infraction convictions (any) current incarceration	<i>0</i>	0	0	0	0
	<i>1</i>	1	1	1	1
	<i>2</i>	2	2	2	2
	<i>3+</i>	3	3	3	3
3. Infraction convictions (serious and violent) current incarceration	<i>0</i>	0	0	0	0
	<i>1</i>	2	2	1	1
	<i>2</i>	4	4	2	2
	<i>3+</i>	6	6	3	3
4. Infraction-free (any)	<i>None / 12+ months</i>	0	0	0	0
	<i>7-12 months</i>	2	1	2	1
	<i>3-6 months</i>	4	2	4	2
	<i>&lt; 3 months</i>	6	3	6	3
5. Infraction-free (serious and violent)	<i>None / 12+ months</i>	0	0	0	0
	<i>7-12 months</i>	1	1	2	1
	<i>3-6 months</i>	2	2	4	2
	<i>&lt; 3 months</i>	3	3	6	3
6. Number of programs completed (any)	<i>0</i>	0	0	0	0
	<i>1</i>	-2	-1	-1	-1
	<i>2-3</i>	-4	-2	-2	-2
	<i>4-10</i>	-6	-3	-3	-3
	<i>11+</i>	-8	-4	-4	-4
7. Work programming	<i>0</i>	0	0	0	0
	<i>1</i>	-1	-1	-1	-1
	<i>2+</i>	-2	-2	-2	-2
8. Drug treatment while incarcerated	<i>Need indicated / No completion</i>	0	0	0	0
	<i>Completed nonresidential drug treatment</i>	-3	-1	-4	-1
	<i>Completed residential drug treatment</i>	-6	-2	-8	-2
	<i>No need indicated</i>	-9	-3	-12	-3
9. Noncompliance with financial responsibility	<i>No</i>	0	0	0	
	<i>Yes</i>	1	1	3	
10. Instant offense violent	<i>No</i>	0	0		0
	<i>Yes</i>	5	5		3
11. Sex offender (Walsh)	<i>No</i>	0			
	<i>Yes</i>	1			
12. Criminal history score	<i>0-1 points</i>	0	0	0	0
	<i>2-3 points</i>	8	4	8	2
	<i>4-6 points</i>	16	8	16	4
	<i>7-9 points</i>	24	12	24	6
	<i>10-12 points</i>	32	16	32	8
	<i>13+ points</i>	40	20	40	10

13. History of violence	<i>None</i>	0	0	0	0
	<i>&gt; 10 years minor</i>	1	1	1	1
	<i>&gt; 15 years serious</i>	2	2	2	2
	<i>5-10 years minor</i>	3	3	3	3
	<i>10-15 years serious</i>	4	4	4	4
	<i>&lt; 5 years minor</i>	5	5	5	5
	<i>5-10 serious</i>	6	6	6	6
14. History of escapes	<i>&lt; 5 years serious</i>	7	7	7	7
	<i>None</i>	0	0	0	0
	<i>&gt; 10 years minor</i>	2	1	3	2
	<i>5-10 years minor</i>	4	2	6	4
15. Education score	<i>&lt; 5 years minor or any serious</i>	6	3	9	6
	<i>Not enrolled</i>	0	0	0	0
	<i>Enrolled in GED</i>	-2	-1	-3	-1
	<i>HS Degree / GED</i>	-4	-2	-6	-2

**Appendix C**  
**Corrected Risk Level Category (RLC) Score Ranges**  
**in the PATTERN 1.2 Risk Assessment Models**

<b>Risk Level</b>	<b>General Male</b>	<b>Violent Male</b>	<b>General Female</b>	<b>Violent Female</b>
Minimum	-23 to 8	-11 to 6	-24 to 5	-11 to 2
Low	9 to 30	7 to 24	6 to 31	3 to 19
Medium	31 to 43	25 to 30	32 to 49	20 to 25
High	44 to 113	31 to 71	50 to 102	26 to 33

Note. The general male model includes 15 items, the violent male model includes 14 items, the general female model includes 13 items, and the violent female model includes 14 items.

**Appendix D**  
**Comparison of Risk Level Category (RLC) Ratings Between Version 1.2 and Provisional Version 1.3 by Four Gender/Outcome Variants of PATTERN**

Depending upon which of the four tools were analyzed, 10 to 27 percent of inmates were categorized differently between version 1.2 and provisional version 1.3 (see Table D1).

**Table D1. Differences in PATTERN Risk Level Category (RLC) Scores Between Version 1.2 and Provisional Version 1.3**

	<b>Total N</b>	<b>N with Different RLC</b>	<b>% with Different RLC</b>
<b>General Male</b>	122,891	13,417	<b>10.9%</b>
<b>General Female</b>	7,778	792	<b>10.2%</b>
<b>Violent Male</b>	122,891	16,227	<b>13.2%</b>
<b>Violent Female</b>	7,778	2,080	<b>26.7%</b>

Note. The crosstab reflects data from a sample of 130,669 inmates in BOP custody on November 28, 2020.

Tables D2 through D5 present the specific cross-tabulations of RLCs between version 1.2 and provisional version 1.3 across the four gender/outcome variants of PATTERN. For these tables, the most important issues are the number of inmates who are classified differently across the minimum-medium threshold.

Results in Table D2 suggest:

- For the general male recidivism tool, 1,937 (or 5.8 percent) of the 33,273 inmates identified as low risk by version 1.2 were rated as medium risk in the provisional version 1.3.
- Additionally, 2,846 (or 7.8 percent) of the 36,536 inmates identified as low risk by provisional version 1.3 were rated as medium risk by version 1.2.
- In total, *4,783 (or 3.9 percent) males in the total male population were classified differently on low and medium general recidivism risk between the two versions.*

**Table D2. General Male Recidivism: Crosstab of PATTERN RLCs Between Version 1.2 and Provisional Version 1.3**

	<b>Minimum (1.3)</b>	<b>Low (1.3)</b>	<b>Medium (1.3)</b>	<b>High (1.3)</b>
<b>Minimum (1.2)</b>	19,723	2,757	0	0
<b>Low (1.2)</b>	403	30,933	1,937	0
<b>Medium (1.2)</b>	0	2,846	19,638	2,351
<b>High (1.2)</b>	0	0	3,123	39,180

Note. The crosstab reflects data from a sample of 122,891 male inmates in BOP custody on November 28, 2020. The shaded cells reflect the number of inmates whose classification remains the same.

For the general female recidivism tool, results in Table D3 suggest:

- 249 (or 6.6 percent) of the 3,738 inmates identified as low risk by version 1.2 were rated as medium risk by provisional version 1.3 (see Table D3).
- Additionally, 96 (or 2.7 percent) of the 3,601 inmates identified as low risk by the provisional version 1.3 were rated as medium risk by version 1.2.
- In total, 345 (or 4.4 percent) females in the total female population were classified differently on low and medium general recidivism risk between the two versions.

**Table D3. General Female Recidivism: Crosstab of PATTERN RLCs Between Version 1.2 and Provisional Version 1.3**

	Minimum (1.3)	Low (1.3)	Medium (1.3)	High (1.3)
Minimum (1.2)	1,930	142	0	0
Low (1.2)	126	3,363	249	0
Medium (1.2)	0	96	1,227	103
High (1.2)	0	0	76	466

Note. The crosstab reflects data from a sample of 7,778 female inmates in BOP custody on November 28, 2020. The shaded cells reflect the number of inmates whose classification remains the same.

For the violent male tool, results in Table 4 show:

- 3,548 (or 6.7 percent) of 53,298 inmates identified as low risk by version 1.2 were rated as medium or high risk by provisional version 1.3.
- Additionally, 3,884 (or 7.3 percent) of the 53,243 inmates identified as low risk by provisional version 1.3 were rated as medium or high risk by version 1.2.
- In total, 7,432 (or 6.0 percent) males in the total male population were classified differently on low and medium/high violent recidivism risk between the two versions.

**Table D4. Violent Male Recidivism: Crosstab of PATTERN RLCs Between Version 1.2 and Provisional Version 1.3**

	Minimum (1.3)	Low (1.3)	Medium (1.3)	High (1.3)
Minimum (1.2)	18,134	708	0	0
Low (1.2)	1,099	48,651	3,519	29
Medium (1.2)	0	3,858	12,056	2,594
High (1.2)	0	26	4,394	27,823

Note. The crosstab reflects data from a sample of 122,891 male inmates in BOP custody on November 28, 2020. The shaded cells reflect the number of inmates whose classification remains the same.

For the violent female tool, Table D5 shows:

- 23 (or 0.6 percent) of the 3,835 inmates identified as low risk by version 1.2 were rated as medium risk by provisional version 1.3.
- Additionally, 738 (or 19.2 percent) of the 3,853 inmates identified as low risk by provisional version 1.3 were rated as medium or high risk by version 1.2.

- In total, 761 females (or 9.8 percent) in the female population were classified differently on low and medium/high violent recidivism risk between the two versions.

**Table D5. Violent Female Recidivism: Crosstab of PATTERN RLCs Between Version 1.2 and Provisional Version 1.3**

	<b>Minimum (1.3)</b>	<b>Low (1.3)</b>	<b>Medium (1.3)</b>	<b>High (1.3)</b>
<b>Minimum (1.2)</b>	2,700	229	0	0
<b>Low (1.2)</b>	926	2,886	23	0
<b>Medium (1.2)</b>	0	549	71	4
<b>High (1.2)</b>	0	189	160	41

Note. The crosstab reflects data from a sample of 7,778 female inmates in BOP custody on November 28, 2020. The shaded cells reflect the number of inmates whose classification remains the same.