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To cite this article: Michael T. Baglivio, Kevin T. Wolff & Katherine Jackowski (24 Sep 2025): Assessing the predictive validity of the Network Inventory of risk, victories, and needs assessment (NIRVANA) for youth receiving prevention services, Journal of Crime and Justice, DOI: [10.1080/0735648X.2025.2562876](https://doi.org/10.1080/0735648X.2025.2562876)

To link to this article: <https://doi.org/10.1080/0735648X.2025.2562876>



Published online: 24 Sep 2025.



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Assessing the predictive validity of the Network Inventory of risk, victories, and needs assessment (NIRVANA) for youth receiving prevention services

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ABSTRACT

The current study assesses the predictive validity of a newly developed holistic risk/needs assessment for youth receiving prevention services. Employing a multiyear statewide sample of over 17,000 prevention youth, multivariate and Area Under Curve techniques are used to examine predictive validity in predicting future formal juvenile justice system involvement (new law violations) across sex, race/ethnicity, and multiple youth age ranges. Furthermore, predictive validity across the severity of the subsequent offense type (misdemeanor, non-violent felony, violent felony) was examined. Findings demonstrate large effect sizes for static risk only, dynamic risk only, and total risk plus protective scores on future offending. Sex and race/ethnicity differences in predictive validity were not evident, through Area Under Curve or multivariate interaction models, while some evidence was found that the NIRVANA performed better for youth under the age of twelve at the time of assessment. Predicted probability analyses reveal stronger prediction of subsequent misdemeanor and violent felony offenses than non-violent felonies, net of demographic controls. Policy implications surrounding the feasibility of holistic risk/needs assessment for youth receiving prevention services are discussed.

ARTICLE HISTORY

Received 24 April 2025
Accepted 15 September 2025

KEYWORDS

Delinquency prevention;
risk/needs assessment;
predictive validity; risk and
protective factors

Introduction

An estimated 549,500 delinquency cases were disposed by juvenile courts in 2022, a 27% increase from 2021, yet 70% lower than the peak in 1997 (OJJDP Statistical Briefing Book 2025). Understanding that formal processing into the juvenile justice system may serve to increase the likelihood of future system involvement (e.g., Cauffman et al. 2024; Petrosino, Turpin-Petrosino, and Guckenburg 2010), to enhance public safety and optimize the likelihood of wellbeing for adolescents, an essential goal is arguably to reduce the proportion of youth touching the system by preventing delinquent behavior. As early as the mid-1700s Cesare Beccaria opined it better to prevent crimes than to punish them (Beccaria 1764). This principle is embodied in best-practice standards for juvenile justice prevention and intervention as elucidated in the Comprehensive Strategy for Serious,

Violent, and Chronic Juvenile Offenders wherein prevention services are targeted to youth at risk of formal system involvement (e.g., Howell 2003, 2009; Wilson and Howell 1993).

Provision of appropriately targeted and effective prevention services may be enhanced through the use of a validated holistic assessment of risk/needs (under the tenants of risk-needs-responsivity; Bonta and Andrews 2023), inclusive of capturing childhood maltreatment and household dysfunctions (Felitti et al. 1998; Baglivio, Greenwald, and Russell 2014), with a strengths-based, resiliency focus (Baglivio and Wolff 2021; Crandall et al. 2020). Such a holistic assessment, provided to youth receiving prevention services, would allow for comprehensive understanding of youth and families' needs and unique situations, provide practical utility through case planning to service providers, and allow for targeting services and service referrals to reduce the likelihood of formal juvenile justice involvement.

In the State of Florida alone, during fiscal year 2022–2023, 43394 youth were formally processed into the Florida Department of Juvenile Justice (equivalent to an adult arrest; Florida Department of Juvenile Justice 2025), while FDJJ-funded prevention programs provided services to 30,943 youth (Florida Department of Juvenile Justice 2023). The current study examines the predictive validity of a holistic risk/needs assessment, newly developed and provided to the majority of FDJJ prevention youth since 2022 in hopes of assisting prevention services providers in stemming the influx of youth into formal system involvement. The purpose of this assessment is to predict the likelihood of future delinquency in the form of formal juvenile justice system involvement from new law misdemeanor and/or felony offending. For the vast majority of youth served through prevention any future offense will be their first formal juvenile justice system contact, however prevention may also serve youth with prior offenses. As such, the assessment was designed to predict any future misdemeanor and/or felony offenses. Importantly, subgroup analysis includes examining predictive validity across sex, race/ethnicity, specific age groups, and subsequent offense type. Toward that end, first, we outline the principles of the Comprehensive Strategy, with a focus on prevention services, followed by an overview of how the risk-needs-responsivity model and the need for validated assessment of risk, needs, cumulative traumatic exposure, and resiliency is pivotal to successful prevention efforts. Next, the assessment tool, the Network Inventory of Risk, Victories, And Needs Assessment (NIRVANA), is explained, followed by hypotheses, our analytic strategy, and results. Lastly, we close with discussion, limitations, and future directions for policy and practice.

Prevention focus

The Comprehensive Strategy is a two-tiered approach promoted to assist juvenile justice systems Relevant to the current study, the first tier is focused on delinquency prevention, aimed to keep youth out of the justice system and halt any criminal career development early in the life course. The second tier, after prevention efforts have failed and once youth have entered the system, calls for a system of proactive graduated sanctions and intervention with heightened emphasis on those progressing in their criminal careers towards becoming serious, violent, and chronic (SVC) offenders (Baglivio, Greenwald, and Russell 2014; Howell 2009; Juvenile Sanctions Center 2005). Preventing at-risk youth from initiating and/or continuing juvenile delinquency stems the influx of adolescents into more serious and chronic offending, thereby lowering the proportion of offenders at each age across the age-crime curve. This

has the potential to dramatically lower crime rates, as a small proportion of chronic offenders commit the majority of all offenses (e.g., DeLisi and Piquero 2011). Halting the beginning and/or escalation of a criminal career as early as possible can have a dramatic effect on overall crime, including violent offending (e.g., Loeber and Stallings 2011).

There exists ample evidence examining the predictive validity of juvenile risk/needs assessment tools for youth formally involved in the juvenile justice system (e.g., Schwalbe 2007), and the importance of matching interventions to assessed risk/needs (Baglivio et al. 2018; Baglivio et al. 2021; Nelson and Vincent 2018). While this prior work illustrates the importance of matching risk/needs to services based on validated assessment within the formal juvenile justice system, it provides limited guidance on the role of prevention services and prevention best practices. Focus on whether risk/needs assessment can enhance prevention services has been largely neglected. The failure to apply RNR-based intervention strategies based on assessed risk and needs to prevention services may undermine their effectiveness in deterring youth from entering offending lifestyles. Risk/needs assessment may be a critical prevention component provided that such tools evidence the predictive validity to predict whether an at-risk youth formally enters the juvenile justice system.

Just in the past few years, scholars have begun to address the inattention to prevention services best practices. Notably, Sheppard et al. (2023), using the exclusive FDJJ risk assessment employed across prevention services at the time of their study, examined the individual and contextual risk factors for future FDJJ involvement among prevention youth. Findings demonstrated education-related risk factors having the strongest relationship with future offending, with aggression, relationships, family, substance use, and attitudes/behaviors-related risks also pertinent. Notably, neighborhood disadvantage affected future juvenile justice system involvement for youth receiving prevention services for those youth under the age of twelve only (Sheppard et al. 2023). Additional recent work examined the feasibility of employing risk assessment tools with prevention youth, again leveraging the FDJJ Prevention Assessment Tool (PAT) risk/needs assessment (Sheppard, Talaugon, and Hernandez 2024). Multivariate and machine learning approaches were employed to optimize scoring, predictive validity, and performance, with findings demonstrating exemplary performance across methodological techniques (such as Area Under Curve, AUC, values of .737 to .742 across techniques, indicating large effects; Rice and Harris 2005). Interestingly, three of the five statistical techniques found the PAT tool differed in performance for the youngest youth (ten years of age) versus other age groups, while all other demographic groups evidenced consistent performance across race/ethnicity and sex (Sheppard, Talaugon, and Hernandez 2024).

Importantly, the largest prevention provider under contract with FDJJ has moved to a different risk/needs assessment than the PAT assessment examined in Sheppard et al. (2023, 2024). As this provider, the Florida Network of Youth and Family Services (hereafter the Florida Network), serves approximately 45% of all FDJJ-funded prevention youth (Florida Department of Juvenile Justice 2023), it is critical to examine the predictive validity of their risk/needs assessment, and whether that tool works similarly across demographic subgroups.

Risk-needs-responsivity and risk/needs assessment for prevention services

Risk-Need-Responsivity (RNR) and its three core principles is the most dominant paradigm across criminal and juvenile justice systems, with a substantial body of empirical support (Andrews and Bonta 2010; Cullen 2013; Wormith and Zidenberg 2018). The use of locally validated risk/needs assessment is a fundamental element of the RNR model as it allows for understanding of client risk and dynamic/changeable criminogenic needs. Fourth-generation risk/needs tools include both static and dynamic risk, as well as protective factors/strengths. Importantly, a key component of such assessments is their clear linkage of the results garnered from the tool to a case management plan. Including both risk and protective factors highlights one of the distinguishing characteristics of fourth generation risk assessment in the area of increased attention to the linkage between assessment and case management service referrals and provision (Andrews et al. 1990). Critically, actuarial assessment exceeds that of 'professional judgement' in terms of predictive validity (e.g., Ægisdóttir et al. 2006; Grove et al. 2000), whereas the empirical evidence supporting more recent attempts to employ machine learning and neural network techniques to significantly improve performance beyond traditional logistic regression methods is ambiguous, at best, especially for samples over 1,000 (Hamilton et al. 2015; Liu et al. 2011; Tollenaar and van der Heijden 2013; but see; Berk and Bleich 2013; Duwe and Kim 2016). Importantly to case planning and equitable treatment across similar levels of risk, such advanced methods, in comparison to logistic regression modeling, suffer from a lack of parsimonious interpretability and transparency (Baglivio and Wolff 2018; Duwe and Kim 2016; Sheppard, Talaugon, and Hernandez 2024). The unfortunate reality is that there have been very few examinations of whether such tools can predict formally juvenile justice involvement among at-risk youth.

Predictive validity across demographic subgroups

Of note, the preferred measure of predictive accuracy, the area under the receiver-operating characteristic (AUC; Rice and Harris 2005), has a demonstrated average value of 0.64 among juvenile risk assessments (Schwalbe 2007), with some evidence of similar predictive validity for males and females (Barnes et al. 2016; Olver, Stockdale, and Wormith 2009; Schwalbe 2008; Smith, Cullen, and Latessa 2009). A recent meta-analysis, conducted separately across sex, indicated a juvenile risk/needs assessment works equally well across subgroups, recidivism, and recidivism type (Pusch and Holtfreter 2018). Examining predictive validity across sex is critical, as there is no consensus as to whether the same risk assessment tools (gender neutral) should be used to predict male and female youth delinquency, or whether specific tools should be developed for girls (e.g., Holtfreter, Reisig, and Morash 2004; Reisig, Holtfreter, and Morash 2006; Salisbury, Van Voorhis, and Spiropoulos 2009; Van Voorhis et al. 2010). Similarly, race/ethnic differences in predictive validity have been found in some studies (e.g., Campbell et al. 2018; Fass et al. 2008; Onifade, Davidson, and Campbell 2009; Schwalbe et al. 2006), while others have found no significant differences in the ability of such tools to predict reoffending across racial/ethnic subgroups (e.g., Baglivio and Jackowski, 2013; Sheppard, Talaugon, and Hernandez 2024; Skeem and Lowenkamp 2016).

Additionally, due to prevention services targeting a higher proportion of younger youth than those formally processed into juvenile justice systems, it is crucial to consider differences in risk factors for delinquency throughout adolescent developmental. Notably, specific risk factors may be more salient for some age groups, such as family indicators for younger youth versus peer associations and school indicators for older adolescents (Childs, Sullivan, and Cullledge 2010; Howell, Lipsey, and Wilson 2014; Loeber, Slot, and Stouthamer-Loeber 2008). Importantly, such differences in the importance of risk factors across ages, with the same being true of across sex, race/ethnicity, or even life-course persistent versus adolescent limited offenders, are differences of degree (strength/magnitude) not necessarily of kind (the risk factors are the same, the strength of those risks may vary across subgroups, on average; Joliffe et al. 2017). Furthermore, prior developmental work has indicated that age may have a moderating impact on risk factors (Tanner-Smith, Wilson, and Lipsey 2013). Lending additional focus on predictive validity across ages, age of onset of delinquent and antisocial behavior is critical, as earlier onset is associated with a greater likelihood of increased frequency, seriousness, and duration of offending (Corrado et al. 2015; DeLisi and Piquero 2011; Loeber and Farrington 2012; Loeber, Farrington, and Petechuk 2003; McCuish, Lussier, and Corrado 2016).

The literature base examining the predictive validity of juvenile risk/needs assessment across ages ranges of youth is rather limited in comparison to studies focused on gender or race/ethnicity. Vincent and colleagues (2012) found that age did not moderate the association between assessment results and reoffending among adjudicated youth ages 12 and under, 13–15, and 16–18. In contrast, earlier work had shown juvenile risk/needs assessments evidence better predictive validity for older than younger youth, among samples of youth who have sexually offended (Viljoen et al. 2008, 2009). Notably, with respect to the feasibility of assessing risk for justice system involvement among younger youth, higher total risk scores on the Early Assessment Risk Lists (EARLs), sex-specific risk/needs tools for children under the age of 12, have been shown to predict increased likelihood of being members of a high-level offender trajectory group than in the rare offender class, with offending measured up to age 18 (Day et al. 2024; see also Koegl, Farrington, and Augimeri 2021). Importantly, as Sheppard et al. (2023) suggest, prevention and early intervention typically targets younger youth than formally processed youth (see also Farrington and Welsh 2008) for whom the vast majority of risk/needs assessments have been developed and such research has focused. Therefore, examining whether such assessments used with prevention youth operate similarly for younger and older adolescents is critical.

Many widely used risk/needs tools, such as the Youth Level of Service/Case Management Inventory (YLS/CMI), Structured Assessment of Violence Risk in Youth (SAVRY), and the Positive Achievement Change Tool (PACT) were designed for youth in early adolescence through late teens, typically ages 12–17 or 12–18 (Vincent and Maney 2009). These tools share a lower age bound around 12 years of age, as many items (such as delinquent peer influence, substance use, attitudes) presuppose adolescent experiences and behavior patterns not common in younger children. Additionally, many juvenile justice systems' jurisdictions begin at age 12 (e.g., California, Utah), and some experts urge caution in applying tools to youth under that age (Vincent, Guy, and Grisso 2012). Notably, some juvenile justice agencies do not have separate tools for younger children, such as FDJJ, which may have affected predictive validity in empirical research (e.g.,

Baglivio 2009; Baglivio and Jackowski 2013). A risk/needs assessment that evidences strong predictive validity across subgroups of youth, based on sex, race/ethnicity, and across ages, will be critical to optimizing the ability of prevention services to target individualized dynamic risk and enhance protective factors related to the likelihood that an at-risk youth will be referred for delinquency (equivalent to an adult arrest) to the juvenile justice system.

The Network Inventory of risk, victories, and needs assessment (NIRVANA)

Historically, risk/needs assessments have primarily been conducted with youth formally processed into the juvenile justice system (Hay, Ladwig, and Campion 2018; Loeber, Farrington, and Petechuk 2003; Sheppard et al. 2023). However, to optimize efforts to lower the age crime curve by reducing the proportion of youth that escalate to chronic and violent offending (e.g., Loeber and Stallings 2011), effective prevention is pivotal. Like intervention services, prevention is predicated on reduction of risk and enhancement of strengths/protective factors, which is enhanced through validated risk/needs assessment. Two recent examinations of a risk/needs assessment for prevention youth, the FDJJ Prevention Assessment Tool (PAT) have demonstrated strong predictive ability (Sheppard et al. 2023, 2024). Importantly, however, the largest provider of prevention services for FDJJ, the Florida Network, has developed a new holistic risk/needs assessment based on extant literature globally, yet heavily influenced by roughly 100 published studies on FDJJ youth specifically. We consider the Florida Network's NIRVANA to be a 'holistic' assessment as it includes static risk factors, dynamic risk and protective factors, childhood maltreatment and household dysfunction factors, and specific positive childhood experiences found in public health work and FDJJ-specific studies. To reiterate, the purpose of the NIRVANA is to predict the likelihood of future misdemeanor and/or felony offending, with equally important functions to guide case planning and services/service referrals. For the majority of youth, any future offense will be their first ever juvenile justice system contact, though the Florida Network may also serve youth with prior offenses. Providing prevention services staff with risk/needs assessment information on the likelihood of future offending and indication of which risk factors and lack of protective factors/strengths are driving that likelihood should serve to enhance case planning and lead to more efficient and effective service delivery. This further allows prevention programs to individualize services as opposed to providing identical services to every youth served by a given program. Better targeting of services to assessed risk and needs should lead to a lower influx of youth entering (or continuing) formally juvenile justice system involvement.

The NIRVANA was developed exclusively for the Network by Analytic Initiatives, LLC., a consultant group with experience developing risk/needs assessments (adult, juvenile, and special groups) and conducting validation studies on existing tools. The NIRVANA is composed of 86 items across 13 domains of (1) Delinquency History, (2) Firearms, (3) School, (4) Employment, (5) Peer Association, (6) Family/Living Arrangements, (7) Alcohol & Drug Use, (8) Mental Health/Suicidal Ideation, (9) Attitudes/Behaviors, (10) Aggression, (11) Skills, (12) Benevolent & Positive Childhood Experiences, and (13) Adverse Childhood Experiences. Notably, the NIRVANA includes the same domains as the FDJJ prevention assessment tool (PAT), with three additional domains of firearms, positive childhood

experiences (PCE), and adverse childhood experiences (ACE) domains. The construction of the NIRVANA was based on extant literature wherein risk factors function in a cumulative fashion such that as the number of different risk factors evident increases, so too does the likelihood of delinquency (e.g., Farrington 1997), yet promotive and protective factors decrease delinquency and/or build resiliency among risk-exposed youth (Farrington, Ttofi, and Piquero 2016).¹ Essentially, the higher the number of risk factor exposures and the lower the number of promotive and protective factor exposures, the greater the likelihood of delinquency, meaning assessing a mixture of risk and promotive/protective factors is most critical in determining future risk of delinquency and probability of desistance (e.g., Loeber, Slot, and Stouthamer-Loeber 2008). Importantly, promotive/protective factors likely matter more for youth not formally processed into the juvenile justice system (i.e., prevention youth), whereas risk factors tend to be more dominant for serious delinquents (Loeber, Slot, and Stouthamer-Loeber 2008). As such, a plethora of risk and protective items are included in the NIRVANA, based on extant literature to have demonstrated relationships with juvenile delinquency.

The inclusion of ACEs is premised on the heightened prevalence of traumatic exposure among juvenile offenders relative to the general population (e.g., Baglivio et al., 2014; Dierkhising et al. 2013), and that most, if not all of the RNR-espoused major risk factors for delinquency have been empirically linked to traumatic exposure (Fritzon et al. 2020). ACEs traditionally refer to ten types of exposure to potentially traumatic events across three types of abuse (physical, emotional, sexual), two types of neglect (physical and emotional), and five indicators of household dysfunction (household mental illness, substance abuse, incarceration history, parental separation/divorce, and domestic violence (Felitti et al. 1998; Dong et al. 2004).²

ACE research has proliferated across disciplines exponentially in the past 25 years (Struck et al. 2021), with a now extensive research base within criminology and juvenile justice specifically (e.g., Astridge et al. 2023; Braga, Cunha, and Maia 2018; Malvaso, Delfabbro, and Day 2016; Yohros 2022). ACE-offending research leveraging FDJJ samples alone has yielded well over 50 published studies, with findings including that higher ACE exposures is associated with self-control deficits (Meldrum et al. 2020), leads to heightened and faster time to recidivism (Wolff, Baglivio, and Piquero 2017), increased odds of violent offending (Johnson 2018) and sexual offending (Levenson et al. 2016), gang membership/association by age 18 (Wolff et al. 2020), placement in a juvenile justice residential facility by age 18 (Zettler et al. 2017), and serious, violent, and chronic/persistent offending through age 18 (e.g., Baglivio et al. 2015; Fox et al. 2015; Perez, Jennings Wesley, and Baglivio 2018). Due to the extent of the ACE-offending association research base, and ACEs being linked to criminogenic needs, the NIRVANA includes the ten traditional ACE exposures, summed to provide a cumulative ACE score.

Finally, the NIRVANA includes an extensive focus on strengths and resiliency. Developmental psychopathology theory posits that early positive childhood experiences (PCE) and safe, secure attachments provide essential safety for youth to acquire developmental abilities in the form of resiliency, self-control and emotional regulation (Cicchetti and Toth 2005; Toth and Cicchetti 2013). PCE are not simply the absence of problematic behaviors but imply the development of essential social skills (Kosterman et al. 2005). Specifically, within the NIRVANA, PCE are included through the incorporation of the ten items of the Benevolent Childhood Experiences (BCE) scale (Narayan et al. 2018)

employed across the globe and the eleven specific PCE found in FDJJ-specific research (Baglivio and Wolff 2021). PCEs include such concepts as family-child communication, feeling supported by family, participating in community/family traditions, feeling a sense of belonging/engagement in school, support from friends, participating in organized activities, and having adult mentors. Importantly, heightened exposure to multiple PCEs is associated with decreased recidivism and PCEs have been found to moderate the relationship between ACEs and delinquency and offending (Baglivio and Wolff 2021; Novak and Fagan 2022). Notably, research utilizing FDJJ samples has found that among youth with six or more PCE (of a possible eleven) rearrest and reconviction were more than 20% lower than those with fewer than six PCE, and that the association between ACE exposures and recidivism was rendered non-significant (Baglivio and Wolff 2021; see also Craig, Wolff, and Baglivio 2022). Through the BCE scale and FDJJ-specific research on PCEs, the NIRVANA includes 21 dichotomous (yes/no) PCE items summed into a cumulative victories/resiliency score.

NIRVANA training and software

The Florida Network is a non-profit statewide association of 29 community-based agencies that serve at-risk youth and families. The Florida Network has over 45 years of experience in providing prevention and early intervention programs to families across Florida, tasked with preventing juvenile delinquency and child abuse through strengthening families. Providing a continuum of services beginning with 24-hour accessible screening processes, community-based counseling, 24-hour crisis shelters, respite services as alternatives to detention placement, intensive case management, and the evidence-based family skills development intervention Stop Now and Plan (SNAP®; Augimeri et al. 2018; Burke and Loeber 2015a), the Florida Network overseas over \$40 million in annual funding from the largest annual FDJJ youth services contract.

The Florida Network developed the NIRVANA (through independent consultants) and implemented the tool by January 2022. The typical NIRVANA ‘user’ is a case manager or counselor, with a minimum of a bachelor’s degree, employed by one of the Florida Network’s agencies. Notably, each completed NIRVANA requires supervisor review and signature. Integral to the success of the NIRVANA was required standardized training in motivational interviewing, trauma, ACEs and PCEs, the NIRVANA assessment, and linking software-scored results to case planning. Importantly, the training involves inter-rater reliability exercises and is provided by qualified trainers who underwent a multi-day training with the NIRVANA developers. Training materials for individuals who administer the NIRVANA include a PowerPoint presentation, software user guide, case study, interview guide, and extensive reference guide that provides instruction and clarification of NIRVANA items and response options to further inter-rater reliability. Trainers (who train staff to administer the tool) additionally received a detailed scripted lesson plan for delivering the PowerPoint presentation and training activities, as well as a NIRVANA training fidelity adherence checklist, which allows qualified NIRVANA trainers to monitor and rate training provision and fidelity of training of one another. Staff must complete the NIRVANA training prior to receiving access to administer the tool.

Importantly, the NIRVANA is embedded in the Florida Network’s information system, allowing automated software scoring (see measures section below) and case planning

within that system. Trained users select forced-choice options for each NIRVANA item based on their interview with the youth and collateral interviews and records review with parents and education (when possible). Most items are forced-choice (multiple choice), wherein the user selects the best response from Likert scaled response. Likert scale items do not all have a uniform number of response options throughout the NIRVANA, though, importantly, only some response items are scored towards static or dynamic risk or protective points. Users are unaware of which item responses score towards risk or protective domain or overall scores. Notably, some items are 'check all that apply', such as an item in the Family/Living Arrangements domain regarding family members the youth feels close to (e.g., mother/female caretaker, father/male caretaker, foster/group home member, 'other' household member). Additionally, all ACE items and PCE/BCE resiliency items are dichotomous, limited to a forced choice 'yes' or 'no'. While the scoring of the NIRVANA is proprietary, each item's responses score as static risk, dynamic risk, or protective, with overall scores of total static risk, total dynamic risk, total risk (static plus dynamic), and total protective. Additionally, there is an ACE score (0–10) and a total victories/resiliency score (0–21 for BCE plus PCE).

Current study

The current study examines the predictive validity of the NIRVANA, focusing on the total static risk, total risk (static plus dynamic risk), and total risk plus protective scores (an index of static risk, dynamic risk and protective scores). While the items in the NIRVANA are garnered from a large body of research on Florida-specific samples of youth, all of that prior FDJJ research focused on delinquent youth formally processed into the juvenile justice system. The only exceptions are the two recent studies by Sheppard et al. (2023, 2024) who used the FDJJ PAT assessment, which does not provide overall risk scores to the users, only domain scores (though their 2024 study used the overall 'off the shelf' score from PAT development and further employed several analytic technics to optimize overall scoring). The NIRVANA is now the exclusive risk/needs assessment administered to the largest FDJJ provider of prevention services, serving over 45% of all such youth and families across the state (representing over 13,000 youth annually). As case planning incorporates the NIRVANA results and leads to specific service provision and referrals for additional services, it is critical that the NIRVANA operates as intended. Furthermore, we examine the predictive validity of the NIRVANA across future offense types (subsequent misdemeanor, felony, and violent felonies). Lastly, the current study examines whether predictive validity is similar across demographic subgroups of sex, race/ethnicity, and age. As prior work has indicated, youth receiving prevention services are younger (on average) than formally processed youth for whom the strength of specific criminogenic needs may differ and for whom the extant risk/needs research has been developed (Sheppard, Talaugon, and Hernandez 2024).

Methods

Data/Sample

Florida Network and FDJJ data were used for the current study. Specifically, the Florida Network maintains demographic indicators and NIRVANA assessment data in its

information system, while the FDJJ maintains the Juvenile Justice Information System (JJIS) which houses data inclusive of complete offense, placement, risk assessment, and intervention dosage (for youth placed in residential programs) for all youth arrested under the age of 18 in Florida. The first NIRVANA administered to a given youth from the time of the NIRVANA implementation (1 January 2022) through October 2024 were included. All youth who are served by a Florida Network program for over one day (24 hours) are administered a NIRVANA. The exception to this would be a youth who may arrive at a shelter program but then run from the shelter (as services are voluntary) prior to a NIRVANA being administered. Youth over the age of 17 were excluded from the current study, as the referral data provided by FDJJ included only juvenile justice offenses and the current study followed each youth from NIRVANA administration to 365 days later (meaning any adult offenses for youth who turned 18 years of age would not be completed, so those youth were excluded). The final sample included 17,894 youth administered a NIRVANA during the study period and followed one year from that NIRVANA administration date for a subsequent referral to FDJJ for a new offense.

Importantly, intake of a youth to a prevention service includes the provision of a unique identification number for each youth, and that number ‘follows’ the youth throughout his/her entire prevention and formal juvenile justice career. This allows for matching the unique youth administered a NIRVANA with any future referrals of that youth for new offenses and formal juvenile justice involvement. Study measures were derived from the overall risk scores (see below) automated from the NIRVANA software based on the forced-choice responses to each NIRVANA item selected by the user upon semi-structured NIRVANA interview. Additionally, the outcome measure of subsequent formal juvenile justice involvement and type of new offense were garnered from the referral/offense data extract provided by FDJJ.

Dependent measures

New law offending

Offending is captured as subsequent formal juvenile justice involvement for a new law offense committed within 365 days from the administration of the NIRVANA for each included youth (e.g., a delinquency referral to FDJJ, equivalent to an adult arrest). Only new misdemeanor and felony offenses are considered as new law offenses.

Severity of subsequent offense

Subsequent offenses, within one year of NIRVANA administration for each youth, were classified as *misdemeanors*, *non-violent felonies*, or *violent felonies*. Violent felonies included murder, manslaughter, attempted murder, attempted manslaughter, felony sexual battery, kidnapping, other felony sexual offenses, armed robbery, and aggravated assault. The subsequent offense type was classified based on the most serious charge in the first arrest after the NIRVANA assessment.

Key independent measures

Key independent variables included the automated scoring of the NIRVANA’s total static risk, total dynamic risk, and total risk scores. *Total static risk* can range from 0 to 12 and was

composed of 12 historical (non-changeable) items across the delinquency history, school, mental health/suicidal ideation/trauma, firearms, and family/living arrangements domains. *Total dynamic risk* can range from 0 to 41 and was derived from 41 items across all NIRVANA domains, except delinquency history (entirely static), ACEs, and Victories/Resiliency. *Total risk* is the sum of total static risk plus total dynamic risk, and, therefore, ranges from 0 to 53.

Finally, in order to explore whether the inclusion of protective factors improves the predictive validity of the NIRVANA a composite measure that accounts for both static and dynamic risk along with protective factors was computed. Specifically, a standardized index of total risk and protective factors was generated using factor scores derived from a principal components' analysis of the total static risk, total dynamic risk, and protective score from the NIRVANA assessment, yielding a single latent dimension of overall youth risk and resilience. The factor solution demonstrated excellent fit, with all three components loading strongly onto a single factor (loadings > .80) and accounting for over 70% of the total variance, supporting the unidimensionality of the risk construct (protective scores being reversed).

Control & demographic indicators

Control and demographic indicators included sex, race/ethnicity, age at assessment, and the type of prevention service the youth received. Specifically, *sex* included classifications of male or female, with an additional 79 youth for which sex was missing/not indicated (0.44% of the sample).³ *Race/ethnicity* included dichotomous indicators of White, Black, Hispanic, and youth classified as 'other' race/ethnicity. In keeping with FDJJ protocol, ethnicity supersedes race such that all White, Black, and 'other' classified youth are non-Hispanic, while Hispanic youth may be White or Black. Age at the time of the NIRVANA assessment was measured continuously in multivariate models and distinguished as less than 12 years of age versus 12 and over years of age in Area Under Curve and testing of differences (see analytic strategy below). Notably, nearly one-third (30.4%) of the sample was classified as under 12 years of age, with 69.6% 12 and over.

The type of prevention service that each youth received was classified into dichotomous types of community counseling, Stop Now and Plan (SNAP®), respite/shelter services, and family youth respite aftercare (FYRAC). *Community counseling* is primarily case management and service referral services, with youth referrals coming from school guidance counselors, school resource officers, local law enforcement, FDJJ, or directly from concerned parents or the youth themselves. *SNAP®* includes youth 12 years of age or younger served through the evidence-based early intervention program, or youth over 12 served in by the relatively new SNAP® for Youth intervention. Both SNAP® programs are 13 weeks of standardized curriculum delivered in-person to youth. SNAP® for the 12 and under youth has an additional component wherein at least one parent attends a parent training group while their youth receives the cognitive behavioral emotion regulation and problem-solving youth group component. *Respite/shelter* services are designed to provide a safe haven and/or 'cooling off period' for youth and respite for the families in crisis. Youth, ages 10–18, voluntarily reside in a 24-hour home-like setting shelter while the youth and family receive services. *FYRAC* are individual and family counseling services designed to serve youth and families in a community setting who have been referred by

FDJJ and arrested for a domestic violence offense on a household member. Youth receiving FYRAC may or may not have previously been served in a respite shelter.

Analytic strategy

Our analytic strategy proceeded in several stages. After providing a description of the analysis sample, we examined the bivariate association between our three measures of risk and arrest for new law offending using Pearson correlations and simple group comparisons to demonstrate the discriminative power of each measure individually. To further assess predictive validity, we calculated area under the curve (AUC) statistics to evaluate the extent to which the three distinct measures of risk accurately distinguish between youth who were and were not arrested. These analyses were conducted not only for the full sample but also disaggregated by key subgroups, including sex and race/ethnicity, as well as by offense type (violent, property, and misdemeanor). Next, we estimated multivariable logistic regression models to assess the independent contribution of the composite risk and protective measure to the likelihood of arrest, adjusting for demographic characteristics and the type of prevention service each youth received. Finally, we tested for moderation effects to determine whether the strength or direction of the association between the total risk index and offending varied across demographic subgroups, specifically by sex, race/ethnicity, and age.

Results

Table 1 provides descriptive statistics associated with the sample used in the current analysis. The youth in the current sample ($N = 17,894$) were predominantly male (54.1%) and racially diverse. Approximately 38.0% were identified as Black, 34.1% as White, and

Table 1. Descriptive statistics for the validation of the NIRVANA.

| | n | % | Mean | SD | Min | Max |
|-------------------------------|--------|--------|-------|------|------|------|
| New Law Offense w/in 365 Days | 2,064 | 11.53% | – | – | – | – |
| New Violent Offense | 1993 | 11.14% | – | – | – | – |
| New Non-Violent Offense | 521 | 2.91% | – | – | – | – |
| New Misdemeanor Offense | 1165 | 6.51% | – | – | – | – |
| Sex | | | | | | |
| Female | 8,128 | 45.42% | – | – | – | – |
| Male | 9,687 | 54.14% | – | – | – | – |
| Missing/Not Indicated | 79 | 0.44% | – | – | – | – |
| Race/Ethnicity | | | | | | |
| White | 6,106 | 34.12% | – | – | – | – |
| Black | 6,803 | 38.02% | – | – | – | – |
| Hispanic | 4,331 | 24.20% | – | – | – | – |
| Other | 654 | 3.65% | – | – | – | – |
| Service Type | | | | | | |
| Community Counseling | 11,975 | 66.92% | – | – | – | – |
| SNAP | 1,148 | 6.42% | – | – | – | – |
| FYRAC | 257 | 1.44% | – | – | – | – |
| DV Respite/Shelter | 4,514 | 25.23% | – | – | – | – |
| Age at Assessment | – | – | 13.2 | 2.99 | 5.15 | 18.9 |
| ACE Score | – | – | 2.23 | 2.56 | 0 | 10 |
| Total Static Risk | – | – | 1.65 | 1.62 | 0 | 11 |
| Total Risk (Static + Dynamic) | – | – | 10.17 | 5.89 | 0 | 37 |
| Risk – Protective Index | – | – | 0 | 1 | –2.1 | 4.4 |

24.2% as Hispanic, with a smaller proportion of other racial/ethnic backgrounds (3.7%). On average, youth were 13.2 years old at the time of assessment ($SD = 2.99$) and reported an average ACE score of 2.23 ($SD = 2.56$), reflecting varying levels of early life adversity. Within 12 months of their initial assessment, 11.5% of youth were arrested for a new law offense within 365 days of NIRVANA assessment, while the majority (88.5%) were not. Youth in the sample were assigned to a range of prevention service types, with the most common being community counseling (66.9%), followed by domestic violence respite or shelter services (25.2%), the SNAP program (6.4%), and FYRAC (1.4%).

All three measures of risk were significantly and positively correlated with new law offending.⁴ The strongest association was observed for the Total Risk – Protective Index ($r = 0.2983$, $p < .05$), followed closely by Total Static Risk ($r = 0.2932$) and Total Risk ($r = 0.2883$). These results suggest that higher levels of assessed risk are moderately associated and positively associated with arrest within a year. Together, these findings provide preliminary evidence of the predictive validity of the NIRVANA assessment and the use of both static and dynamic risk factors alongside an indicator of protective factors.

Across all distinct measures of risk, youth in the highest risk percentiles were substantially more likely to be arrested compared to those in the lowest percentiles. For example, only 2.2% of youth in the bottom 5% of Total Risk were arrested for a new law offense, compared to 37.7% in the top 5%. Similarly, new offending rates increased from 1.6% to 40.0% across the same top and bottom percentiles when using the Total Risk – Protective Index. In contrast, youth in the bottom 5%, 10%, and 25% of Static Risk had a 0% incidence of new offending, whereas those in the top 5%, 10%, and 25% had rates of 13.4%, 12.7%, and 12.2%, respectively.⁵ These findings underscore the discriminative power of the NIRVANA tool. Youth with the highest assessed risk were consistently the most likely to be arrested for a new law offense, while those with the lowest risk scores had minimal or no incidence of arrest, especially when dynamic and protective factors were considered alongside static risk.

The next step used to assess the predictive validity of the different measures of risk drawn from the NIRVANA assessment was to calculate Area Under the Curve (AUC) statistics for each index. Figure 1 displays the AUC values and 95% confidence intervals for three risk measures in predicting offending in the full sample. Predictive accuracy slightly improved with the inclusion of dynamic and protective factors, with the highest AUC observed for the Risk – Protective index ($AUC = 0.747$), although this difference was not statistically significant given the overlapping confidence intervals observed. Given the composite measure achieved the highest AUC statistic and was more highly correlated with offending, we explore its predictive validity across pertinent demographic subgroups as well as across offense types in the section below.

Figure 2 shows the predictive accuracy of the Total Risk – Protective Index across different offending types, using AUC values with 95% confidence intervals. Predictive validity was highest for misdemeanor ($AUC = 0.742$) and violent offending ($AUC = 0.734$), and somewhat lower for non-violent offending ($AUC = 0.698$). Importantly, the only significant difference in predictive validity was found between misdemeanor offending and non-violent offending as the CIs did not overlap. Additionally, all AUC values fall within the range considered typical-to-strong for risk assessment tools (Rice and Harris 2005) in the juvenile justice field, with NIRVANA AUC values above the 0.64 average found in meta-analysis of juvenile risk assessment tools (Schwalbe 2008).

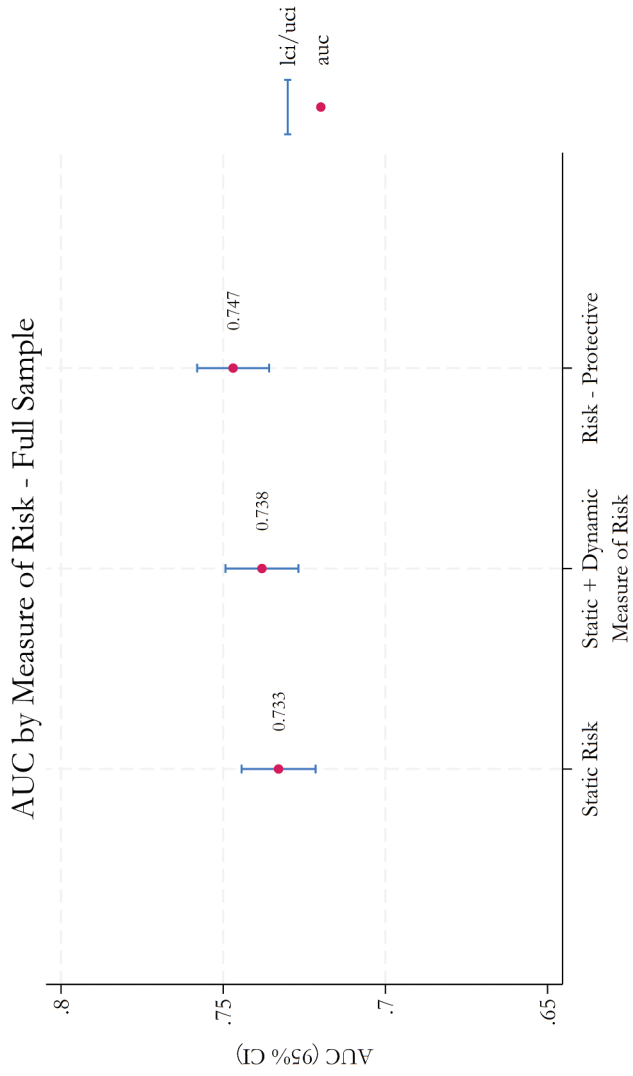


Figure 1. Area Under the Curve by Risk Index.

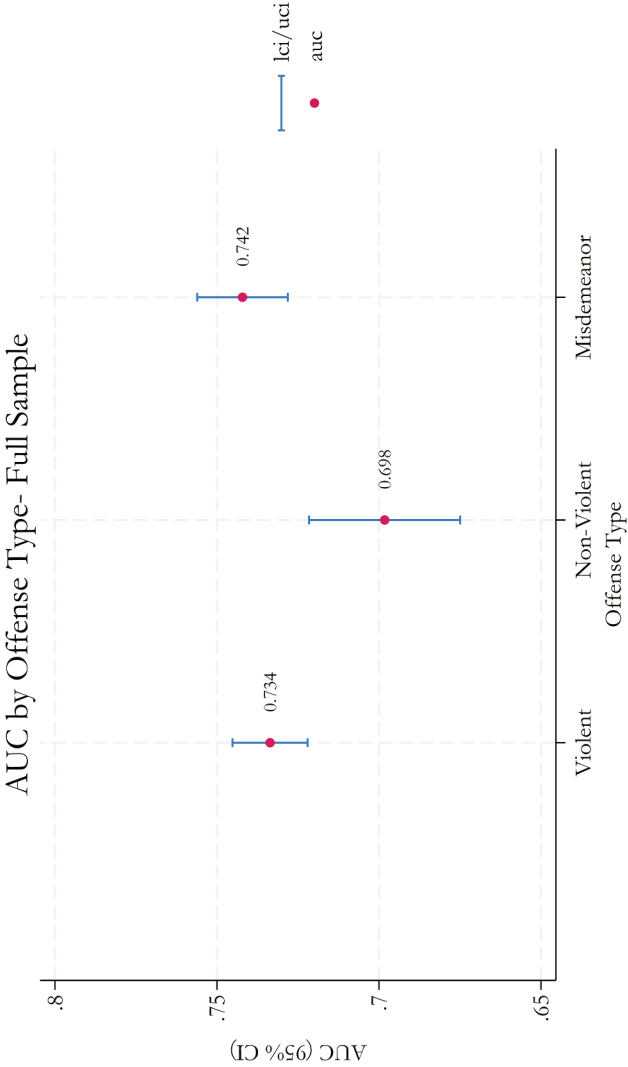


Figure 2. Area Under the Curve by Offense Type.

Figure 3 displays the predictive accuracy of the Total Risk – Protective Index across demographic subgroups, with AUC values and 95% confidence intervals. The tool performed similarly across racial and ethnic groups, with AUCs ranging from 0.734 to 0.753, and slightly higher predictive validity for male youth (AUC = 0.765) compared to female youth (AUC = 0.747). Notably, the tool was more predictive among youth under 12 years old (AUC = 0.793) compared to those aged 12 and older (AUC = 0.716), suggesting stronger predictive performance for younger youth.

Table 2 presents the results of multivariable logistic regression models assessing the predictive validity of the Total Risk – Protective Index across different types of offending, with odds ratios (ORs) and 95% confidence intervals (CIs) reported. The Total Risk – Protective Index was a significant predictor of all types of offending. Specifically, a one-unit increase in the Total Risk – Protective Index was associated with significantly higher odds of any new offense (OR = 1.88, 95% CI [1.78, 1.99]), violent offending (OR = 1.89, 95% CI [1.79, 2.00]), non-violent offending (OR = 1.64, 95% CI [1.50, 1.80]), and misdemeanor offending (OR = 1.69, 95% CI [1.58, 1.80]).

Figure 4 displays predicted probabilities of new-law offending across five levels of the Total Risk – Protective Index, controlling for all covariates in the model. For each of the explored offense types (e.g., any, violent, non-violent, and misdemeanor) the likelihood of offending was observed to steadily increase as a youth's level of risk increases.

Table 3 presents moderation models testing whether the predictive association between the Total Risk – Protective Index and offending varies by sex, race/ethnicity, and age. The interaction terms for sex and race/ethnicity were non-significant, indicating that the predictive validity of the risk index is consistent across male and female youth, as well as across racial/ethnic groups. In contrast, the interaction between risk and being age 12 or older was significant (OR = 0.549, 95% CI [0.430, 0.700]), suggesting that the risk tool is more predictive for younger youth. These results support the generalizability of the NIRVANA index across most demographic subgroups, with notably stronger predictive utility among younger children.

To further test whether the predictive validity of the NIRVANA Total Risk – Protective Index varied significantly across subgroups (e.g., by age), we followed best practices outlined by Mize (2019) for nonlinear models by calculating and statistically comparing second differences in predicted probabilities. Rather than relying solely on the interaction term coefficients from logistic regression, which can be misleading in nonlinear models, we assessed whether the marginal effect of risk significantly differed across groups using predicted probabilities derived from the model. Specifically, we tested whether the change in predicted offending probability associated with increasing risk differed between, for example, youth under age 12 and those age 12 and older. This approach aligns with Mize's recommendations, allowing for more accurate and interpretable subgroup comparisons in the context of nonlinear modeling. Results of this ancillary analysis confirmed that the association between risk and new offending was equivalent across each of the subgroups explored, except for significant differences between youth under or over the age of 12.

Figure 5 displays predicted probabilities of any arrest within 365 days across levels of the Total Risk – Protective Index, disaggregated by sex, race/ethnicity, and age at assessment. As risk increases, the predicted probability of offending rises across all subgroups, but in one instance the magnitude of this increase differs. By sex, male youth show

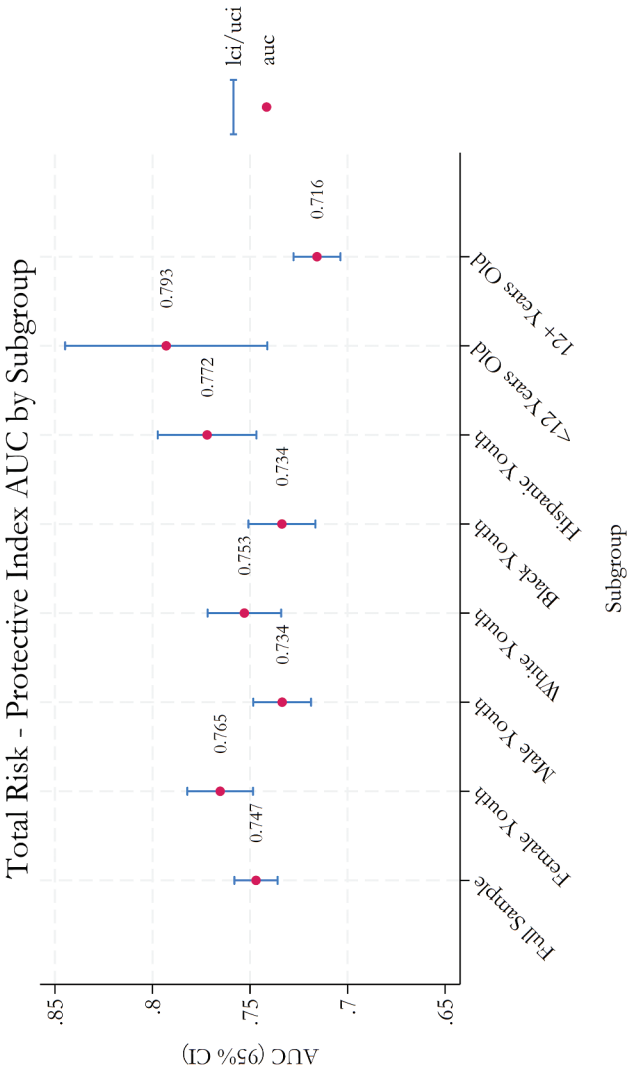


Figure 3. Area Under the Curve by Subgroup.

Table 2. Multivariable assessment of the predictive validity of the NIRVANA by offense type.

| | Any New Offense | Violent Offense | Non-Violent Offense | Misdemeanor Offense |
|-------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | OR/95% CI | OR/95% CI | OR/95% CI | OR/95% CI |
| Total Risk – Protective Index | 1.880*** [1.780,1.986] | 1.891*** [1.790,1.999] | 1.643*** [1.498,1.802] | 1.686*** [1.578,1.801] |
| Black | 1.203** [1.069,1.354] | 1.210** [1.073,1.364] | 1.448*** [1.170,1.792] | 1.052 [.910,1.217] |
| Hispanic | .790** [.680917] | .786** [.676915] | .754 [.565,1.006] | .749** [.621903] |
| Other Race | 1.037 [.794,1.354] | 1.066 [.815,1.394] | 1.258 [.783,2.022] | 1.027 [.743,1.418] |
| Female | .621*** [.558691] | .656*** [.589730] | .317*** [.255394] | 0.944 [.829,1.074] |
| Missing/Not Indicated Sex | .364* [.152874] | .388* [.162931] | .265 [.036,1.934] | 0.382 [.117,1.247] |
| Age at Assessment | 1.195*** [1.166,1.224] | 1.191*** [1.163,1.221] | 1.227*** [1.173,1.283] | 1.161*** [1.126,1.197] |
| ACE Score | .970** [.949991] | .973* [.952995] | .964 [.926,1.004] | 0.992 [.966,1.019] |
| SNAP | .815 [.578,1.149] | .845 [.599,1.192] | .494 [.229,1.065] | 0.825 [.518,1.314] |
| FYRAC | 2.136*** [1.581,2.886] | 1.793*** [1.313,2.448] | 2.074*** [1.365,3.153] | 1.275 [.823,1.975] |
| Respite/Shelter | 2.981*** [2.653,3.350] | 2.891*** [2.570,3.253] | 1.856*** [1.497,2.300] | 3.018*** [2.600,3.503] |
| Constant | .007*** [.005010] | .007*** [.005010] | .002*** [.001003] | .005*** [.003008] |
| Pseudo R-Square | .1891 | .1851 | .1402 | .1486 |

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. OR = Odds Ratio. CI = Confidence Interval. $N = 17,894$.

consistently higher predicted probabilities of offending at each risk level compared to female youth, although the association between risk and offending (i.e., the slope of the line) was similar between the two groups. By race/ethnicity, Black youth exhibit the highest predicted probabilities, especially at higher risk levels, while Hispanic and White youth show similar and comparatively lower predicted probabilities. The most pronounced difference in predictive validity appears by age. Specifically, youth assessed before age 12 show a much steeper increase in predicted offending with higher risk scores, indicating that risk as measured by the NIRVANA tool may be especially predictive for younger youth. Below we discuss these findings in greater detail.

Discussion

The current study examined the predictive validity of a newly developed fourth generation risk/needs assessment exclusively administered by the Florida Network, FDJJ's largest prevention services provider. Such analyses are pivotal, as there is dearth of prior work examining whether risk/needs assessments are feasible and appropriate for at-risk youth not yet justice-involved (but see Augimeri et al. 2020; Sheppard et al. 2023, 2024). Valid assessment, across sex, race/ethnicity, and ages of youth, will assist prevention services with optimizing service targeting to reduce the likelihood of at-risk youth formally entering the juvenile justice system. The NIRVANA demonstrated strong predictive power across sex, race/ethnicity, and across offense severity (misdemeanor, felony, violent felony). While the tool demonstrated better predictive validity for youth assessed at the

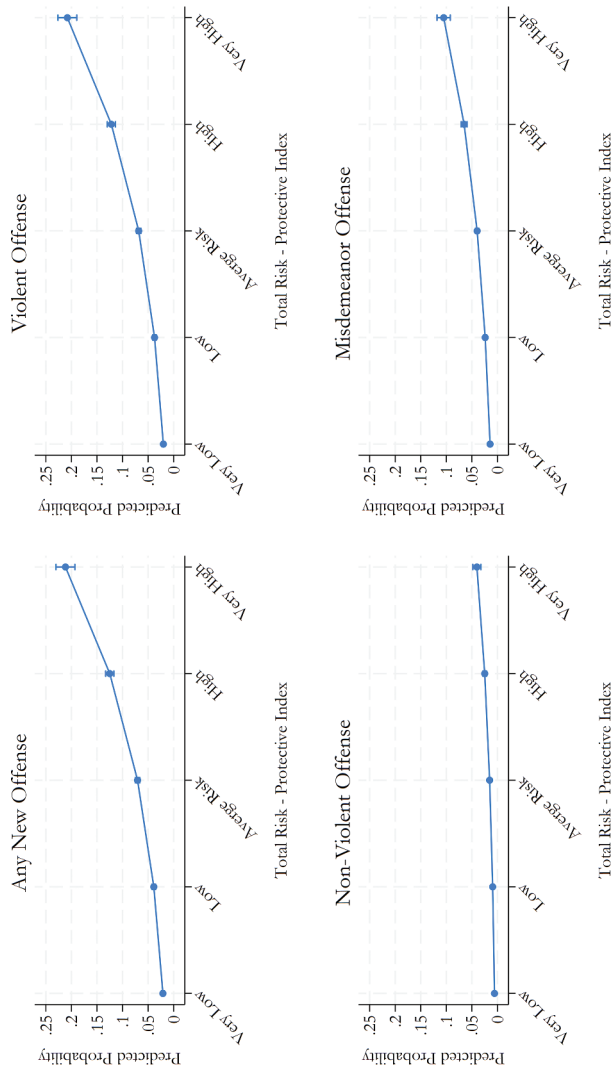


Figure 4. Predicted Probability of New Offending by Offense Type.

Table 3. Multivariable assessment of the predictive validity of the NIRVANA.

| | Sex Differences | Race Differences | Differences by Age |
|-------------------------------|---------------------------|---------------------------|----------------------------|
| | OR/95% CI | OR/95% CI | OR/95% CI |
| Total Risk – Protective Index | 1.809*** [1.691,1.935] | 1.878*** [1.721,2.050] | 3.294*** [2.590,4.189] |
| Risk X Female | 1.063 [.963,1.174] | – – | – – |
| Risk X Black | – | .969 [.866,1.083] | – |
| Risk X Hispanic | – | 1.051 [.913,1.209] | – |
| Risk X Other Race | – | .798 [.616,1.033] | – |
| Risk X Age 12+ | – | – | .549*** [.430700] |
| Black | 1.205** [1.070,1.357] | 1.231** [1.071,1.416] | 1.203** [1.069,1.354] |
| Hispanic | .787** [.678914] | .775** [.652922] | .794** [.684921] |
| Other Race | 1.075 [.822,1.406] | 1.235 [.910,1.676] | 1.060 [.812,1.385] |
| Female | .592*** [.523670] | .616*** [.553685] | .617*** [.555686] |
| Other Gender/Non-Conforming | – | .334* [.139803] | .340* [.142815] |
| Age 12+ at Assessment | 6.793*** [5.378,8.580] | 6.787*** [5.373,8.574] | 8.738*** [6.596,11.576] |
| SNAP | 1.136 [.799,1.615] | 1.138 [.800,1.618] | 1.142 [.802,1.627] |
| FYRAC | 2.722*** [2.037,3.637] | 2.726*** [2.039,3.643] | 2.737*** [2.049,3.656] |
| Respite/Shelter | 2.914*** [2.595,3.272] | 2.897*** [2.580,3.253] | 2.906*** [2.590,3.261] |
| Constant | .017*** [.013022] | .017*** [.013021] | .013*** [.010018] |
| Pseudo R-Square | .2034 | .2033 | .2049 |

Note: * $p < .05$, ** $p < .01$, *** $p < .001$. OR = Odds Ratio. CI = Confidence Interval. $N = 17,894$. In the sex moderation model, only male and female youth were included given there were only 79 ‘missing/not indicated’ sex youth (Model $n = 17,815$).

age of 11 and younger than older youth, AUC statistics exceeded .700 for all demographic subgroups examined. Additionally, sex and race/ethnicity subgroups showed no significant differences in predictive validity across methodological techniques (overlapping AUC confidence intervals and testing of differences with interaction terms).

Furthermore, results demonstrated inclusion of both static and dynamic risk, as well as protective factors enhanced predictive validity. The inclusion of protective factors is critical as the limited prior work assessing the FDJJ Prevention Assessment Tool (used by the Florida Network prior to the development of the NIRVANA) did not include consideration of protective factors (Sheppard et al. 2023, 2024). The NIRVANA includes extensive focus on measuring strengths and resiliency, including the incorporation of both the Benevolent Childhood Experiences (BCE) scale (Narayan et al. 2018), and the exact Positive Childhood Experiences (PCE) found in prior FDJJ work to reduce to effect of Adverse Childhood Experiences (ACEs) on reoffending to non-significance (Baglivio and Wolff 2021; see also Kowalski et al. 2023). While the current study did not test whether the NIRVANA total protective factor index moderated the effects of ACEs on new offending,

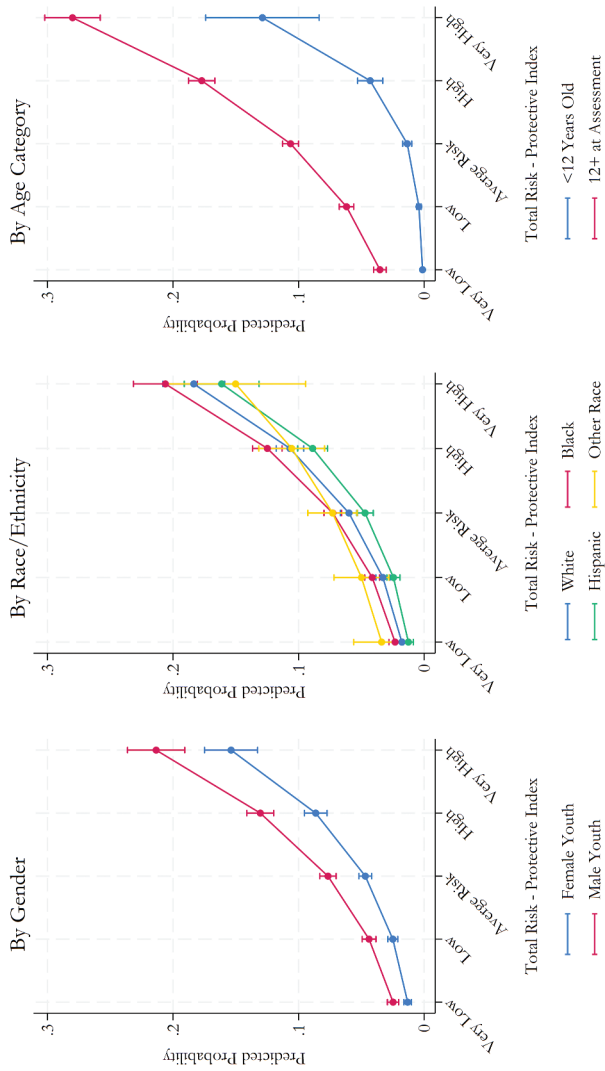


Figure 5. Predicted Probability of New Offending by Subgroup.

notably the effect of ACEs on new offending was non-significant or inversely related to new offending in our multivariate models. Future work should continue to examine the relationship between ACEs and PCEs, and their impacts on new offending among non-system-involved at-risk youth.

Importantly, and contrary to the Sheppard, Talaugon, and Hernandez (2024) analysis of the Prevention Assessment Tool, the current NIRVANA analyses highlighted stronger predictive performance for younger youth than older youth receiving prevention services. This is paramount as youth receiving prevention services are, on average, younger than youth with formal justice involvement and often substantially younger. Going back to our reminder of Beccaria's (1764) insight that it is better to prevent crimes than to punish them, the ability to effectively assess at-risk youth and therefore target effective intervention to assessed risk and needs and developing strengths/resiliency should be the first component of a Comprehensive Strategy for Serious, Violent, and Chronic Juvenile Offenders. Prior work has touted the importance of adherence to the Comprehensive Strategy:

Achieving adherence to the comprehensive strategy entails early delinquency prevention and cutting off the 'supply' of future serious, violent, and chronic offenders by reducing the prevalence of child delinquents in the general population, while managing the 'demand' side in providing effective delinquency intervention to those already meeting serious, violent, and chronic status. Effective intervention, therefore, has the capability of lowering the age – crime curve by following the evidence-based mantra of providing the right quality service to the right youth, at the right time, and at the right dosage and intensity (Baglivio, Jackowski et al. 2014, 27; see also Loeber et al. 2012)

The NIRVANA's performance in predicting formal system involvement among younger youth is an important asset, as age at first arrest is one of the strongest predictors of life course persistent offending trajectories (e.g., DeLisi and Piquero 2011; Loeber and Farrington 1998), including among FDJJ youth (Baglivio et al. 2015; Baglivio, Jackowski et al. 2014). Preventing the initiation and/or escalation of criminal careers among such high-risk youth is critical, as these serious, chronic offenders are unique in terms of the societal costs they impose (e.g., victimization, social, and financial; Piquero, Jennings, and Farrington 2013). The estimated monetary value of saving a single high-risk youth is demonstrated to be upwards of \$5.3 million at age 18 (Cohen and Piquero 2009; see also Cohen, Piquero, and Jennings 2010). The NIRVANA's risk minus protective index demonstrated a group of youth at the top 5% (most at-risk) to evidence a 40% rate of formal referral to FDJJ within one year, in contrast to the sample average of under 12%, and only 2% for the lowest 5% of the sample on that risk minus protective score. Fortunately, there is ample evidence of the effectiveness of early intervention and prevention programs, including early-family training programs (Piquero et al. 2009) and self-control enhancement intervention (Piquero, Jennings, and Farrington 2010).

Like any analysis ours is not without limitations. A key limitation of the current analysis is its generalizability beyond the Florida context. Because the data were drawn exclusively from youth receiving prevention services through the Florida Network, which administers the NIRVANA tool statewide, the findings may not extend to youth populations in other states or service systems with different demographic, cultural, or service delivery

characteristics. Additionally, although the sample is large and diverse, it only includes youth under the age of 18 who all had not yet been formally processed into the juvenile justice system, limiting applicability to more justice-involved populations. Additionally, it is important to note that the inter-rater reliability of the NIRVANA has not yet been empirically evaluated or established. Finally, because the study followed youth for only 12 months after assessment, it cannot speak to long-term predictive validity or sustained effects of interventions informed by NIRVANA scores. A longer follow-up period would enhance understanding of the tool's capacity to predict long-term trajectories and sustained effects of early interventions. With respect to practical policy implications, we caution that the current study relies more heavily on the overall risk and protective scores produced by the NIRVANA software, as well as the summary ACE and PCE/BCE resiliency scores. Notably, NIRVANA users are provided these summary scores within the software and reports automatically compare a youth's initial to reassessments over time (whether overall risk, dynamic risk, dynamic protective, ACEs, and/or resiliency scores change). However, it is likely that workers rely more heavily on domain scores in providing targeted services and service referrals. While users see in the software which domain(s) scores to risk on a given assessment, to enable targeting of services, the current study did not assess domain scores or risk/protective changes over time, which should be the focus of future work. The Florida Network does use NIRVANA data to examine differences in proportion of youth with higher risk in each domain across Florida (e.g., X % evidence substance abuse in one area of the state, while Y% in have such risk in another area). Such data enables the Network to ensure local service providers can effectively serve the youth admitted, based on NIRVANA data, and/or assess service gaps throughout the state. Such practical uses of risk/needs assessment information, beyond individualized targeting of services/referrals for each youth, are pivotal for prevention providers to optimize service delivery and ensure they are meeting the needs of youth and families across the jurisdictions they serve.

Conclusion

The current study continued to demonstrate the efficacy of risk/needs assessment for at-risk youth who are not yet system involved, building on recent prior work. The strength of predictive validity evidenced by the NIRVANA demonstrates the importance of static and dynamic risk but also dynamic strengths and resiliency among at-risk youth. The importance of dynamic and changeable risk factors and factors aimed at building resiliency/strength provides prevention practitioners the guidance to develop effective case plans that can have meaning impact of reducing the influx of at-risk youth into the juvenile justice system, thereby potentially lowering the age-crime curve as fewer individuals initiate or continue to offend over time.

Notes

1. Here we acknowledge the operationalizations as per Farrington, Ttofi, and Piquero (2016) wherein a risk factor predicts a higher probability of delinquency, promotive factors are associated with a lower likelihood of delinquency, while protective factors are effective in

reducing delinquency among individuals exposed to risk factors (interacts with a risk factor to nullify its effects).

2. While beyond the scope of the current study, we acknowledge scholarship calling for the expansion of ACEs to include factors such as racial discrimination, community violence, bullying, homelessness, and others (e.g., Bonner et al. 2020; DeLisi, Drury, and Elbert 2019; Finkelhor et al. 2013, 2015; Kushner and Leban 2024; Mersky, Janczewski, and Topitzes 2017). The NIRVANA includes several such items independently, but does not include in the overall ACE score to allow comparisons with samples and findings across decades of research using the ten-ACE methodology.
3. Notably, sex was the only measure for which there was any missing/not indicated data (79 youth total). All other measures had complete data across the entire sample of youth.
4. Correlations are shown in [Appendix A](#) included in the supplementary materials associated with this article.
5. Results are presented in [Appendix B](#) provided in the supplementary materials associated with this article.

Acknowledgements

The views expressed in this manuscript are not necessarily reflective of those of the Florida Department of Juvenile Justice.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix

Appendix A: Correlations between Risk and Protective Scores and New Law Offenses

| | | (1) | (2) | (3) | (4) |
|-----|-------------------------------|---------|---------|---------|-----|
| (1) | 12-Month Recidivism | 1 | | | |
| (2) | Total Static Risk | 0.2932* | 1 | | |
| (3) | Total Risk (Static + Dynamic) | 0.2883* | 0.6808* | 1 | |
| (4) | Total Risk – Protective Index | 0.2983* | 0.7205* | 0.9575* | 1 |

Appendix B: Simple Group Comparisons by Risk & Protective Scores

| | Static Risk | Total Risk | Risk – Protective |
|------------|-------------|------------|-------------------|
| Bottom 5% | 0% | 2.20% | 1.55% |
| Top 5% | 13.41% | 37.73% | 39.96% |
| Bottom 10% | 0% | 2.36% | 2.12% |
| Top 10% | 12.74% | 32.52% | 35.46% |
| Bottom 25% | 0% | 3.46% | 2.81% |
| Top 25% | 12.22% | 24.21% | 25.53% |

Note: Percent of each group who offended within 365 days shown.