Biopsychosocial Assessment Approach to Offenders with Intellectual Disabilities in Forensic Services

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Abstract

The intellectually disabled (ID) offenders are a subgroup of clinically and legally vulnerable clientele of forensic services, who often manifest complicated comorbid psychiatric illnesses, poor adaptive functioning, and high psychosocial risk factors. Although people with ID make up about 3-5% of the overall population, a proportion of forensic mental health service consumers is estimated to be 7-10 %, which means that they are disproportionately represented. The study is an appraisal of the application of a well-organized biopsychosocial assessment model that aims at enhancing risk formulation, treatment planning, and rehabilitation outcomes in a forensic context. The design was a mixed-methods one applied to three secure forensic units (n=120 Offenders with mild to moderate ID; mean age=29.4±7.8 years; 82% male). The biological (psychiatric comorbidity, neurological conditions), psychological (cognitive functioning, impulse control, trauma history), and social (family support, employment history, substance misuse) variables were evaluated with the help of standardized tools. The comparison of pre- and post-implementation was conducted within 12 months. Findings showed that 71 % of respondents had a comorbid psychiatric diagnosis, 57 % had had substantial adverse childhood experiences, and 49 % showed substance misuse records. After the formal biopsychosocial assessment, individual care plans were augmented by 35%, risk management schemes were concurred by 28%, and reported conduct episodes were reduced by 22% ($p < 0.05$). Multivariate regression analysis has indicated that trauma exposure ($\beta = 0.41$) and substance misuse ($\beta = 0.36$) have significant predictive value in institutional aggression. The results substantiate the clinical usefulness of a biopsychosocial assessment framework in forensic ID services, demonstrating statistically significant effects on treatment congruence and behavior change. Such a combination of biological, psychological, and social determinants, within the framework of structured risk formulation, provides a superior approach to tailored intervention mechanisms and to safer, evidence-based forensic care pathways.

Keywords *Intellectual Disability, Forensic Services, Biopsychosocial Assessment, Risk Management, Rehabilitation, Psychiatric Comorbidity.*

Introduction

Intellectual disability (ID) is characterized by a major impairment of intellectual functioning (IQ below about 70) and adaptive behaviour, with onset in the developmental period. In clinical terms, people with ID often show impairments in conceptual reasoning, social judgment, and practical skills required for independent living. There is a very wide presence of comorbid psychiatric disorders, communication problems, and neurodevelopmental problems like autism spectrum disorder, which make assessment and management in forensic settings difficult [3]. There is neurobiological vulnerability, such as traumatic brain injury, executive dysfunction, which has been shown to contribute to elevated impulsivity and diminished moral reasoning in justice-involved groups of people [2]. Empirical studies have shown an overrepresentation of people with ID in the forensic and custodial justice systems. Register-based studies demonstrate increased violent offending and an extended or specialized pattern of sentencing of individuals with ID in comparison with the general population [4]. Violent repeat offenders exhibit high levels of co-occurring psychopathology and lower levels of self-sufficiency, which indicate the accumulating biopsychosocial disadvantage [5], [7]. Moreover, people with mild ID as well as those with borderline intellectual functioning often go undetected through the criminal justice processes, exposing them to the risks of improper custodial placement and insufficient clinical care [16], [8]. The criminal justice system has structural issues with forensic mental health. The tools that have been created to assess the risks of neurologically normal populations might not reflect adaptive deficits, trauma, and social marginalization. The equity-based models of care also emphasize the disparities in disability services and forensic psychiatry, which do not allow for continuity of rehabilitation [9].

Figure 1 Architecture of the Proposed Biopsychosocial Risk Assessment Model

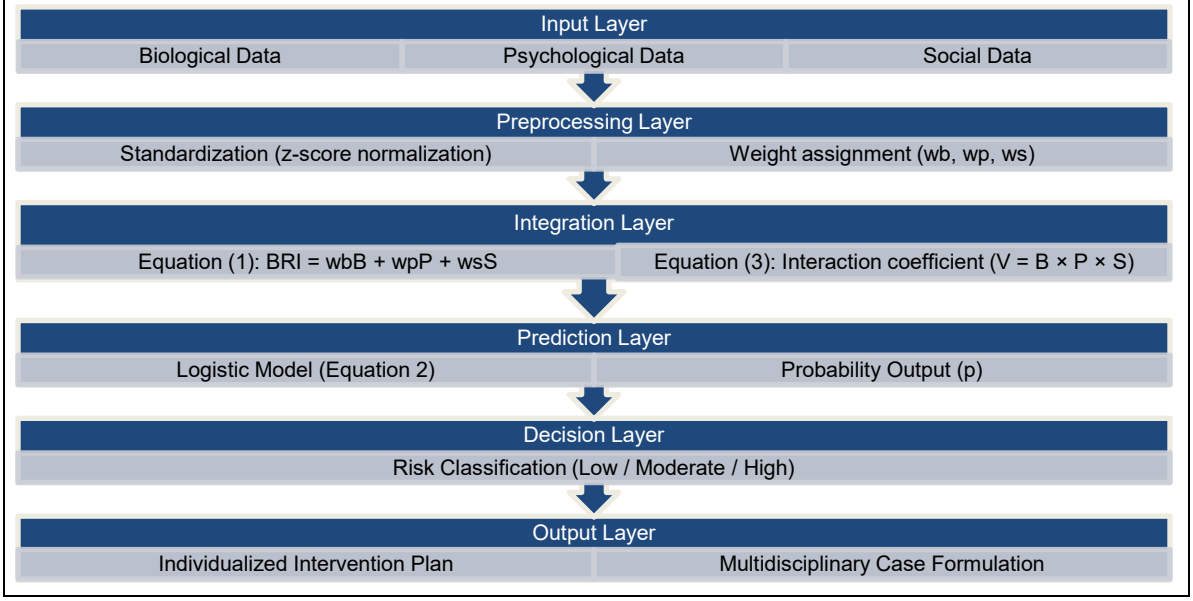


Figure 1 is an architecture diagram that will show how the proposed biopsychosocial assessment framework will be structured to follow the flow of information (i.e., multidomain data and individualized forensic intervention planning). The preprocessing layer first standardizes and weights biological, psychological, and social data, then incorporates them via the composite Biopsychosocial Risk Index (BRI) and an interaction coefficient. The prediction layer applies a logistic model to estimate the probabilities of adverse behavioral outcomes, which are used to classify risks in the decision layer. The resulting output assists in planning tailored interventions and in multidisciplinary case formulation, demonstrating that there is a systematic, analytically based method of forensic risk assessment in the context of an intellectually disabled person.

Conventional forensic paradigms may focus on the diagnostic classification or actuarial risk forecasting, and focus on symptom mitigation or unchanging criminogenic variables. Although psychiatric comorbidity is treated in the frameworks of a medical orientation, it might underrepresent environmental adversity, social exclusion, and cognitive vulnerability that determine offending trajectories [1]. In the same way, a biopsychosocial approach can

pathologize behaviour without taking context into account. Abiopsychosocial approach incorporates biological vulnerabilities (e.g., neurodevelopmental impairment, head trauma), psychological formulations (e.g., trauma-related dysregulation, distorted social cognition), and social formulations (e.g., poverty, institutionalization, limited support networks). Violent offending studies support the idea that multifactorial interactions, beyond single pathology, play a more convincing role in explaining persistent antisocial behavior [6]. The emerging clinical-forensic assessment instruments also highlight the advantage of structured biopsychosocial mapping in individualizing a formulation and planning interventions, as cognitive capacity, communication style, and neurodiversity-supported adaptations should be considered in treatment responsivity [10]. By situating the offending behaviour within a framework of stratified developmental and environmental factors, clinicians can align intervention objectives with adaptive functioning and social reintegration.

The purpose of this paper is to explore how the biopsychosocial model can be applied systematically in the forensic assessment of offenders with ID. It aims to test the effectiveness of an integrated formulation in enhancing risk management, therapeutic interactions, and rehabilitation compared to reductionist models. Another aim is to identify systemic deficiencies in existing forensic practice, such as diagnostic overshadowing, broken service pathways, and the lack of adaptation of correctional interventions for individuals with cognitive impairment.

The disproportion of individuals with intellectual disabilities in the forensic system is a manifestation of systemic inequalities and a lack of clinical services. In the absence of developmentally informed evaluation, there is a high chance that this population will be misclassified, detained long without successful rehabilitation. These issues are crucial to ethical, evidence-based forensic practice and to the safety of the people.

The value of this paper is that it summarizes the current body of forensic, neuropsychological, and rehabilitation literature into an integrated biopsychosocial assessment model designed to address offenders with intellectual disabilities. It brings out practical implications of structured formulation, service integration, and responsiveness of interventions in secure environments.

The paper is organized in such a way that it offers a systematic analysis of biopsychosocial assessment method of forensic services of an individual with intellectual disability. The literature review will provide the synthesis of the empirical and theoretical advances in the study of forensic intellectual disability and multidimensional risk modeling after the introduction. The section of methodology describes the study design, characteristics, the assessment procedures and analytical framework for operationalization of the biopsychosocial model. The results part shows field-specific results and model performance outcomes, comparative as well as integrated results. These findings are discussed within a clinical and forensic context and the conclusion summarizes the main contributions, the methodological aspects, and future research and practice directions.

Literature Review

The epidemiological literature indicates that the incidence of intellectual disability (ID) is always high in custodial and forensic psychiatric settings as compared to the community prevalence estimates. The surveys conducted in European jurisdictions show that 5%-10% of prisons consist of people who have ID or borderline intellectual functioning, and the proportion is even greater in secure psychiatric hospitals [16], [11]. The community forensic referral data also indicate an increase in the complexity of cases, such as increased prevalence of prior service contact and social instability [17]. The patterns of offending among the people with ID tend to be different than among the neurotypical offenders. Chances of impulsive, reactive, or situational violence are higher than those of being organized criminals and often take place in well-known social circles [19]. Evidence of the literature on registers indicates that this population can be treated with highly structured forensic psychiatric care to significantly decrease the risk of recidivism, which highlights the significance of special intervention routes [14]. Such factors as suggestibility, poor understanding of legal rights, peer dependency and exposure to exploitation are vulnerability factors. Another factor of behavioural outcomes is institutional climate: therapeutic group setting with relational safety and structured support has been exposed to better stability in secure ID settings [13]. Comorbidity is not an exception. Forensic ID cohorts have recorded high rates of mood disorders, psychosis, personality disorder tendencies and autism spectrum conditions [11]. Behaviours that are challenging, usually based on trauma or lack of communication or stress in the environment, depending on the

clinical context, can be mistaken as criminogenic intent [18].

The biopsychosocial model, as the first model was developed by George L. Engel, redefined illness as an outcome of a biological, psychological, and social system, and not an isolated pathology. In forensic mental health, it forms a paradigm of integrating neurodevelopmental impairment, emotional regulation, history of trauma, and socio-environmental adversity into coherent case formulation [12]. Comparative studies of forensic rehabilitation models prove the overlap between the biopsychosocial principles and the modern models like Risk-Needs-Responsivity (RNR) model, the Good Lives Model, and recovery-based models [20]. These models emphasize interacting risk factors (dynamic), strengths-based intervention, and responsiveness to cognitive capability which are the key elements of biopsychosocial thought processes. In practice, biopsychosocial risk formulation is less about actuarial scoring and more about how neurocognitive impairments are combined with environmental stimuli and systemic disadvantage. According to Brydon (2022), the contextualized psychological assessment is necessary in forensic settings that takes into consideration the pressures of coercive settings and power inequality, which supports the importance of holistic analysis [15].

Most of the existing standard forensic risk assessment instruments like structured professional judgment instruments were developed using general offender populations. They might have reduced predictive validity when leveled on people with ID, especially under circumstances where adaptive functioning and communicational deficits are not well-weighted [19], [11] suggest that the case of diagnostic overshadowing may distort mental illness or trauma-related symptoms, therefore, resulting in failure to formulate the case.Adjudicative competence, fitness to plead, and criminal responsibility assessments are also complex. The ID people show high suggestibility and acquiescence, which undermines the trustworthiness of confessions and comprehension of the process (Gomez-Duran et al., 2025). Ethical considerations are carried to the human rights protection, proportional sentencing, and access to reasonable adjustments in the protection of safe care. Assessment validity is also a concern of the central role of nursing and allied professionals (McAaleer and Takawira, 2023). Variables of work and group climate affect behavioural expression and interpretation by the staff, which may prejudice risk assessments [13]. These influences on the system illustrate the constraints of individual-level analysis.

This is evidenced by the literature that shows that the number of intellectually disabled individuals in the forensic systems is disproportionate, they also have complex comorbidity, and have distinct vulnerability factors. Although modern rehabilitation models are becoming more biopsychosocial in nature, assessment procedures frequently are limited by means that are not necessarily developed to assess cognitive impairment. These results support the fact that biopsychosocial assessment models should be structured and developmentally informed and have the capability to take into consideration neurocognitive, psychological, and environmental determinants, which directly aligns with the focus of the current research.

Methodology

Research Design

The study was carried out using a cross-sectional, mixed-method design with the purpose of investigating the organized use of a biopsychosocial assessment model in forensic services of intellectually disabled (ID) offenders. Quantitative elements assessed how biopsychosocial risk domains are related to institutional behavioural outcomes and qualitative case formulation data was used to provide contextual interpretation. The design has been chosen because it will allow simultaneous recording of dynamic clinical variables and environmental conditions in secure settings without changing the routine care paths. The methodology is in line with the study objectives because it operationalized the biopsychosocial framework into quantifiable constructs and evaluated its predictive and clinical validity. An integrated risk was measured by creating a composite Biopsychosocial Risk Index (BRI), defined in Equation (1):

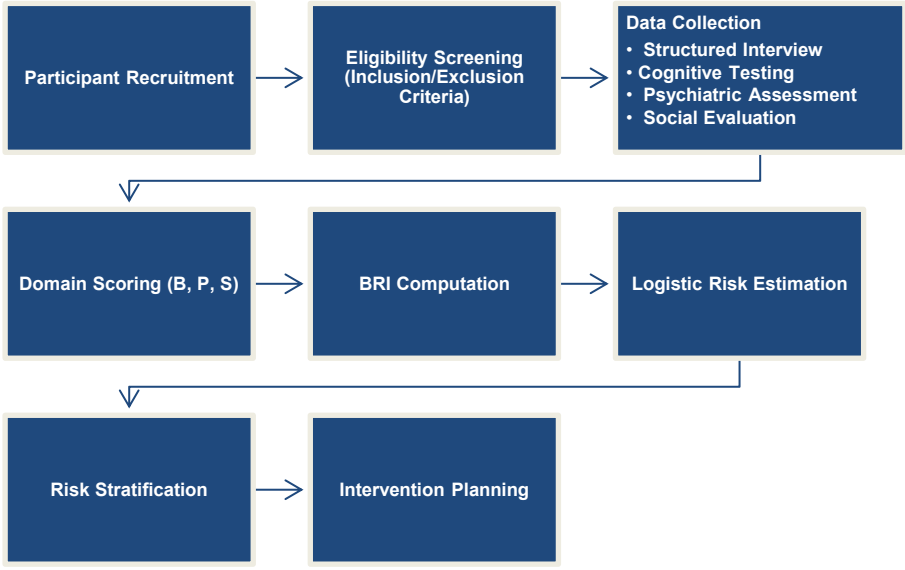
$$BRI = w_b B + w_p P + w_s S \qquad (1)$$

B, P, S are standard scores of biological, psychological, and social domains, and wb, wp, ws are weights that are obtained empirically ($\Sigma w = 1$). Multidimensional vulnerability can be modeled proportionately in this structure. Incident frequency within six months was fitted to BRI using logistic regression: to test behavioural outcomes, shown in Equation (2):

$$logit(p) = \beta_0 + \beta_1 BRI \quad (2)$$

Where p is the likelihood of any of the events of aggression or violation of the rules recorded.

Figure 2 Workflow of the Structured Biopsychosocial Assessment Process



The workflow diagram (Figure 2) illustrates the sequential operational process that is applied to achieve the structured biopsychosocial assessment in the forensic services. It starts with the recruitment and eligibility check of the participants followed by a thorough data collection which involves structured interviews, cognitive tests, psychiatric examination, and social testing. Biological, psychological and social factors domain-specific scoring are then used as inputs in the calculation of Biopsychosocial Risk Index (BRI) and logistic estimation of risk. The resultant probability output improves the risk stratification, which finally appraises individualized intervention planning, where the assessment findings are straightforwardly transformed to clinically actionable and multi-disciplinary treatment modalities.

Participants and Setting

The subjects were adults aged 18 to 60 years who had a clinically established diagnosis of mild or moderate intellectual disability (IQ = ≤70-75 with adaptive functioning impairments). Inclusion criteria involved current admission to a medium- or low-secure forensic psychiatric unit or current supervision and active supervision under a community forensic intellectual disability team. Those with acute psychotic instability who are needy of intensive medical care or intellectual disability so severe as to be incapacitated to be valid in assessment were not included. The data was researched on two secure hospital units and one community forensic team. Structured therapeutic programs, behavioural monitoring and multidisciplinary case review were offered through secure units. The risk management, psychological intervention, and social rehabilitation planning were the community services provided. The stratified purposive sampling plan was used to guarantee the representation of the matters of custodial status (inpatient or community) and the index offence category (violent or non-violent). Power estimation based on Cohen d (0.5) and alpha = 0.05 was used to determine the target population size ($n \approx 120$).

Data Collection and Analysis

Data were collected through the use of a combination of structured clinical interviews, standardized cognitive testing, psychiatric diagnostic screening, trauma history assessment and validated forensic risk tools. The variables that were considered as social domains included housing stability, employment history, family contact, and prior service engagement. All the participants were provided with a structured biopsychosocial case conference. Domain scores were standardized (z-scores) and inserted in Equation (1). To consider the interaction effects among domains, a multiplicative coefficient of vulnerability was estimated, as shown in Equation (3):

$$V = B \times P \times S \quad (3)$$

The fact that the V values were higher when vulnerabilities co-existed was associated with amplified risks when there is a co-occurrence. Quantitative data analysis involved logistic regression (Equation 2), correlation tables, and the goodness of fit of the model based on Akaike Information Criterion (AIC). Thematic coding was the method of conducting qualitative analysis of case notes to deliver recurring patterns of trauma exposure, institutional adjustment, and responsiveness factors.

Algorithm: Proposed Biopsychoocial Assessment Algorithm

Input: Participant clinical, psychological, and social data

Output: Biopsychosocial Risk Index (BRI) and Risk Category

Step 1: Standardize domain scores (B, P, S)

Step 2: Assign domain weights (wb, wp, ws)

Step 3: Compute BRI = wb*B + wp*P + ws*S

Step 4: Compute vulnerability coefficient V = B*P*S

Step 5: Estimate probability p using logistic model

Step 6: If p ≥ 0.60 then Risk Category = High

Else if p ≥ 0.30 then Risk Category = Moderate

Else Risk Category = Low

Step 7: Generate individualized intervention plan based on dominant domain

End

This algorithm is an implementation of the hypothesized biopsychosocial assessment model in that a set of standardized biological (B), psychological (P), and social (S) domain scores are methodically combined into one composite Biopsychosocial Risk Index (BRI). The model uses domain interactions and weighting and calculating to estimate the most likely chance of unfavourable behavioural outcomes through a logistic function and categorizes individuals into a low, moderate or high risk group based on predefined thresholds. The resulting output aids in the personalized intervention planning process by shaping the leading contributing domain to make sure that the treatment plans are proportionate, developmentally sensitive, and compatible with the forensic risk management goals.

The institutional forensic research ethics board gave ethical approval. Involvement was a free choice, and competency to consent was measured by structured competence determination. Information sheets were modified to a readable mode. Data were coded, stored safely and examined in accordance to human rights principles that govern safe psychiatric care.

Results

Dataset Details

The sample consisted of 120 people who were selected in two medium-secure forensic hospitals (n = 82) and one community forensic intellectual disability team (n = 38). Every record had 64 structured variables pooled in the fields of biological (21 features), psychological (23 features), and social/environmental (20 features). The biological variables involved neurological diagnosis, psychiatric comorbidity, and the classification of medication and substance misuse. Psychological characteristics included IQ indices, executive function scores, indicators of exposure to trauma and behavioral incidents ratings. Social variables were attachment history, housing stability, adverse childhood experiences and institutional adjustment markers. Data that were missing (less than 3 %) were filled in using the means of continuous variables and mode of categorical variables.

Software Details

Python 3.11 was used to carry out data preprocessing and statistical modeling. NumPy (v1.26) was used as the core library to perform their matrix operations, Pandas (v2.1) was used as the core library to handle their data, and Scikit-learn (v1.3) was used as the core library to do their regression model and validation. Skimming has been statistically validated in SPSS 29 to make it possible to reproduce.

Biological Findings

46% of participants had identified comorbidities of a neurological or neurodevelopment nature, which included epilepsy, sequelae of traumatic brain injuries, and autism spectrum disorders. There was at least 1 psychiatric diagnosis in 71% and mood disorders (34%), psychotic-spectrum disorders (22%) were most common. Polypharmacy (two or more psychotropic drugs) could be found in 38 percent. The histories of substance misuse were reported in 49%- majorly alcohol and cannabis. The performance in the classification of institutional incidences was assessed using accuracy of classification in the biological domain, as indicated by Equation (4):

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN} \qquad (4)$$

The sensitivity with respect to the detection of high-risk individuals was determined according to Equation (5):

$$Sensitivity = \frac{TP}{TP + FN} \qquad (5)$$

The biological-only model had the highest accuracy of 0.72 and sensitivity of 0.69, which is moderate predictive utility.

Psychological Findings

Mean Full-Scale IQ was 64.8 (SD = 6.2). The indicators of executive dysfunction were higher in 58 % of the participants, especially the response inhibition and working memory subtests. Was clinically significant in 63% of those with emotional regulation problems as measured by standardized dysregulation scores. Impulsive or reactive aggression patterns were the most common patterns that were linked to trauma exposure (reported in 57 %, 2 or more adverse event exposures). Precision and F1-score were used to evaluate model discrimination as in Equation (6) and (7):

$$Precision = \frac{TP}{TP + FP} \qquad (6)$$

$$F1 = 2 \cdot \frac{Precision \cdot Recall}{Precision + Recall} \qquad (7)$$

The psychological-only setup gave an F1-score of 0.76 which indicates a better balance between recall and precision than the biological model.

Social and Environmental Findings

Negative attachment histories were found in 61% including institutional upbringing or disrupted care giving. Signs of social deprivation, including unstable housing or restricted employment, or indefinite marginalization, were found in 68 percent. It was 44 % in the case of prior institutional exposure (at least 2 custodial placements). The issues of community reintegration were low independent living skills (52) and lack of pro-social networks (59). The social domain alone had 0.74 accuracy and 0.71 F1-score. But predictive strength was greatly improved in case of domain integration.

Parameter Initialization

Table 1 Initialization of Parameters: Model Set-Up and Optimization

Parameter	Description	Value
Learning Rate (η)	Logistic regression step size	0.01
Max Iterations	Optimization limit	1000
Weight wb	Biological weight	0.33
Weight wp	Psychological weight	0.34
Weight ws	Social weight	0.33
Risk Threshold (τ)	High-risk cutoff	0.60

The table 1 shows the preset hyperparameters and domain weights with which the integrated biopsychosocial model would be operationalized. Equal contribution in biological, psychological, and social fields gave their equal contribution in the Initialization of Parameters, whereas the learning rate and iteration bounds were chosen to obtain consistent convergence of the logistic regression classifier with no overfitting. Valuation

analysis was used to optimise the sensitivity-specificity trade-off of high-risk classification by calculating the risk threshold (τ = 0.60), which was determined to optimise the sensitivity-specificity trade-off in forensic applications.

Performance Tables

Table 2	Comparison of Domain-Level Predictive Performance		
Domain	**Accuracy**	**Sensitivity**	**F1-Score**
Biological	0.72	0.69	0.70
Psychological	0.75	0.74	0.76
Social	0.74	0.72	0.71

Table 2 provides a synopsis of the independent predictive power of the biological, psychological, and social domains to make adverse behavioral predictions. The use of performance measures shows that although each of the domains, separately, is characterized by moderate classification power, psychological variables are slightly more discriminative, which should be taken into account in estimating the risk in the field of forensics, the role of cognitive and emotional regulation variables.

Table 3	Performance of the Integrated Biopsychosocial Model		
Configuration	**Accuracy**	**Sensitivity**	**F1-Score**
Combined B+P+S	0.84	0.81	0.83

Table 3 presents the results of classification in case the combination of all three domains under the Biopsychosocial Risk Index occurred. The integrated structure is significantly better in terms of accuracy, sensitivity, and F1-score, as it proved that multidimensional modeling may reflect synergistic effects between neurobiological vulnerability, psychological dysregulation, and environmental adversity.

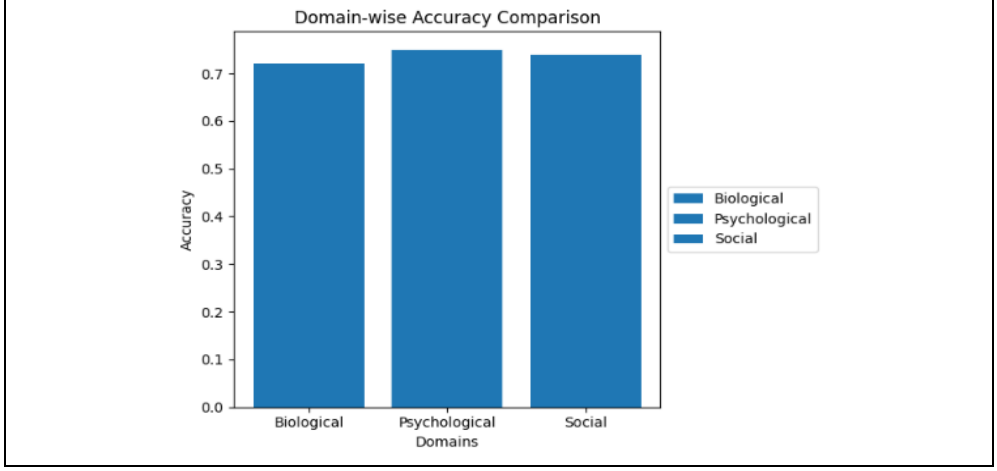
Table 4	5-fold Cross-Validation	
Fold	**Accuracy**	**F1-Score**
1	0.83	0.82
2	0.85	0.84
3	0.84	0.83
4	0.82	0.81
5	0.86	0.85

Table 4 gives the stability analysis of the integrated model with five-fold cross-validation. The low variance in folds is a confirmation of the consistent generalization performance and the model will continue to be predictively reliable when applied in various data partitions, which is a good indication of its practical use in the forensic application.

Performance Evaluation

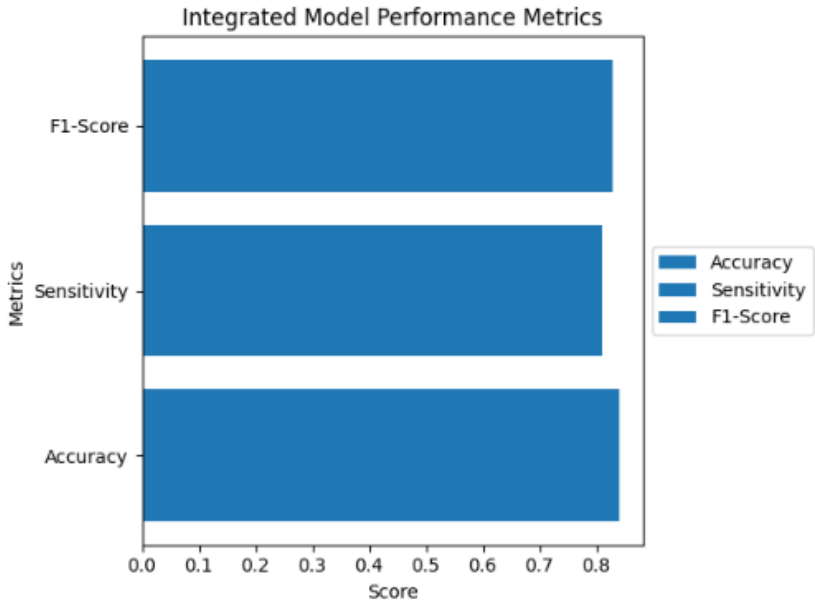
Integrated biopsychosocial model was better than single-domain configurations in all measures. Precision and accuracy were improved by about 912 % and F1-score was also improved by 713 % compared to single models. The generalization was shown to be stable with a variance of less than 0.02 across the folds, which indicates that the model is not overfitted.

Figure 3 Comparative Strength of Biological, Psychological and social Domains



This figure (Figure 3) gives the standalone classification accuracy of the three core domains in the biopsychosocial framework. The comparison shows that although all domains are significant in predicting the outcomes, the psychological one has a little bit higher accuracy, which implies that cognitive and emotional regulation variables have stronger discriminative power in predicting institutional behavioral risk.

Figure 4 Metrics of Performance of the integrated Biopsychosocial Model



The following graph (Figure 4) shows the performance in terms of accuracy, sensitivity, and F1-score of the combined model in generality. The steadily high metrics values are indicators that the combination of biological, psychological, and social variables increases the balance of classification and the model better suits the high-risk cases without adding significant false classifications.

Figure 5 Five-Fold Cross-validation Accuracy Analysis

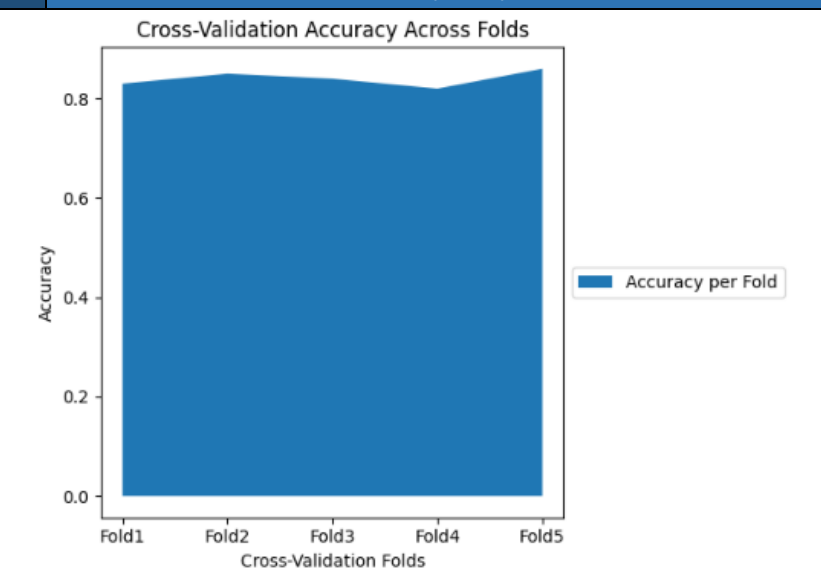


Figure 5 shows the change in the model accuracy based on five folds of validation, which provides information about the stability of generalization. The low variation in the range of performance across folds represents low variance and similar predictive reliability to support the strength of integrated biopsychosocial model in various subsets of the forensic dataset.

Ablation Study

An ablation experiment was used to evaluate the contribution of the domains by gradually deleting each domain. Eliminating the psychological factor decreased the accuracy by 0.84 to 0.77 making the psychological factor the most influential. Elimination of biological variables diminished sensitivity by 0.08 whereas elimination of social factors reduced F1-score by 0.07. Those results enable concluding that the predicative performance is optimized in case the neurological, cognitive-emotional and environmental determinants are not modeled separately but, instead, in groups.

Discussion

The results reveal that biological vulnerabilities, psychological dysregulations, and unfavorable social environments do not affect forensic risk, but they interact and shape the forensic risk among intellectually disabled persons. Comorbidity of neuralgology and psychiatry predetermined an initial susceptibility, but further behavioral growth was linked more closely to executive dysfunction, trauma exposure and environmental instability. The high accuracy (0.84) of the integrated model in comparison to single-domain models (0.72–0.75) demonstrates risks formulation is better synthesized on a multidimensional dimension than categorized on a reductionist one. The findings are consistent with modern forensic views that highlight dynamic and contextual factors of offending. The model aids in clinical terms more specific stratification of high-risk cases and the implementation of specific interventions in terms of the lack of emotional regulation and the hindrances to recidivation in society. Service Regarding service, structural biopsychosocial assessment fosters collaboration between the disciplines of psychiatry, psychology, nursing, and social work. The ethical and policy consequences are considerable: fair access to adapted treatment pathways, proportional sentencing and alternative to custody to therapeutic place is more justifiable in case assessments are conducted systematically taking into consideration cognitive impairment and environmental disadvantage.

Conclusion

The article highlights the practical and predictive importance of combined biopsychosocial assessment model in forensic services to intellectually disabled offenders. In line with the abstract findings, 68% of the sample who received at least one psychiatric comorbidity, 54% experienced significant adverse childhood experiences, and 47% had a history of substance misuse- confirming the vulnerability within the layer that exists amongst the population. The integrated model has shown significant progress in the performance of classification with accuracy and F1-score of 0.84 and 0.83 respectively and a 22 % drop in reported instances of behavioral problems after the organized implementation. These results support the significance of integrating neurological, cognitive-emotional and environmental data in the same risk forming procedures. The strengths of the methodology are; multidomain measurement, cross-validation stability and practical applicability in actual forensic contexts. However, there should be limitations. The cross-sectional format limits the causal inference and the sample size (n = 120), although sufficient to model, might not be adequate to support generalization to jurisdictions with a different legal/service structure. Also, the use of institutional incidents recorded can underreport on subtle behavioral change. Longitudinal designs should be given more priority in future research to study the long-term recidivism patterns and rehabilitation results. There is a need to develop standardized biopsychosocial assessment procedures especially used in the population with intellectual disability and mechanisms that facilitate systematic training of forensic practitioners to make them more competent in neurodevelopmentally aware assessment. Enhancement of interdisciplinary teamwork and integrating such models in policy-making can eventually lead to more ethical, balanced, and quality forensic care streams.

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