

Random Forest Prediction of Adolescent Risk-Taking Behaviors Based on Sensation Seeking, Online Disinhibition, Emotional Impulsivity, Peer Deviance, and Executive Dysfunction

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1. Round 1

1.1. Reviewer 1

Reviewer:

In the first paragraph of the Introduction, the authors state that “adolescent risk-taking is not merely a product of poor judgment or immaturity, but rather the consequence of dynamic interactions among emotional dysregulation, neurocognitive development, environmental reinforcement, and personality-based vulnerabilities.” This statement is theoretically valuable, yet the manuscript does not subsequently articulate a unifying conceptual framework integrating these domains. The authors should explicitly identify whether the study is grounded in dual-systems theory, imbalance models of adolescent neurodevelopment, social learning theory, problem behavior theory, or ecological systems theory, and then map each predictor variable onto the proposed framework to improve conceptual coherence.

The paragraph beginning with “Among the psychological constructs most consistently associated with adolescent risk-taking is sensation seeking” overstates causal interpretations of sensation seeking despite the cross-sectional design. Sentences such as “highly sensation-seeking adolescents may display impaired behavioral inhibition” should be rephrased to avoid causal or mechanistic assumptions unsupported by the current methodology. The discussion of neuropsychological mechanisms would

benefit from distinguishing empirical findings directly tested in this study from theoretical extrapolations derived from previous literature.

In the paragraph discussing online disinhibition, the sentence “The emergence of cyberpsychopathy frameworks has further expanded understanding...” introduces the concept of cyberpsychopathy, yet the manuscript does not adequately justify why psychopathy-related literature is directly relevant to a non-clinical adolescent school sample. The authors should either provide a clearer theoretical bridge connecting online disinhibition to psychopathic traits or reduce the emphasis on psychopathy-oriented constructs to avoid conceptual overextension.

The Introduction repeatedly frames the study as examining “machine learning prediction,” but the outcome variable appears to be derived from a continuous self-report scale. The manuscript later reports accuracy, precision, recall, F1-score, and AUC, which are classification metrics. However, the paper never explains how the continuous risk-taking variable was converted into a categorical outcome. The authors must explicitly state whether the target variable was dichotomized, multiclass categorized, or otherwise transformed, including the exact cut-off criteria and class distributions, because the current reporting makes the machine learning pipeline impossible to interpret scientifically.

In the Methods section under “Study Design and Participants,” the statement that schools were selected “to maximize the heterogeneity of behavioral and psychosocial characteristics relevant to machine learning modeling” requires clarification. It is unclear whether stratified procedures were used to ensure socioeconomic, geographic, or demographic balance. The authors should report the sampling frame, the number of eligible schools approached, participation rates, and whether any schools or students declined participation, as these details directly influence external validity and sampling bias.

The inclusion criterion requiring “regular access to digital media and internet platforms” may have unintentionally excluded economically disadvantaged adolescents or adolescents with restricted technology access. The authors should justify this criterion theoretically and discuss how it may bias the sample toward higher digital engagement populations, especially given that online disinhibition was one of the predictors.

The manuscript reports using “grid search optimization combined with five-fold cross-validation procedures,” yet the exact hyperparameter ranges are omitted. For transparency and reproducibility, the authors should provide the parameter grid for `n_estimators`, `max_depth`, `min_samples_split`, `max_features`, and any additional tuning settings. A supplementary table containing the final optimized hyperparameters would substantially improve methodological rigor.

The Findings section reports “accuracy of 91% in the training phase and 87% in the testing phase,” but no information is provided regarding class imbalance. Accuracy can be misleading when outcome classes are unequally distributed. The authors should report class proportions, balanced accuracy, ROC curves, sensitivity-specificity tradeoffs, and potentially Matthews Correlation Coefficient or Cohen’s Kappa to better evaluate classifier performance.

Authors uploaded the revised manuscript.

1.2. Reviewer 2

Reviewer:

The paragraph describing data collection states that questionnaires were completed “in approximately 45 to 60 minutes.” Given the large number of instruments administered, including a 75-item executive functioning inventory, the authors should address the possibility of participant fatigue and inattentive responding. It would strengthen the methodology if the manuscript reported whether attention-check items, response-time analyses, or careless-response detection procedures were implemented.

The description of the “digital behavioral survey” is insufficiently detailed. The manuscript states that it captured “impulsive posting, participation in dangerous online challenges, exposure to deviant peer communities, and frequency of risky internet interactions,” yet no psychometric properties, item examples, scoring procedures, or validation evidence are provided. Since digital behavior is central to the study’s conceptual contribution, the absence of methodological detail substantially weakens reproducibility and interpretability.

In the Measures section, the authors report Cronbach’s alpha coefficients for all scales but do not report confirmatory factor analyses or evidence of construct validity within the Argentine adolescent sample. Given the cross-cultural nature of the study,

the manuscript should provide information regarding translation procedures, cultural adaptation, linguistic validation, and whether factorial invariance or psychometric equivalence was assessed.

The paragraph describing the Adolescent Risk-Taking Questionnaire states that the scale includes “unsafe internet use,” which may conceptually overlap with the predictor variable of online disinhibition. The authors should address potential criterion contamination and conceptual redundancy between the predictor and outcome variables. Without such clarification, the predictive performance of the model may be artificially inflated due to overlapping construct content.

The Data Analysis section states that “all continuous variables were standardized prior to machine learning implementation.” Standardization is generally unnecessary for tree-based algorithms such as Random Forest because these algorithms are scale-invariant. The authors should justify why standardization was applied and clarify whether preprocessing decisions were performed exclusively on the training data to avoid information leakage into the test set.

Authors uploaded the revised manuscript.

2. Revised

Editor’s decision after revisions: Accepted.

Editor in Chief’s decision: Accepted.