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CatBoost Prediction of Social Anxiety Among Students with Specific Learning Disabilities: Contributions of Rejection Sensitivity, Self-Compassion, and Peer Victimization

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1. Round 1

1.1. Reviewer 1

Reviewer:

The paragraph stating “One of the most influential interpersonal factors associated with social anxiety is rejection sensitivity” provides theoretical justification but lacks a clear conceptual model linking rejection sensitivity, peer victimization, self-compassion, and social anxiety. A conceptual framework figure illustrating the hypothesized relationships among variables would substantially strengthen the theoretical coherence of the study.

In the final paragraph of the Introduction, the sentence “The present study sought to address these gaps by employing a CatBoost machine learning model…” should be expanded to include explicit research questions or hypotheses. Although machine learning studies are often prediction-oriented, articulating expected directions of relationships would improve scientific rigor and alignment with the theoretical literature.

Within the "Study Design and Participants" section, the authors report that "A total of 428 students participated in the study." However, no justification for sample size adequacy is provided. A priori power analysis, learning-curve analysis, or machine-learning-specific sample size rationale should be included to demonstrate that the sample was sufficient for stable model development and validation.

Regarding Table 2, the reported performance indices are encouraging; however, model evaluation would be considerably strengthened by comparison with baseline algorithms. The authors should compare CatBoost performance against alternative machine learning approaches such as Random Forest, XGBoost, LightGBM, Support Vector Regression, or linear regression to demonstrate the added value of selecting CatBoost.

In the Results section, the sentence "The small discrepancy between training and testing performance metrics suggested minimal overfitting" requires quantitative support. The authors should report cross-validation performance statistics, confidence intervals, or repeated-validation results to substantiate claims regarding model generalizability and stability.

Table 3 presents feature importance values of 41.82%, 34.67%, and 23.51%, yet the manuscript does not specify whether these values are based on gain, split frequency, prediction value change, or another CatBoost importance metric. The exact feature importance calculation method should be clearly reported.

Authors revised the manuscript and uploaded the document.

1.2. Reviewer 2

Reviewer:

The sentence "Participants were recruited from public and private educational institutions that offered specialized educational support programs" requires additional methodological detail. The authors should explain the sampling strategy (random, stratified, convenience, or purposive sampling), recruitment procedures, participation rate, and number of schools involved to allow readers to assess selection bias and representativeness.

In the Measures section, the description of the Social Anxiety Scale for Adolescents (SAS-A) omits psychometric information specific to the current sample. The authors should report internal consistency coefficients (e.g., Cronbach's alpha or McDonald's omega) for each instrument within the present dataset rather than relying exclusively on prior validation studies.

The paragraph describing the Rejection Sensitivity Questionnaire states that "Composite scores are calculated according to the developers' scoring procedures." This description is insufficiently precise. The manuscript should explicitly present the scoring formula, computation process, and possible score range to facilitate methodological transparency and replication.

In the Data Analysis section, the authors indicate that "Missing data were minimal and were addressed using multiple imputation procedures." However, the percentage of missing values, number of imputations, imputation algorithm, and diagnostics used to assess imputation quality are not reported. These details are necessary for evaluating the robustness of the dataset preparation process.

The statement "Data preprocessing procedures included standardization of continuous variables" raises methodological concerns because CatBoost is generally insensitive to feature scaling. The authors should justify the decision to standardize variables and clarify whether preprocessing was conducted before or after train-test splitting to avoid potential data leakage.

In the paragraph beginning "The dataset was randomly divided into training and testing subsets using an 80:20 ratio", additional information regarding random seed selection and reproducibility procedures is needed. Reporting the random state used during dataset partitioning would improve transparency and allow independent verification of results.

Table 1 reports correlations such as "Rejection Sensitivity demonstrated a strong positive correlation with social anxiety (r = .69)". Given these relatively large correlations, the manuscript should report multicollinearity diagnostics including variance inflation factors, tolerance values, and condition indices rather than simply stating that multicollinearity thresholds were not exceeded.

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2. Revised

Editor's decision: Accepted.
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