

Explainable AI Analysis of Cognitive Distortions and Their Predictive Role in Adolescent Major Depressive Episodes

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1. Round 1

1.1. Reviewer I

Reviewer:

The manuscript reports forward-backward translation of the Adolescent Cognitive Distortions Inventory but does not describe confirmatory factor analysis or measurement invariance testing in the Georgian context. Given the cross-cultural emphasis in the Introduction, please report CFA indices (CFI, TLI, RMSEA) or justify their omission.

In the paragraph describing multistage cluster sampling across Tbilisi, Kutaisi, and Batumi, please specify whether urban/rural stratification was considered and whether school socioeconomic status was controlled. Without this clarification, representativeness claims remain limited.

Although stratified sampling is mentioned for training/testing splits, the manuscript does not report the prevalence ratio of depressive vs. non-depressive cases in each subset. Please provide confusion matrices and class distribution metrics to assess potential imbalance effects.

The ROC curve figure is referenced but lacks explicit confidence intervals around AUC. Please include 95% CI for AUC and annotate sensitivity/specificity at the optimal Youden index.

Authors uploaded the revised manuscript.

1.2. Reviewer 2

Reviewer:

The paragraph following Table 2 states that correlations did not exceed 0.80 and therefore multicollinearity was absent. However, no variance inflation factor (VIF) or tolerance statistics are reported. Please include VIF values, particularly for tree-based model inputs.

The manuscript indicates that demographic covariates were collected but does not clearly state whether these variables were included in the final predictive models shown in Table 3. Please clarify the modeling pipeline and whether covariates improved AUC.

While hyperparameter tuning is mentioned, no details are provided (e.g., learning rate, max_depth for XGBoost, C and gamma for SVM). For reproducibility, please include a supplementary table listing optimized parameters.

The statement “indicating excellent discrimination” should be contextualized with calibration performance (e.g., Brier score, calibration curve). High AUC does not guarantee well-calibrated probability estimates, especially in clinical screening contexts.

The manuscript states that depression probability increased sharply beyond the 75th percentile for catastrophizing. Please provide the exact SHAP dependence plot slope or odds ratio shift to quantify this threshold effect rather than relying on descriptive wording.

Authors uploaded the revised manuscript.

2. Revised

Editor's decision after revisions: Accepted.

Editor in Chief's decision: Accepted.