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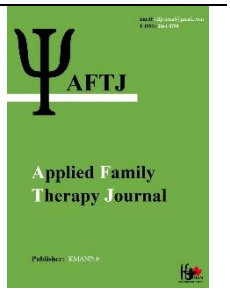

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Explainable AI Prediction of Parenting Self-Efficacy from Socio-Emotional Family Dynamics

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1. Round 1

1.1. Reviewer 1

Reviewer:

In the paragraph beginning with “Recent empirical studies have increasingly emphasized…”, the manuscript integrates multiple constructs but lacks a brief conceptual framework explicitly outlining the hypothesized relationships among emotional regulation, relational dynamics, stress, and parenting self-efficacy.

The sentence “Traditional regression approaches… struggle to accommodate these high-dimensional interactions” should include a short methodological explanation of which statistical limitations are most problematic (e.g., multicollinearity, interaction proliferation, nonlinearity).

When introducing explainable AI, the authors should justify the selection of SHAP and LIME over alternative interpretability approaches, clarifying their relative advantages for psychological research.

The description “Participants were recruited using a multi-stage cluster sampling strategy” lacks operational detail. Please specify the number of clusters, approximate cluster size, school selection criteria, and regional response rates.

The manuscript reports “Cronbach’s alpha coefficients ranging from 0.78 to 0.92” but does not provide reliability estimates for each instrument individually. These should be reported separately for transparency.

While highlighting methodological advances, the authors should also discuss computational cost, interpretability trade-offs, and clinical feasibility of implementing such models in real practice.

Response: Revised and uploaded the manuscript.

1.2. Reviewer 2

Reviewer:

In the sentence “Feature selection was conducted using mutual information and recursive feature elimination”, the final number of retained predictors and the specific selection thresholds should be reported to allow replication.

Clarify whether feature selection and hyperparameter tuning were conducted exclusively within training folds during nested cross-validation, ensuring that the test set remained completely independent.

The claim “These distributions provided adequate variability” would be strengthened by reporting skewness, kurtosis, and normality diagnostics.

Model performance reporting should include confidence intervals for R^2, RMSE, and MAE to provide information about the stability of estimates.

Please clarify whether the SHAP importance values represent mean absolute contributions and how they were aggregated across cross-validation folds.

The interpretation of ΔR^2 interaction effects would benefit from reporting confidence intervals or significance testing for these incremental contributions.

The manuscript refers to the SHAP summary plot but does not sufficiently guide the reader in interpreting key visual patterns such as color gradients, dispersion, and interaction structure.

The assertion that “stress operates as a central regulatory force within the family system” should be explicitly anchored within established family systems or transactional frameworks.

The buffering role of emotion regulation is compelling; however, the authors should discuss whether this effect appears linear or threshold-based given the nonlinear modeling strategy.

Response: Revised and uploaded the manuscript.

2. Revised

Editor’s decision after revisions: Accepted.

Editor in Chief’s decision: Accepted.

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