

Construction and Validation of a Machine Learning-Based Risk Prediction Model for Sleep Quality in Patients with OSA [Response to Letter]

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Dear editor

We appreciate the thoughtful letter and constructive feedback from Wan et al regarding our article

Construction and Validation of a Machine Learning-Based Risk Prediction Model for Sleep Quality in Patients with OSA.^{1,2}

On the Modeling of Temporal Dynamic Features of Oxygen Desaturation (ODI)

We acknowledge the observation that our current model utilizes static features (eg, median ODI) and does not incorporate dynamic temporal features like REM-related clustering. While incorporating such features (eg, minute-by-minute oximetry sequences) may indeed enhance sensitivity to specific OSA subtypes, our aim in the present study was to develop a parsimonious and clinically interpretable model using routinely collected indicators. Nonetheless, we recognize this as an important future direction and agree that the integration of temporal deep learning architectures such as LSTM is promising.

On Potential Overfitting (AUC=1.0 in Training Set)

We agree that an AUC of 1.0 in the training set raises concerns regarding overfitting. In our modeling pipeline, we employed L2 regularization, 10-fold cross-validation, and early stopping to minimize this risk. However, we concur that multi-center validation is critical and appreciate the recommendation to incorporate transfer learning from open-source datasets to improve generalizability.

On Male Sample Dominance and Generalizability

Indeed, our sample was predominantly male (~90%), reflecting local OSA diagnosis patterns. We recognize this as a limitation and are currently expanding data collection to achieve more balanced sex representation.

On Clinical Translation of SHAP Values and Feature Interactions

We appreciate the comment that SHAP values, while helpful for interpretation, may not fully capture feature interactions, especially synergistic mechanisms like depression–ODI interactions. Our exploratory SHAP interaction analysis did suggest potential synergy, but we agree that longitudinal studies and visual analytics tools (eg, risk dashboards) would strengthen clinical applicability.

Thank you again for the insightful comments, which align with our own plans for future model development.

Data Sharing Statement

No new data were created or analyzed in this communication. Data sharing is not applicable.

Author Contributions

BG – Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing, Supervision. The author agrees on the journal on which this communication was submitted, agrees on the final version accepted for publication, and agrees to take responsibility and be accountable for the contents of this communication.

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Disclosure

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