

Codesigning a Clinical Prediction Model for Aboriginal Perinatal Mental Health Using Glassbox AI and Aboriginal Wisdom and Lived Experience

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Abstract. Perinatal mental health is vital for mothers, infants, and families. Aboriginal mothers, despite their strengths, face greater mental health disparities due to colonisation and trauma. Traditional screening methods lack cultural sensitivity. The Baby Coming You Ready (BCYR) program offers a culturally sensitive assessment with promising pilot results. To support health professionals, an AI solution using the Explainable Boosting Machine (EBM) is proposed, trained with Aboriginal lived experiences. This model identifies maternal protective and risk factors, offering interpretable predictions for holistic culturally sensitive care.

Keywords. perinatal mental health, Aboriginal health, artificial intelligence

1. Introduction

Perinatal depression and anxiety greatly impact maternal and infant health, potentially leading to severe outcomes like preterm birth and suicide [1]. Despite their resilience, Aboriginal women face increased risks due to the lasting effects of colonisation and cultural disruption. Conventional health systems often lack cultural sensitivity and can retraumatise Aboriginal women. The Baby Coming You Ready (BCYR) program offers a strengths-based, culturally safe perinatal screening that considers the seven elements of Aboriginal social and emotional wellbeing [2]. But, health professionals may lack confidence in assessments and rely too heavily on psychological risk scores. To address this, Aboriginal knowledge was integrated with AI to develop a culturally safe, strengths-focused clinical prediction model. This model identifies and weighs maternal protective and risk factors, offering an interpretable decision-making process for holistic assessment.

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2. Methods

The BCYR pilot study (Sep. 2021 - Jun. 2023) offers a de-identified dataset of 293 Aboriginal mothers from twelve perinatal healthcare settings in Western Australia. Perinatal mental health indicators are derived from the Kessler five-item psychological distress scale (K5). Following feature selection and expert review, 20 predictors and one output variable were chosen for model construction using the glassbox Explainable Boosting Machine (EBM) model [3].

3. Results

The EBM achieved a prediction accuracy of 0.849 and an AUC of 0.821, demonstrating strong predictive power. The visual explanations were generated from the EBM, showcasing both global feature importance across the full dataset and local explanations for individual cases. This approach highlights the specific contributions of each feature and their interactions in the model's predictions.

4. Conclusions

The model shows promise in predicting and understanding Aboriginal mothers' perinatal mental health. Continuous collaboration informed by Aboriginal wisdom will further improve the model. This AI-assisted clinical prediction guide for clinicians and mothers could facilitate identifying maternal protective factors, accurately assessing overall risks, enhancing support relevance, minimising unnecessary child protection notifications, and improving care quality and clinician confidence.

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