

The Best AI Predictor Isn't Data

It's when and how patients engage with mindfulness interventions.

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THE DATA

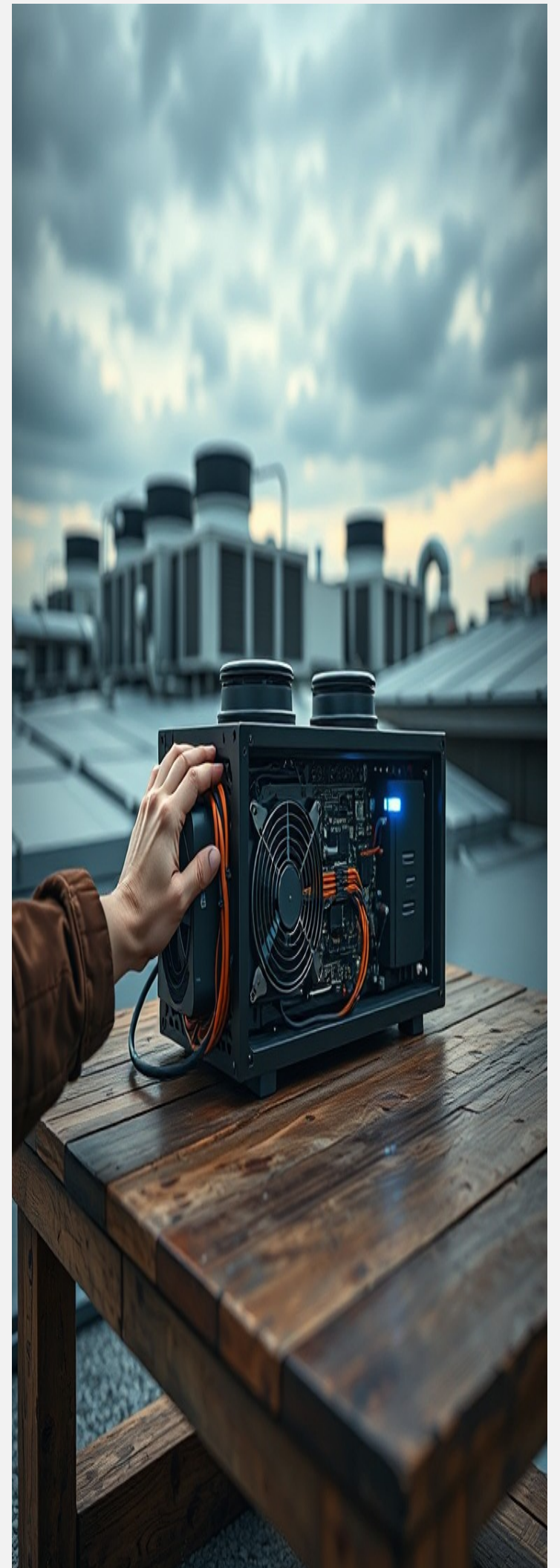
5.038

RMSE at 24 weeks

LightGBM achieved the best 24-week performance in predicting depression outcomes after mindfulness interventions.

This RMSE score reflects the model's predictive accuracy in estimating Beck Depression Inventory-II (BDI-II) scores 24 weeks post-intervention. The low error rate indicates that long-term outcomes are not only predictable but also governed by consistent behavioral and contextual factors—key for designing AI systems that adapt over time.

Source: arXiv • Published September 19, 2026
<https://arxiv.org/abs/2610.08809>



01

Timing Beats Baseline Severity

While baseline depression severity remains the strongest overall predictor, short-term outcomes are more strongly influenced by clinical and hospital context. This suggests that AI models for mental health should prioritize temporal dynamics—when and where care is delivered—over static patient profiles. For sovereign AI labs, this means embedding real-time environmental context into inference engines, not just historical data.

02

Adherence Drives Long-Term Success

Long-term outcomes show greater dependence on behavioral adherence and demographic factors. This implies that AI systems supporting mindfulness interventions must monitor and adapt to user engagement patterns—such as session frequency and duration—not just symptom severity. For self-hosted AI stacks, this calls for lightweight, on-prem behavioral tracking tools that respect privacy while enabling adaptive feedback loops.



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