Baseline Symptom Profile Does Not Predict Early Response to Electroconvulsive Therapy (ECT) in Major Depressive Disorder (MDD)

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Introduction

- Electroconvulsive therapy (ECT) is currently one of the most effective treatments for depression. [1]
- Some clinicians use previously researched "clinical predictors," such as age and melancholic features, to help determine whether their patients are likely to respond early to ECT. [2]
- However, there is conflicting evidence to support this practice. [3-6]
- Given that some clinicians use these factors to recommend ECT to their patients, it is reasonable to deduce that some providers are not recommending ECT to those who do not meet these predictor variables.

Objective

- We performed a retrospective chart review using one of the largest existing datasets of ECT patients to determine whether any particular symptom profile can predict rapid ECT response.

Methodology

- 2142 treatment-seeking patients at McLean Hospital were assessed using the Quick Inventory for Depressive Symptomatology (QIDS) and Behavior And Symptom Identification Scale (BASIS-24) scores at baseline and after five ECT treatments.
  - BASIS-24 is a validated scale which was developed at McLean and is frequently used there to assess mental health treatment outcomes.
- Outcomes included 1) percentage improvement in overall depression severity and 2) "responder" vs "nonresponder" status (responder ≥50% improvement in QIDS).
- We specifically investigated early response because later time points may be more biased by selective drop-out.
- Patients were divided into a training set (80%, n=1723) and test set (20%, n=431).
- A lasso regression model was used to determine the amount of variance in clinical outcomes explained by baseline symptoms measured by the 16 items on QIDS, 24 items on BASIS-24, age, and sex (42 predictors total).

Results

- The mean QIDS improvement was 31.5% (SD 26.5%) after five ECT treatments.
- 27.9% of patients were classified as responders after five ECT treatments.
- Using the lasso regression model, minimal clinical variance was explained by baseline clinical factors in both the training set ($R2 = 4.8\%$, RMSE = 0.256) and the test set ($R2 = 4.7\%$, RMSE = 0.258). Figure 1 underscores the weak predictive value for determining which patients would be most likely to improve.
- Most of the individual predictors were not strongly correlated with one another (Figure 2).
- Overall, baseline factors accounted for 4.8% of the variance in clinical outcomes (95% CI 0.0285, 0.0675), which was statistically significant but clinically modest.
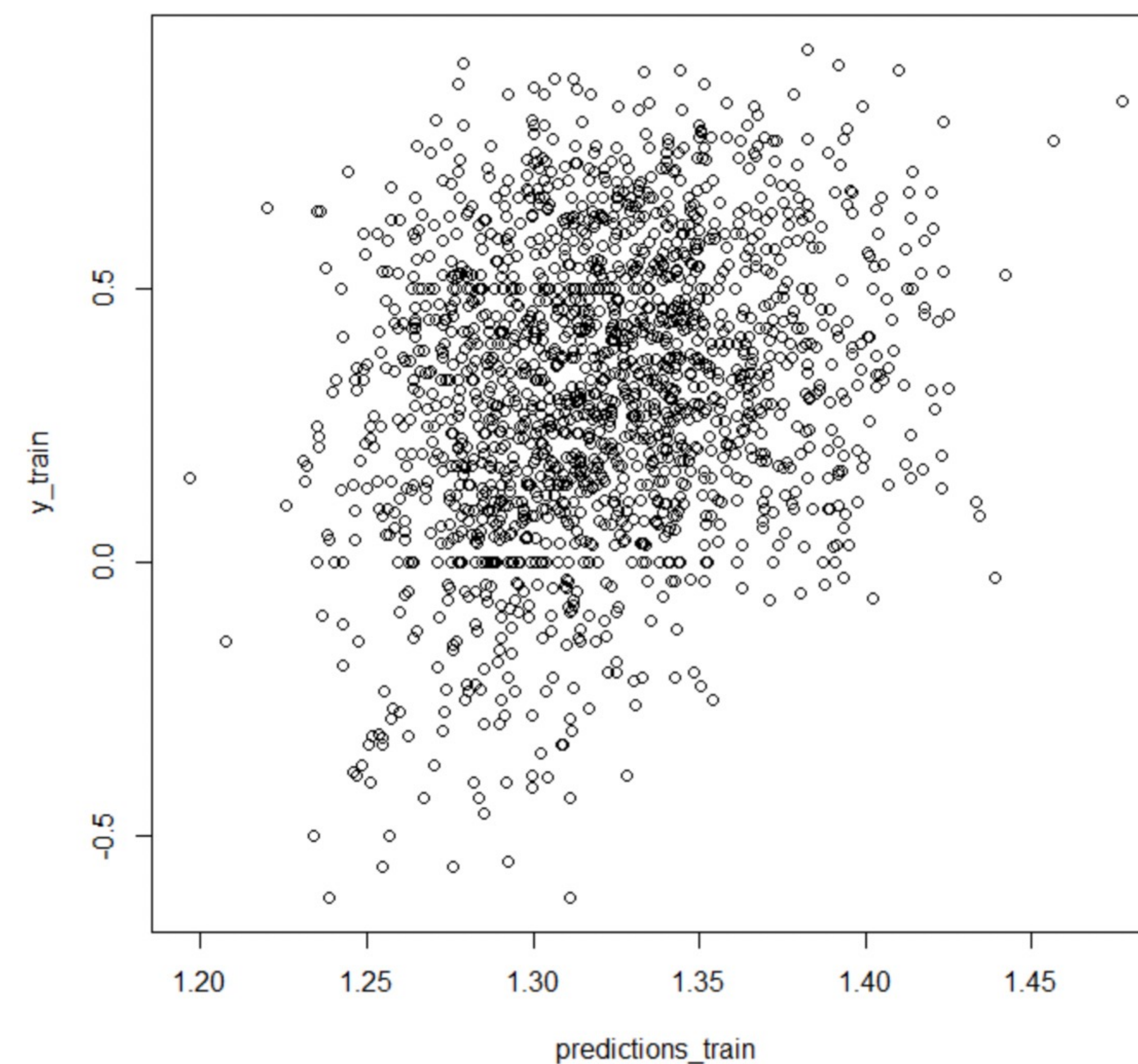
Figure 1: A scatterplot of a 10-fold cross-validated predictive model. Predicted (x-axis) vs actual outcomes (y-axis). The model fails to show any meaningful predictive value for determining actual outcomes.

Results (cont.)
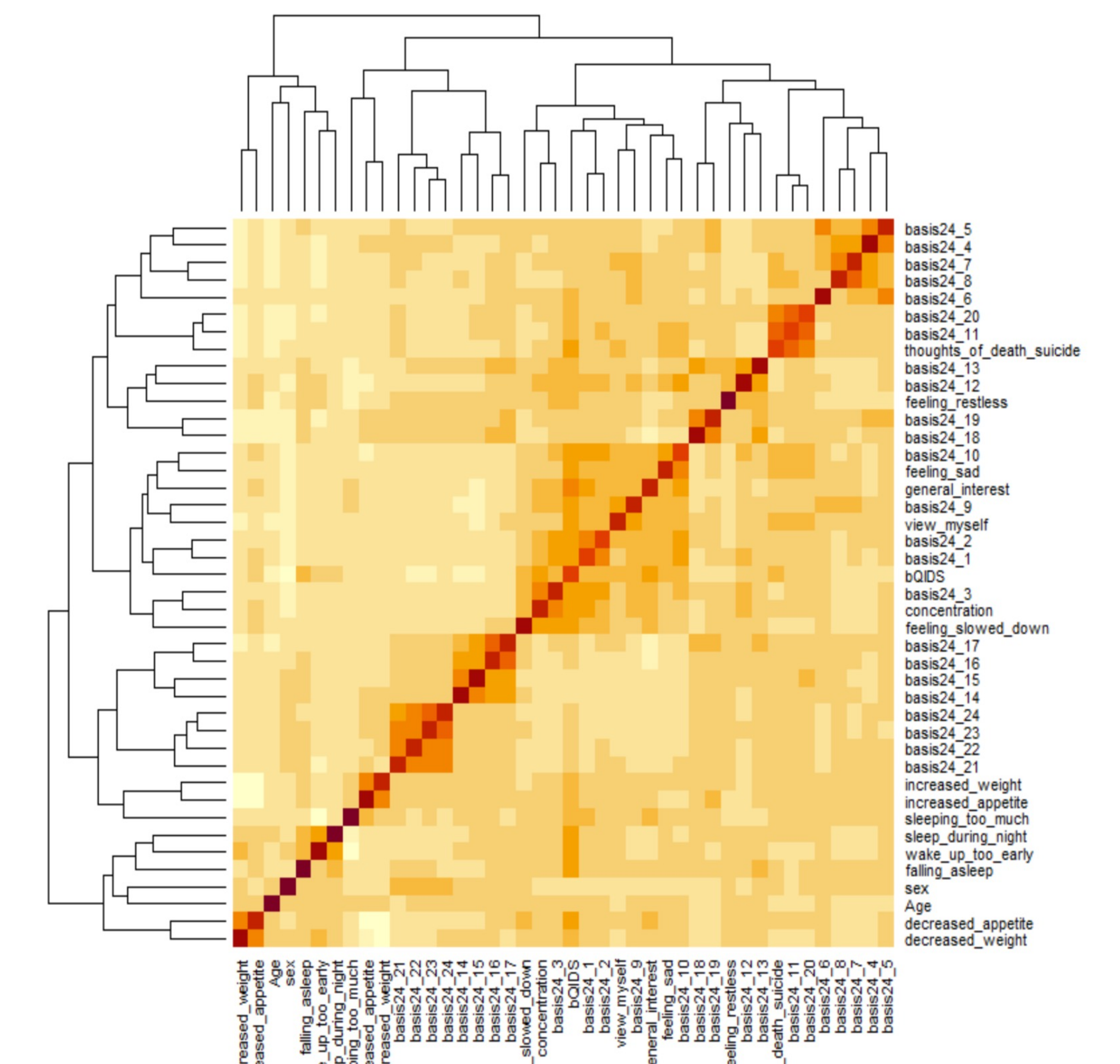
Figure 2: Cross-correlation between the 42 baseline variables/clinical predictors (16 items on QIDS, 24 items on BASIS-24, age, and sex).

Conclusion

- Based on the largest-ever dataset of patients receiving ECT, we demonstrated that baseline symptom profiles have minimal impact on early clinical response.
- These results argue against the use of baseline symptom profiles to decide which patients should be referred for ECT.
- One limitation of this model is that it only includes patients who completed five treatments and does not provide information on patients who dropped out before the fifth treatment.
- Furthermore, the model only tells us about early responders but does not investigate factors that may predict a patient's likelihood of responding later on in the treatment course.
- Future directions should include modeling this effect at different time points and at independent centers.

References

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