# IBQ Machnine Learning Supplemental 2023

The material contained herein is supplementary to the article named in the title and submitted to the journal, XXX.

10/25/2022

This supplemental appendix provides exploratory data and factor analyses of agricultural insurance loss for the Pacific Northwest (PNW) and the inland Pacific Northwest (iPNW) of the United States.

## Supplemental Figure and Tables List

**Itemized Models**

Figure S1: Accuracy Estimates: Chronological Age Group vs. Pre-Term Group - ALL VARIABLES

Figure S2: Receiver Operator Curve: Chronological Age Group vs. Pre-Term Group - ALL VARIABLES

Figure S3: Accuracy Estimates: Age Adjusted Group vs. Pre-Term Group - ALL VARIABLES

Figure S4: Receiver Operator Curve: Age Adjusted Group vs. Pre-Term Group - ALL VARIABLES

**Transformed Feature Models**

Figure S5: Accuracy Estimates: Chronological Age Group vs. Pre-Term Group - TRANSFORMED VARIABLES

Figure S6: Receiver Operator Curve: Chronological Age Group vs. Pre-Term Group - TRANSFORMED VARIABLES

Figure S7: Accuracy Estimates: Age Adjusted Group vs. Pre-Term Group - TRANSFORMED VARIABLES

Figure S8: Receiver Operator Curve: Age Adjusted Group vs. Pre-Term Group - TRANSFORMED VARIABLES

**Feature Importance Graphs**

Figure S9: Feature Importance: Chronological Age Group vs. Pre-Term Group - ALL VARIABLES

Figure S10: Feature Importance: Age Adjusted Group vs. Pre-Term Group - ALL VARIABLES

Figure S11: Feature Importance: Chronological Age Group vs. Pre-Term Group - TRANSFORMED VARIABLES

Figure S12: Feature Importance: Age Adjusted Group vs. Pre-Term Group - TRANSFORMED VARIABLES

**Model Results Tables**

Table S1: Model Results: ALL VARIABLES

Table S2: Model Results: TRANSFORMED VARIABLES

**Model Comparisons**

Figure S13: R2 Comparisons - Chronological Age Group VS Pre-Term Group, Transformed Variables VS. All Variables

Figure S14: AUC Comparisons - Chronological Age Group VS Pre-Term Group, Transformed Variables VS. All Variables

Figure S15: R2 Comparisons - Age Adjusted Group VS Pre-Term Group, Transformed Variables VS. All Variables

Figure S16: AUC Comparisons - Age Adjusted Group VS Pre-Term Group, Transformed Variables VS. All Variables

# Model Development and Output: Chronological Age Group VS. Pre-Term Group - ALL VARIABLES

**Model Accuracy Estimates: Chronological Age Group VS. Pre-Term Group - All Variables**
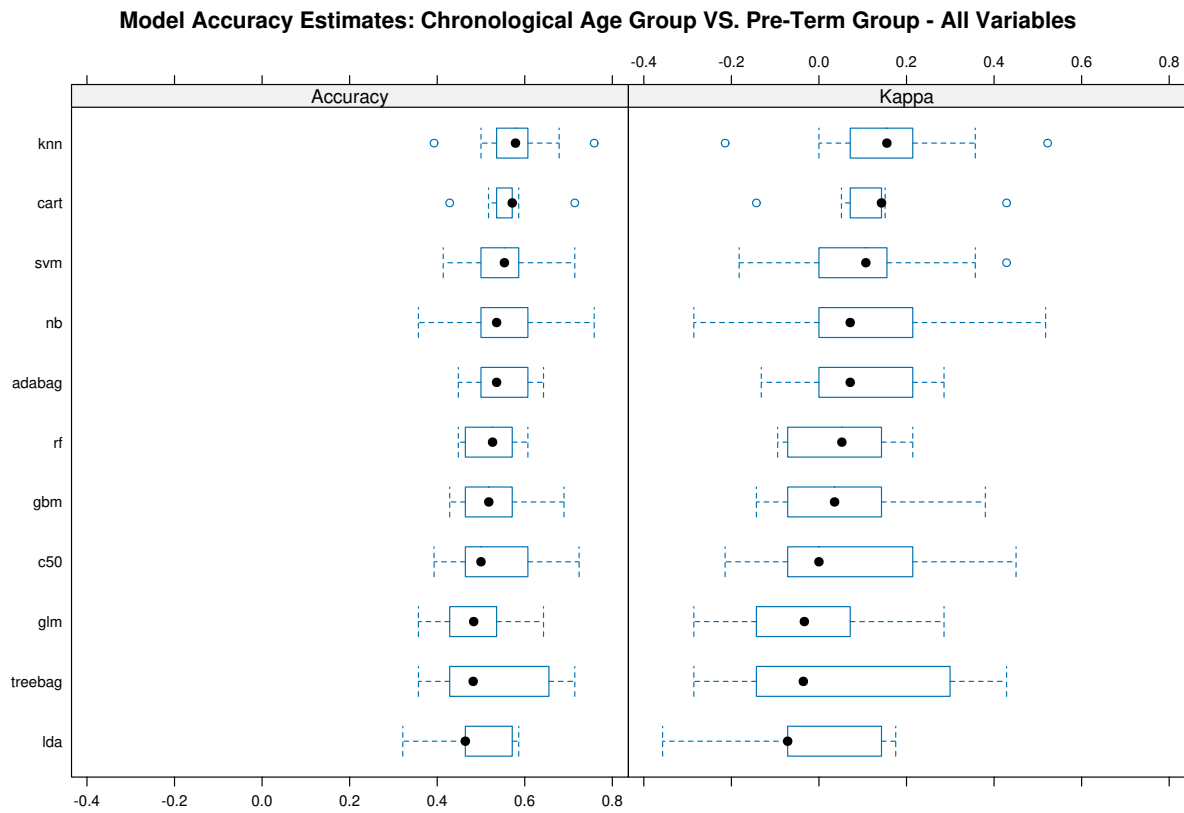


Figure S 1: Accuracy Estimates: Chronological Age Group vs. Pre-Term Group - All Variables.

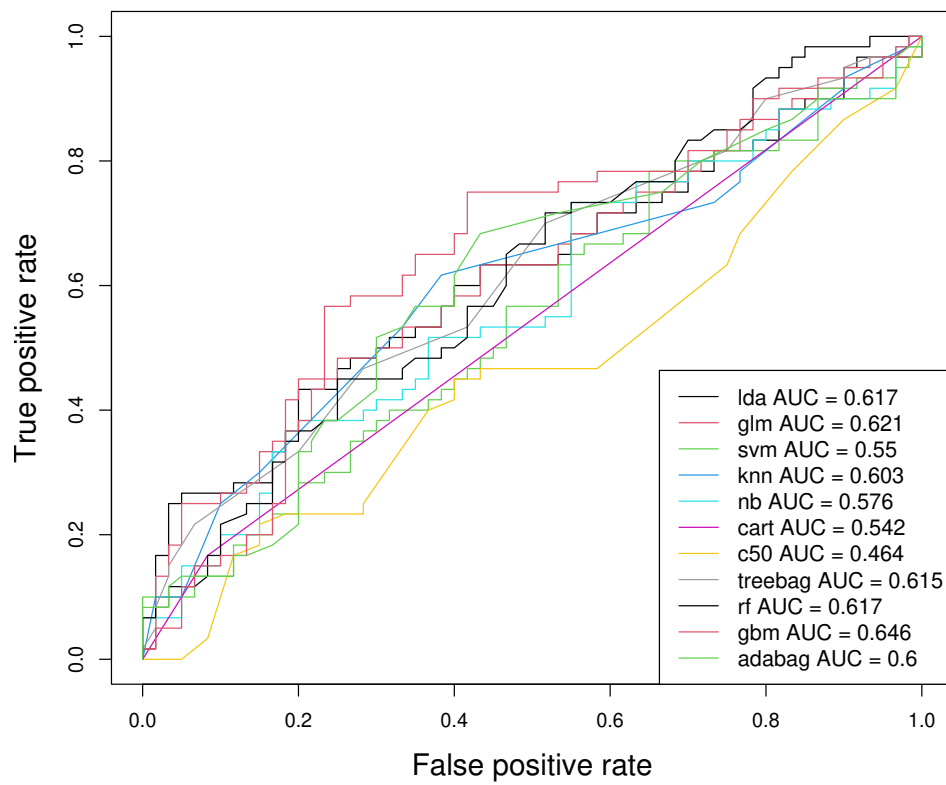**ROC Curve: Chronological Age Group VS. Pre-Term Group - All Variables**



Legend:
- lda AUC = 0.617
- glm AUC = 0.621
- svm AUC = 0.55
- knn AUC = 0.603
- nb AUC = 0.576
- cart AUC = 0.542
- c50 AUC = 0.464
- treebag AUC = 0.615
- rf AUC = 0.617
- gbm AUC = 0.646
- adabag AUC = 0.6

Figure S 2: Receiver Operator Curve: Chronological Age Group vs. Pre-Term Group - All Variables.

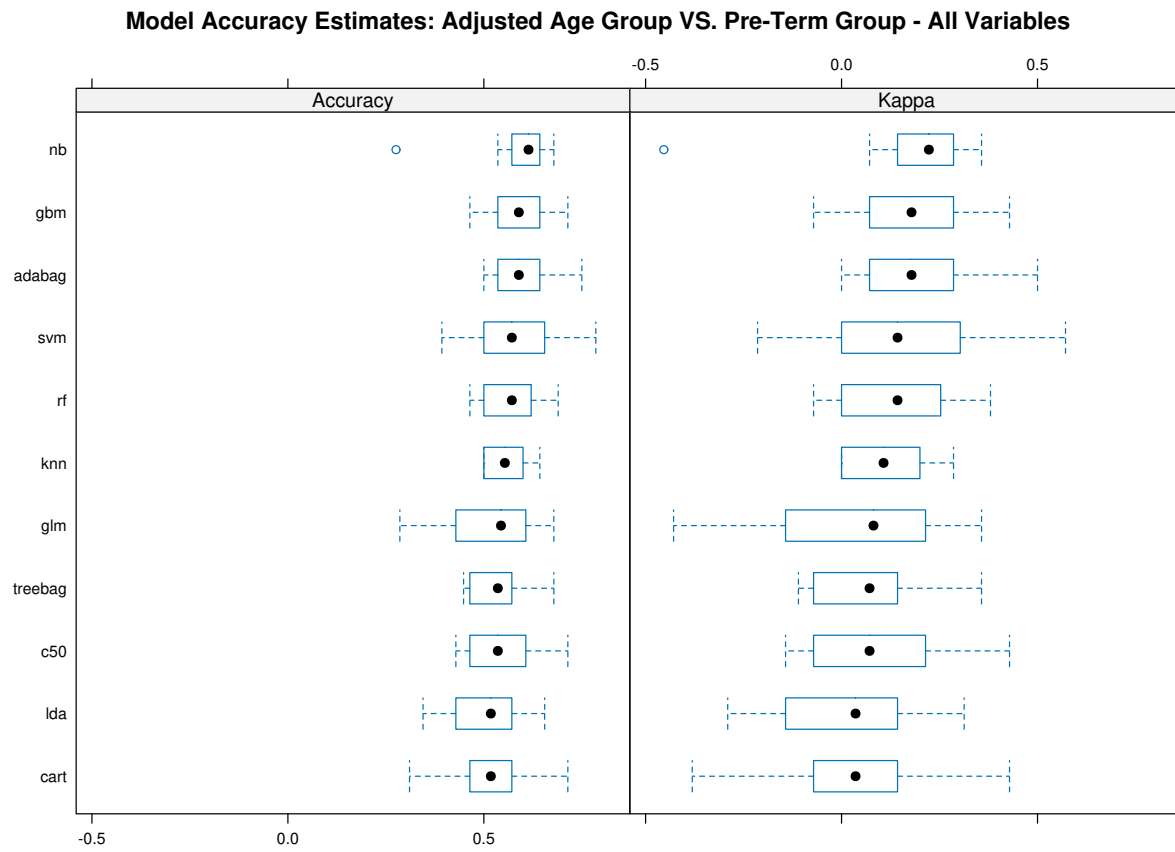# Model Development and Output: Adjusted Age Group VS. Pre-Term Group - ALL VARIABLES



Figure S 3: Accuracy Estimates: Age Adjusted Group vs. Pre-Term Group - All Variables.

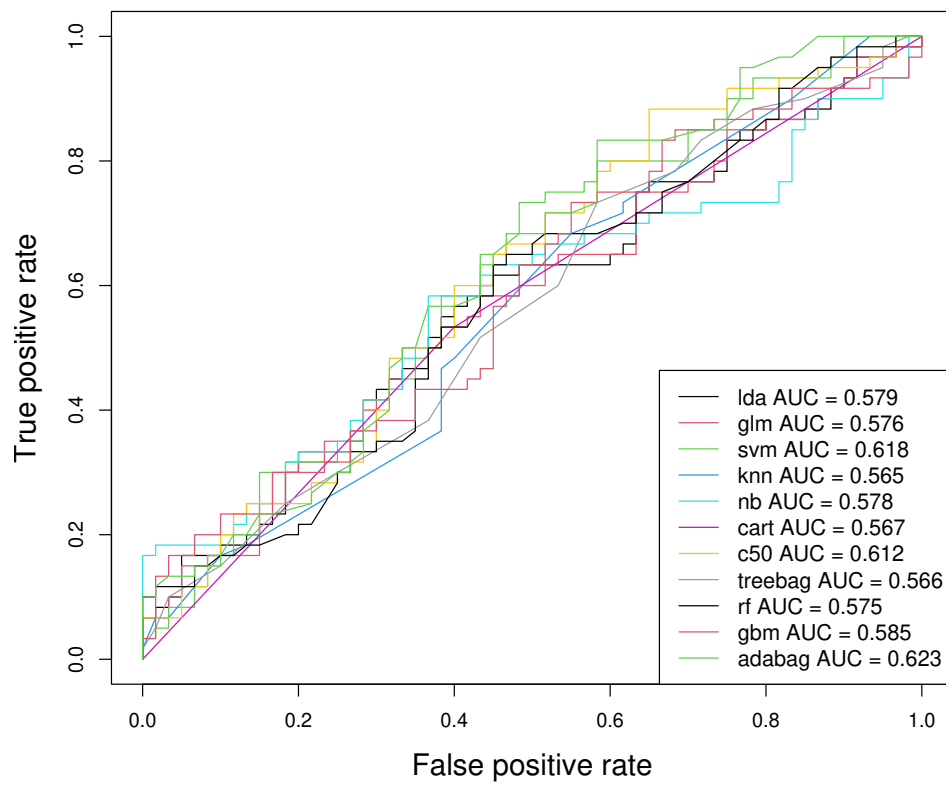**ROC Curve: Adjusted Age Group VS. Pre-Term Group - All Variables**



Figure S 4: Receiver Operator Curve: Age Adjusted Group vs. Pre-Term Group - All Variables.

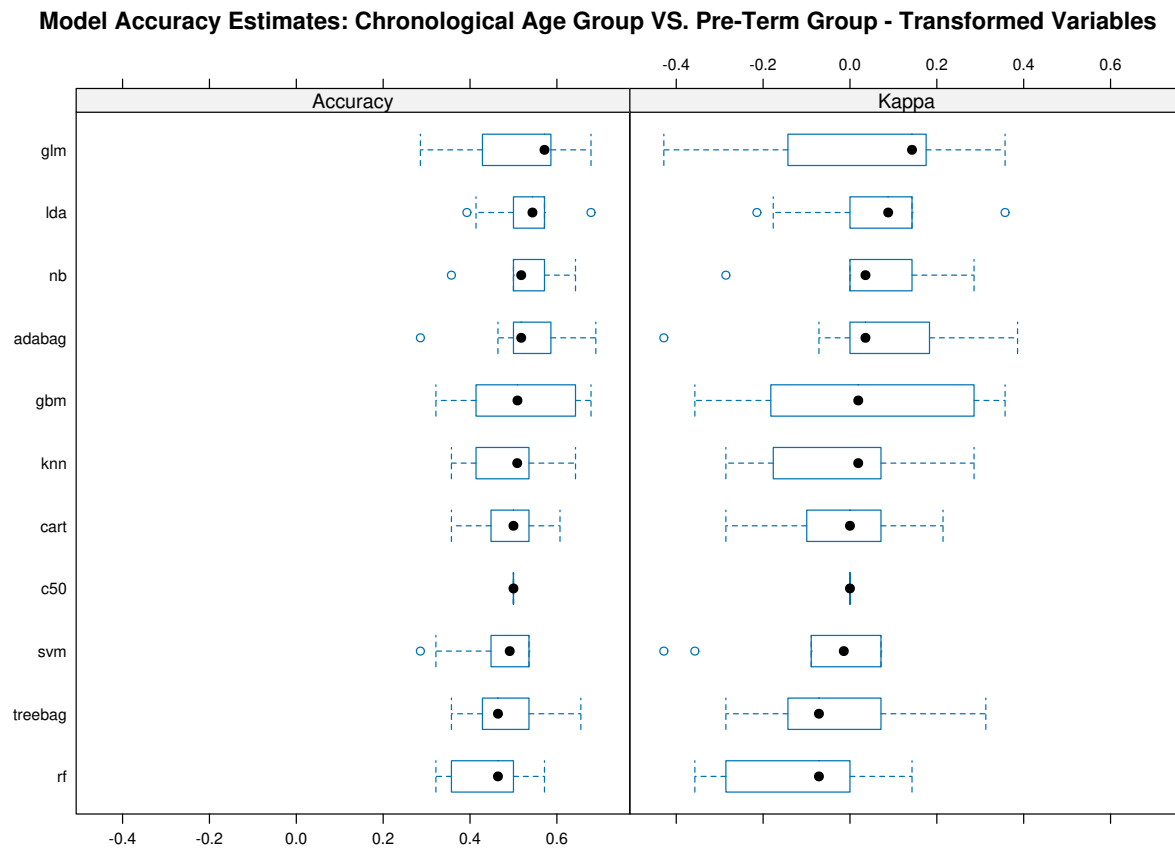# Model Development and Output: Chronological Age Group VS. Pre-Term Group - TRANSFORMED VARIABLES

**Model Accuracy Estimates: Chronological Age Group VS. Pre-Term Group - Transformed Variables**



Figure S 5: Accuracy Estimates: Chronological Age Group vs. Pre-Term Group - Transformed Variables.

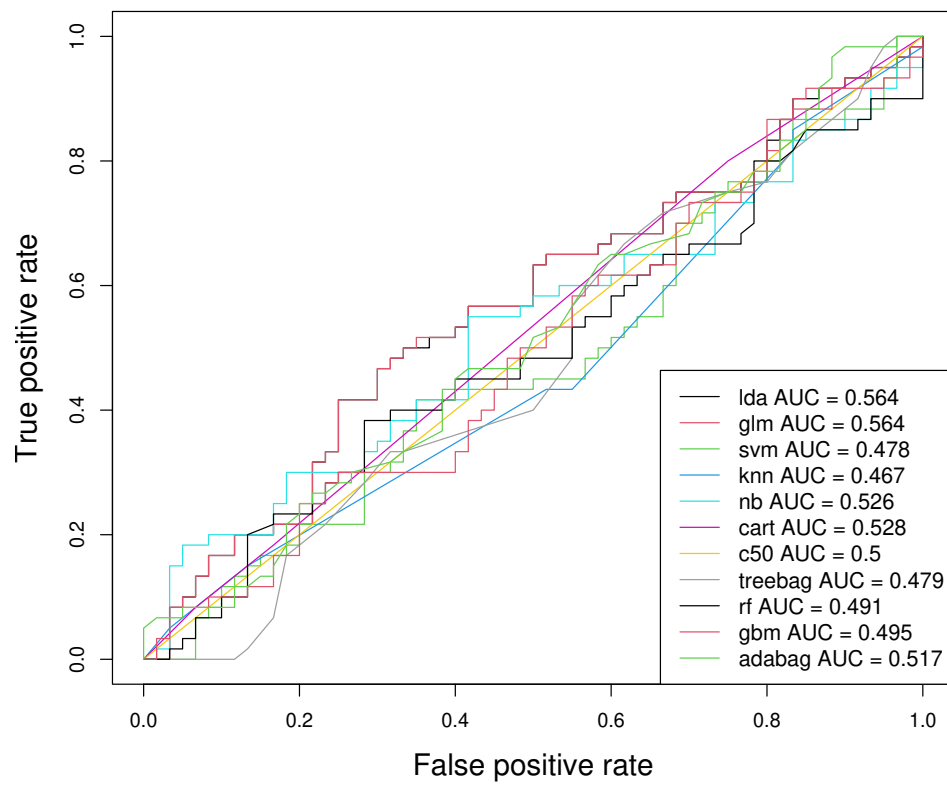**Curve: Chronological Age Group VS. Pre-Term Group - Transformed Variables**



Figure S 6: Receiver Operator Curve: Chronological Age Group vs. Pre-Term Group - Transformed Variables.

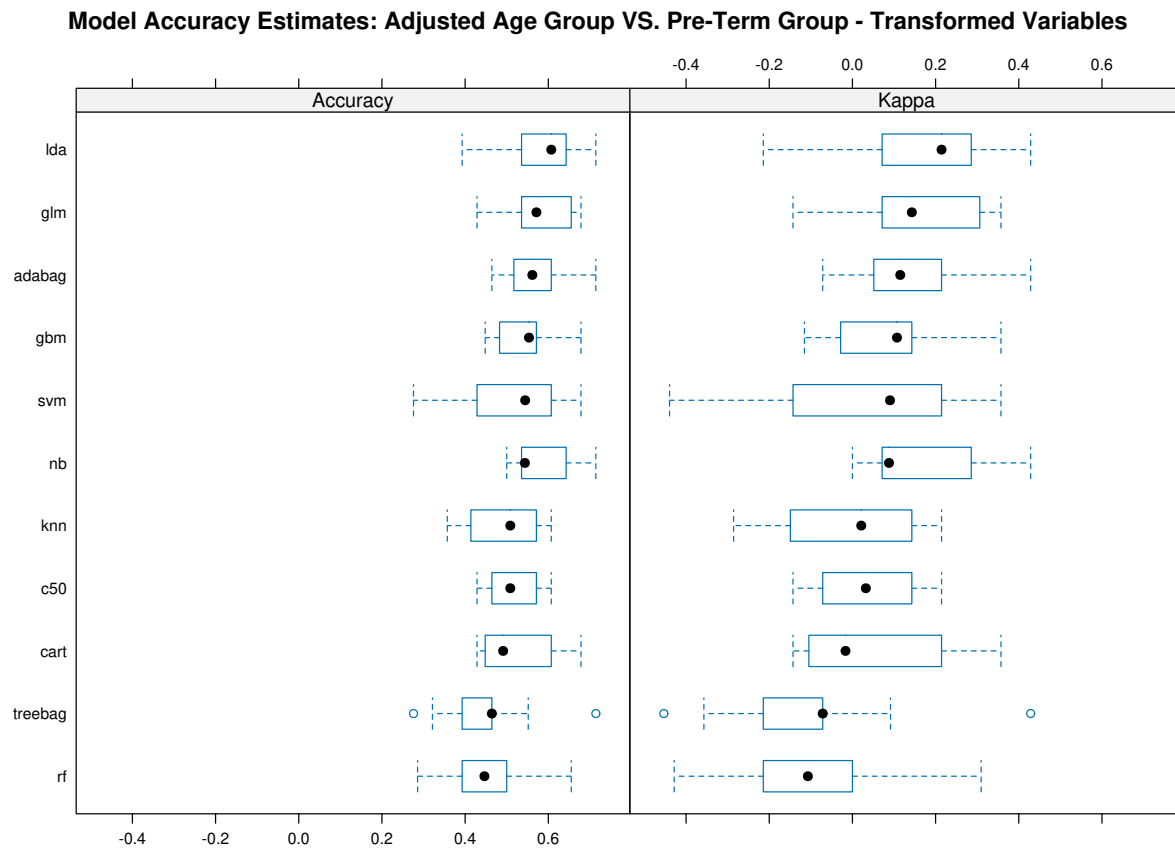# Model Development and Output: Adjusted Age Group VS. Pre-Term Group - TRANSFORMED VARIABLES

**Model Accuracy Estimates: Adjusted Age Group VS. Pre-Term Group - Transformed Variables**



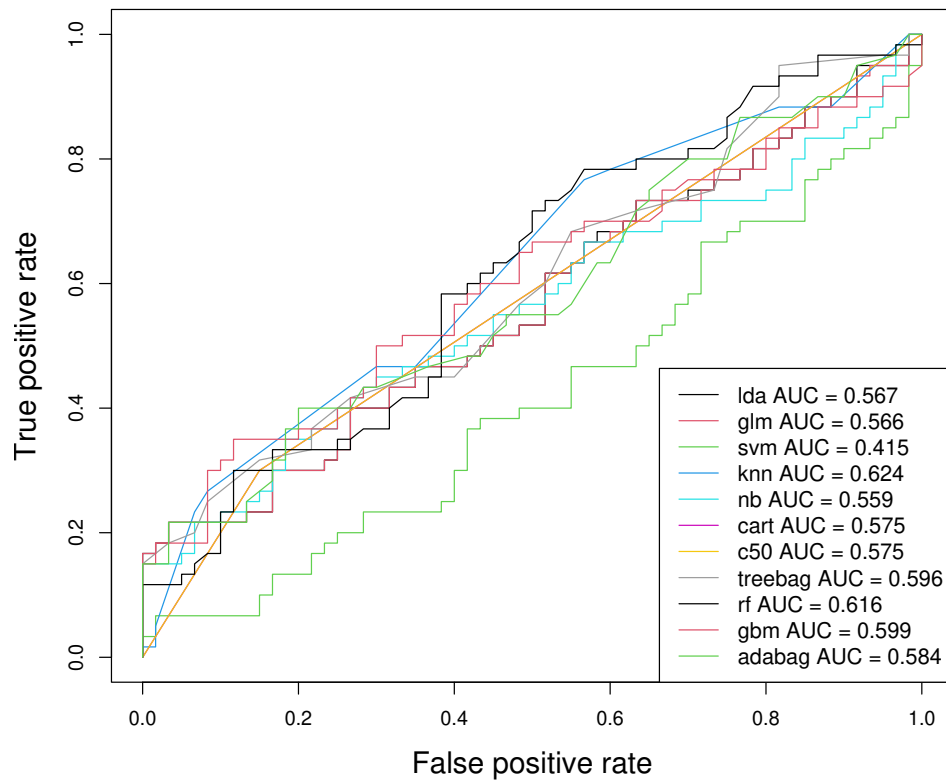Figure S 7: Accuracy Estimates: Age Adjusted Group vs. Pre-Term Group - Transformed Variables.

Figure S 8: Receiver Operator Curve: Age Adjusted Group vs. Pre-Term Group - Transformed Variables.

**Feature Importance - Random Forest Model Results: Transformed Variables**
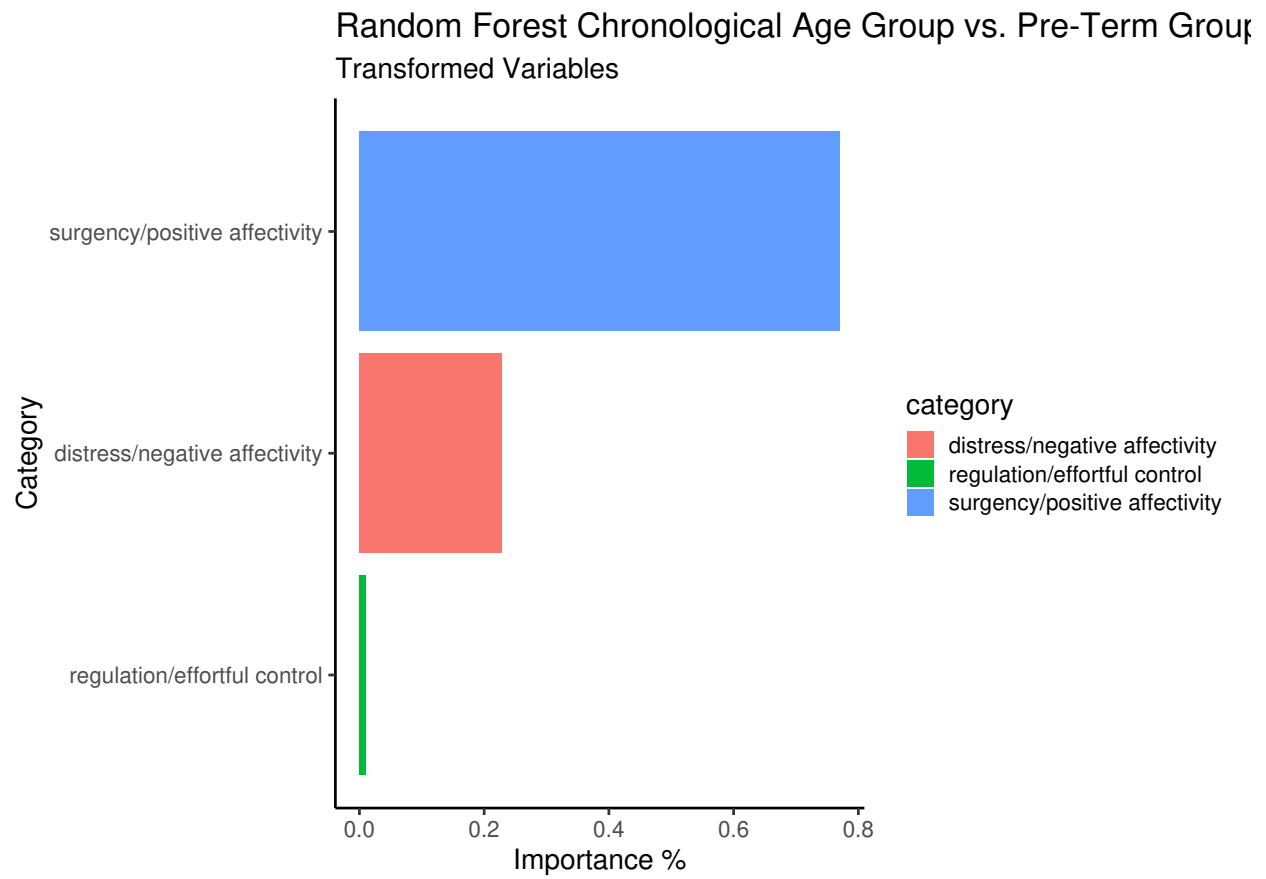
Figure S 9: Feature Importance: Chronological Age Group vs. Pre-Term Group - Transformed Variables
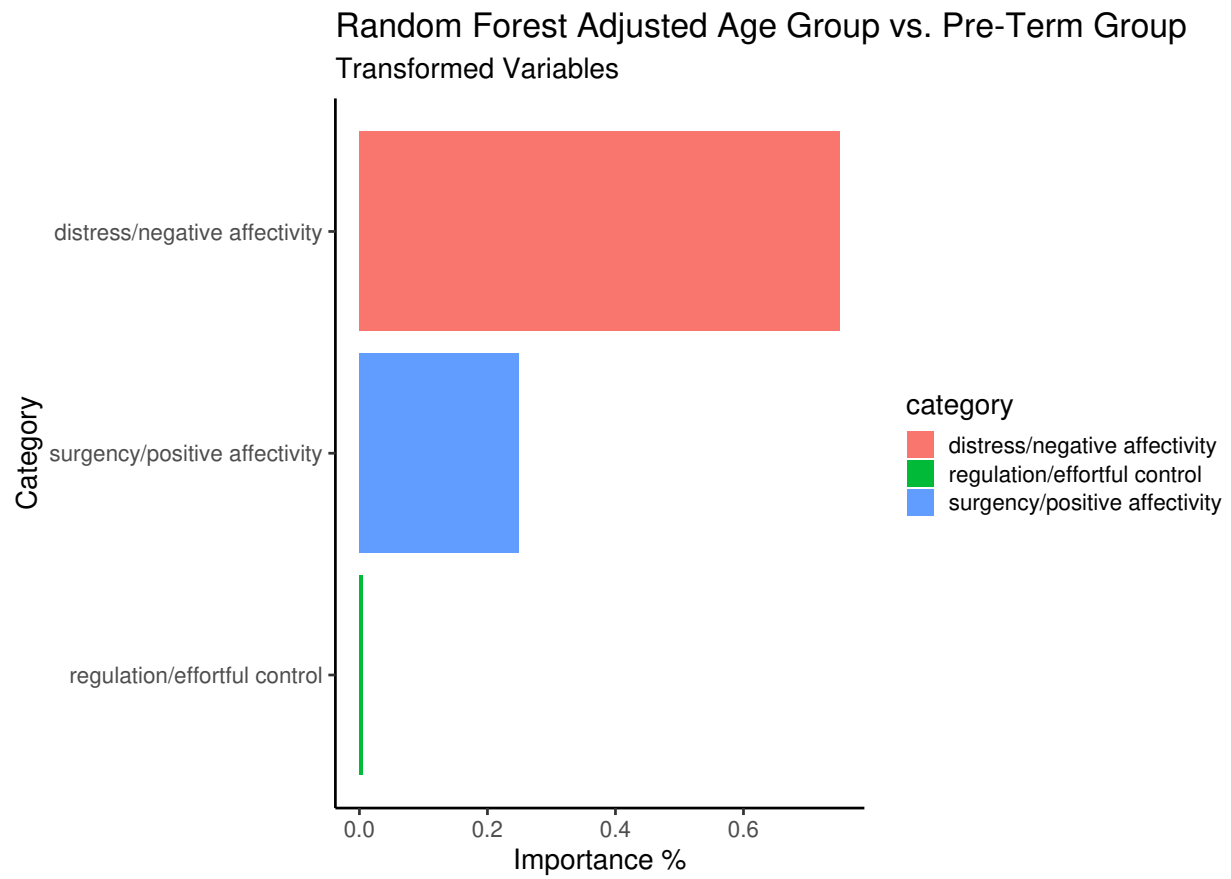
Figure S 10: Feature Importance: Age Adjusted Group vs. Pre-Term Group - Transformed Variables

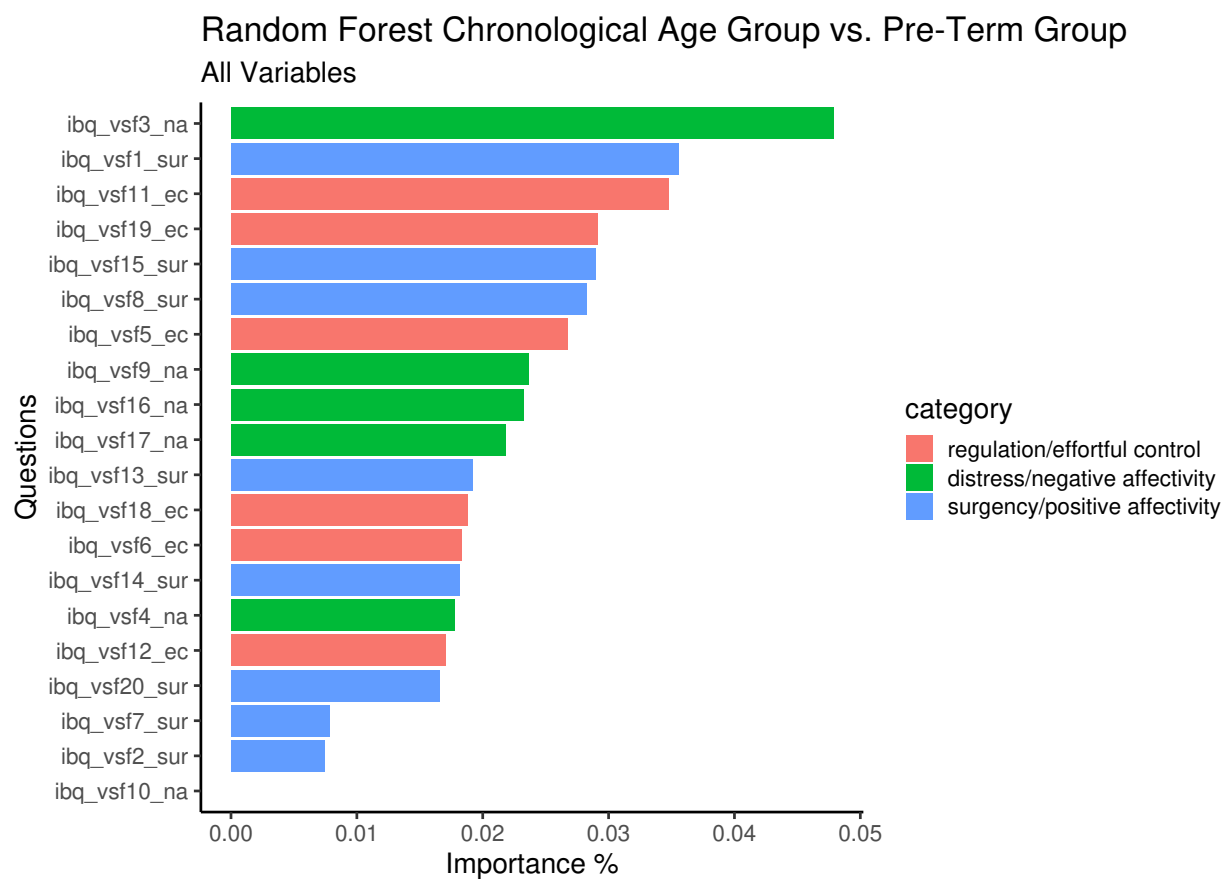**Feature Importance - Random Forest Model Results: All Variables**

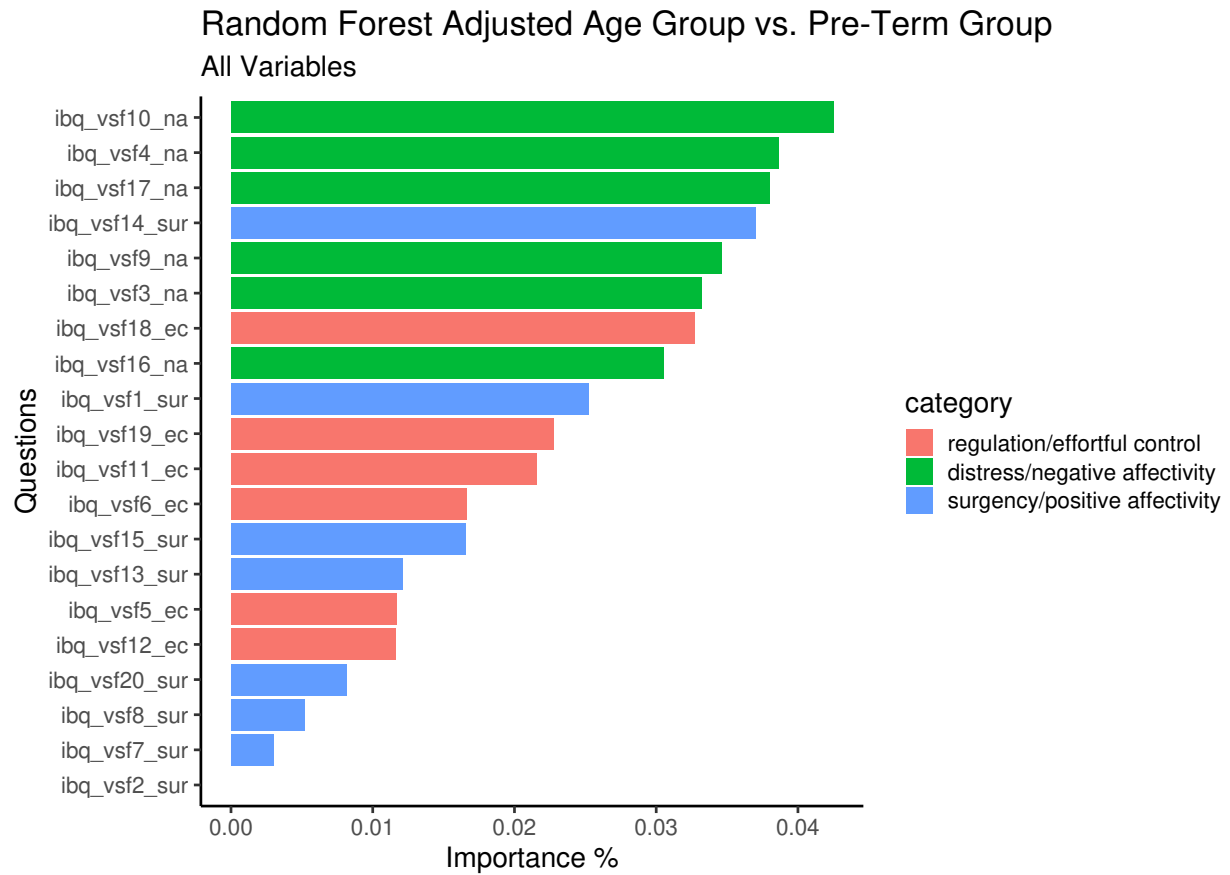Figure S 11: Feature Importance: Chronological Age Group vs. Pre-Term Group - All Variables

## Random Forest Adjusted Age Group vs. Pre-Term Group
### All Variables



Figure S 12: Feature Importance: Age Adjusted Group vs. Pre-Term Group - All Variables

Table S 1: Model Results: Transformed Variables

| models | Chronological VS. Pre-Term: All Variabes | | | Adjusted Age VS. Pre-Term: All Variables | | |
|---|---|---|---|---|---|---|
| | accuracy | kappa | AUC | accuracy | kappa | AUC |
| lda | 0.493 | -0.014 | 0.617 | 0.504 | 0.009 | 0.579 |
| glm | 0.490 | -0.021 | 0.621 | 0.524 | 0.047 | 0.576 |
| svm | 0.493 | -0.016 | 0.550 | 0.557 | 0.113 | 0.618 |
| knn | 0.581 | 0.162 | 0.603 | 0.542 | 0.085 | 0.565 |
| nb | 0.542 | 0.084 | 0.576 | 0.579 | 0.156 | 0.578 |
| cart | 0.539 | 0.078 | 0.542 | 0.490 | -0.020 | 0.567 |
| c5.0 | 0.475 | -0.051 | 0.464 | 0.514 | 0.029 | 0.612 |
| bagging | 0.517 | 0.032 | 0.615 | 0.532 | 0.063 | 0.566 |
| rf | 0.500 | 0.001 | 0.617 | 0.574 | 0.149 | 0.575 |
| gbm | 0.503 | 0.008 | 0.646 | 0.582 | 0.163 | 0.585 |
| adabag | 0.543 | 0.084 | 0.600 | 0.546 | 0.093 | 0.623 |

Table S 2: Model Results: Transformed Variables

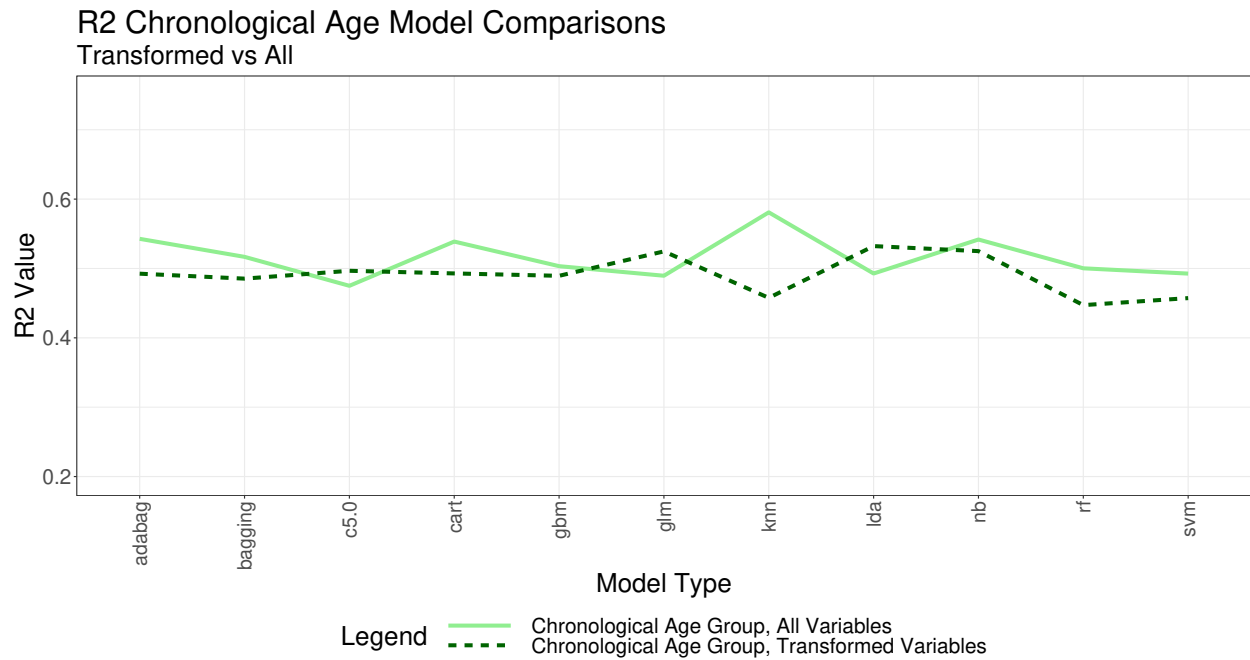| models | Chronological VS. Pre-Term: Transformed Variabes | | | Adjusted Age VS. Pre-Term: Transform | | |
|---|---|---|---|---|---|---|
| | accuracy | kappa | AUC | accuracy | kappa | |
| lda | 0.532 | 0.064 | 0.564 | 0.581 | 0.162 | |
| glm | 0.525 | 0.050 | 0.564 | 0.585 | 0.169 | |
| svm | 0.457 | -0.083 | 0.478 | 0.519 | 0.038 | |
| knn | 0.458 | -0.086 | 0.467 | 0.497 | -0.004 | |
| nb | 0.525 | 0.050 | 0.526 | 0.578 | 0.156 | |
| cart | 0.493 | -0.014 | 0.528 | 0.504 | 0.008 | |
| c5.0 | 0.497 | -0.007 | 0.500 | 0.514 | 0.029 | |
| bagging | 0.485 | -0.029 | 0.479 | 0.454 | -0.093 | |
| rf | 0.447 | -0.105 | 0.491 | 0.449 | -0.102 | |
| gbm | 0.489 | -0.022 | 0.495 | 0.547 | 0.093 | |
| adabag | 0.492 | -0.014 | 0.517 | 0.568 | 0.135 | |

Figure S 13: R2 Comparisons - Chronological Age Group VS Pre-Term Group, Transformed Variables VS. All Variables.
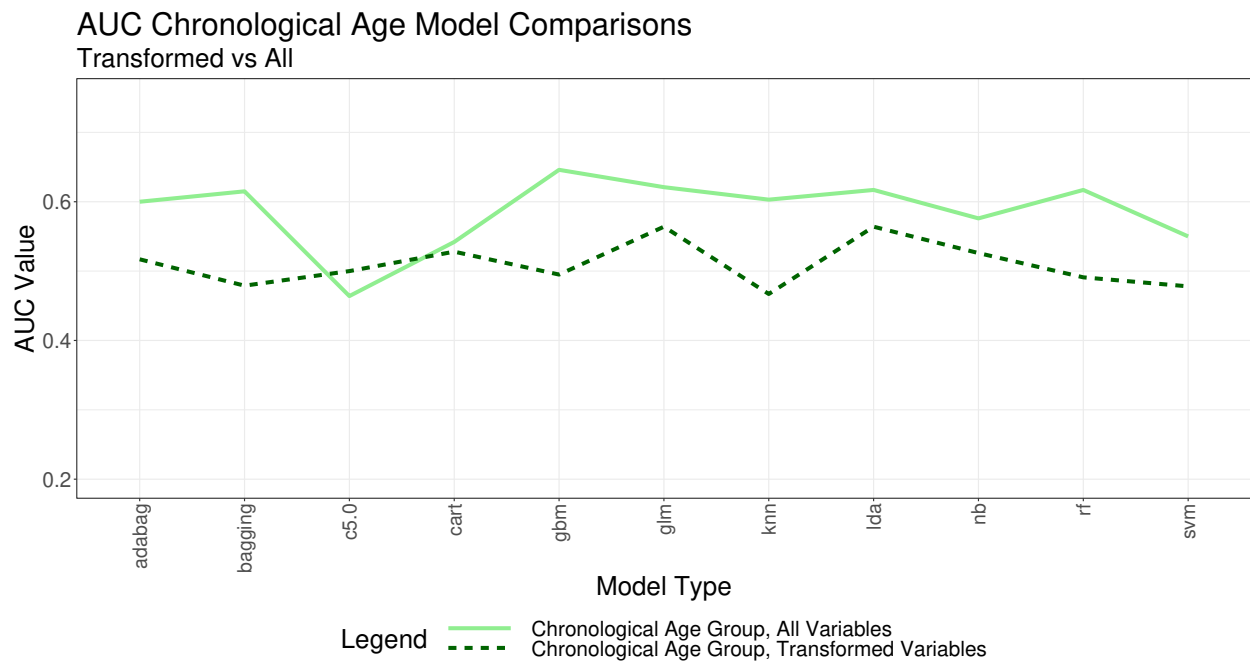


Figure S 14: AUC Comparisons - Chronological Age Group VS Pre-Term Group, Transformed Variables VS. All Variables.
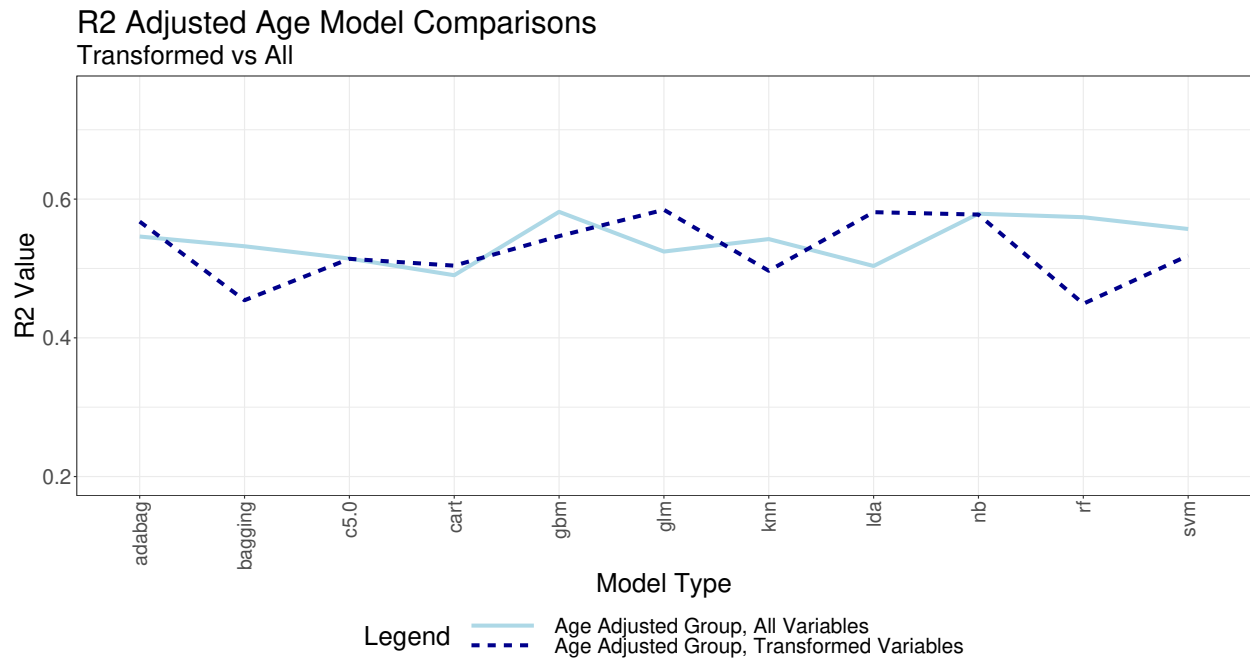
Figure S 15: R2 Comparisons - Age Adjusted Group VS Pre-Term Group, Transformed Variables VS. All Variables.
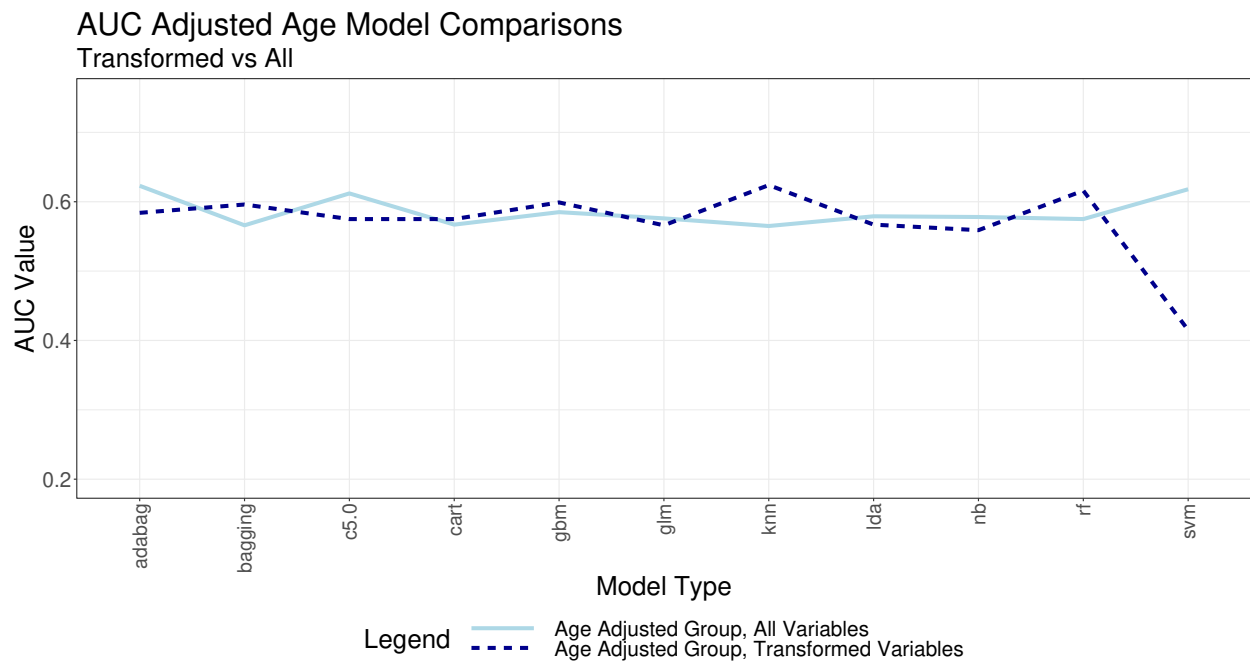


Figure S 16: AUC Comparisons - Age Adjusted Group VS Pre-Term Group, Transformed Variables VS. All Variables.