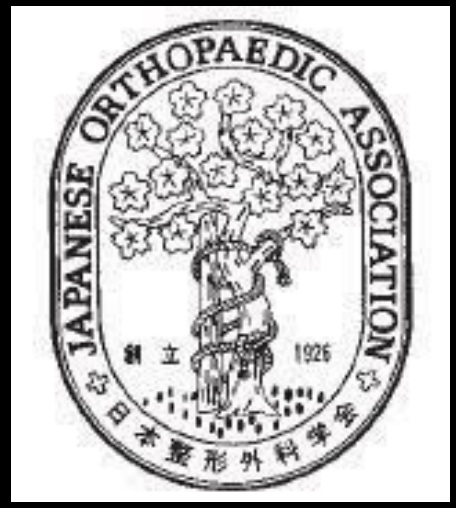
Background

- Degenerative Cervical Myelopathy (DCM) : chronic & progressive mechanical compression of the cervical spinal cord can lead to irreversible loss of neurologic function due to demyelination and apoptosis of oligodendrocytes.

- Surgeons currently lack the ability to accurately predict recovery following surgery for patients with DCM
- Patients often have specific questions about functional improvement after surgery (i.e. *Will I be able to walk again?)*

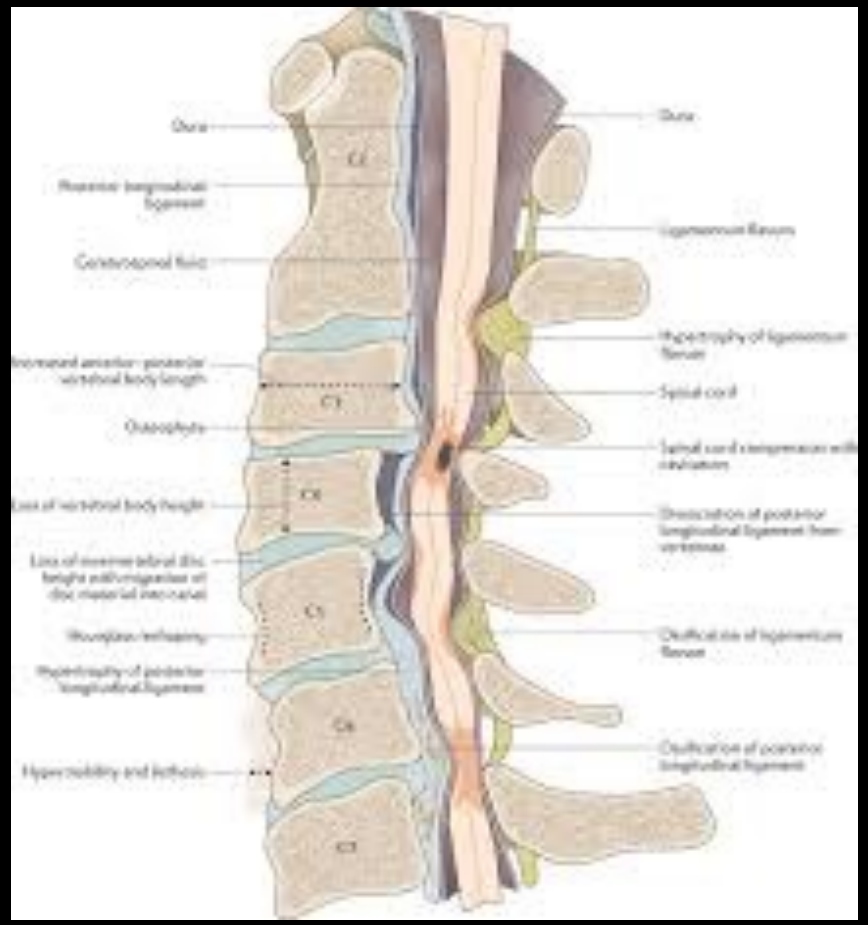
Background

- The Modified Japanese Orthopaedic Association (mJOA) score is a well-known metric that is comprised of subdomain scores that are commonly affected by DCM.



Purpose

- Our primary objective in this study was to build a clinical prediction model for improvement in mJOA *sub-domains* at 12 months following surgery using data from a longitudinal, multi-center clinical spine registry

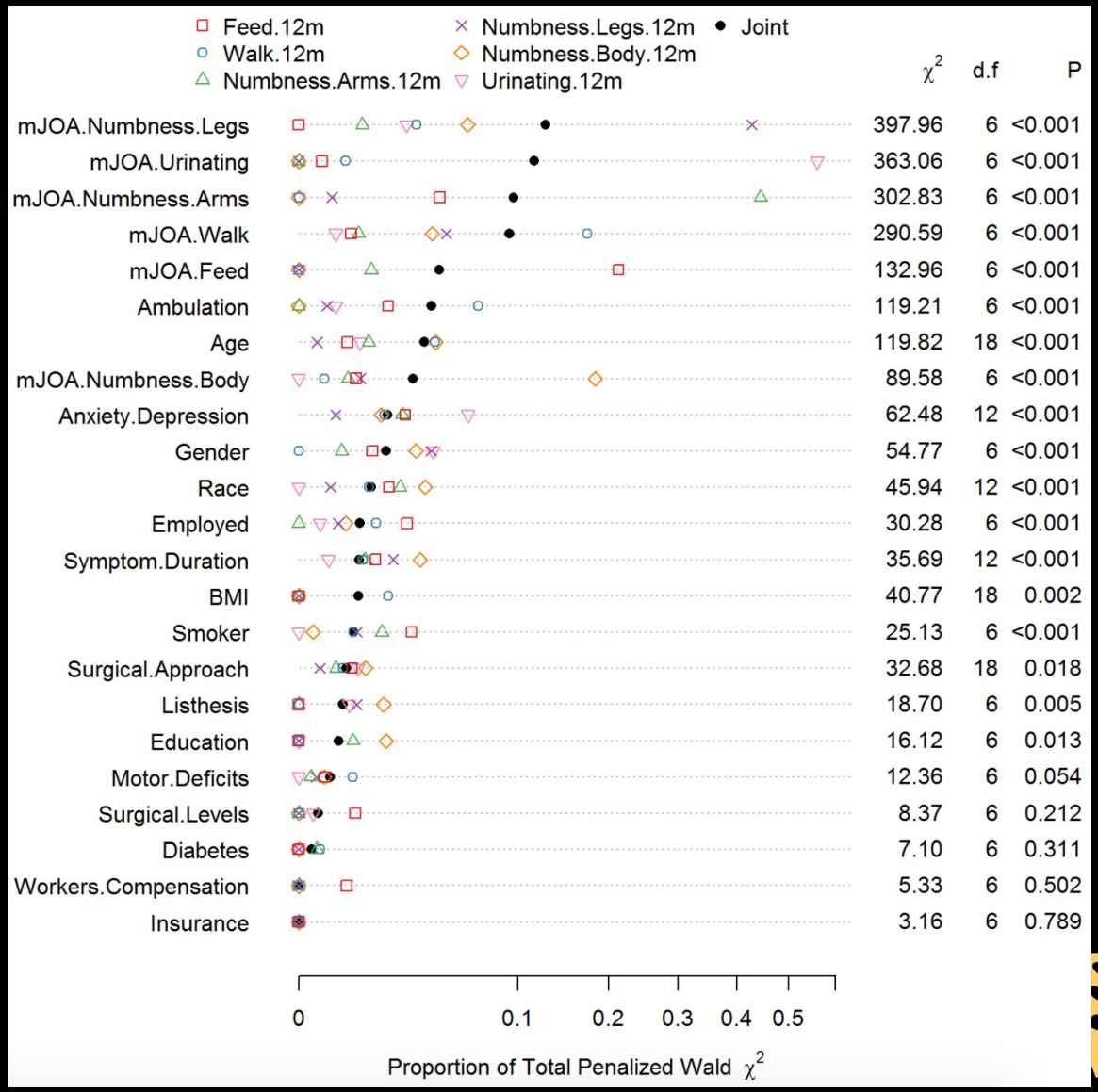


Methods

- Patient data was collected from the cervical module of the Quality Outcomes Database (QOD)
- Outcomes of interest were the 6 subdomain items of the mJOA score at 12 months postop
- Patient demographic, clinical, and surgical covariates as well as baseline subdomain scores were also collected
- A multivariable proportional odds ordinal regression model was developed
- The model was internally validated using bootstrap resampling to estimate the performance on a new sample of patients

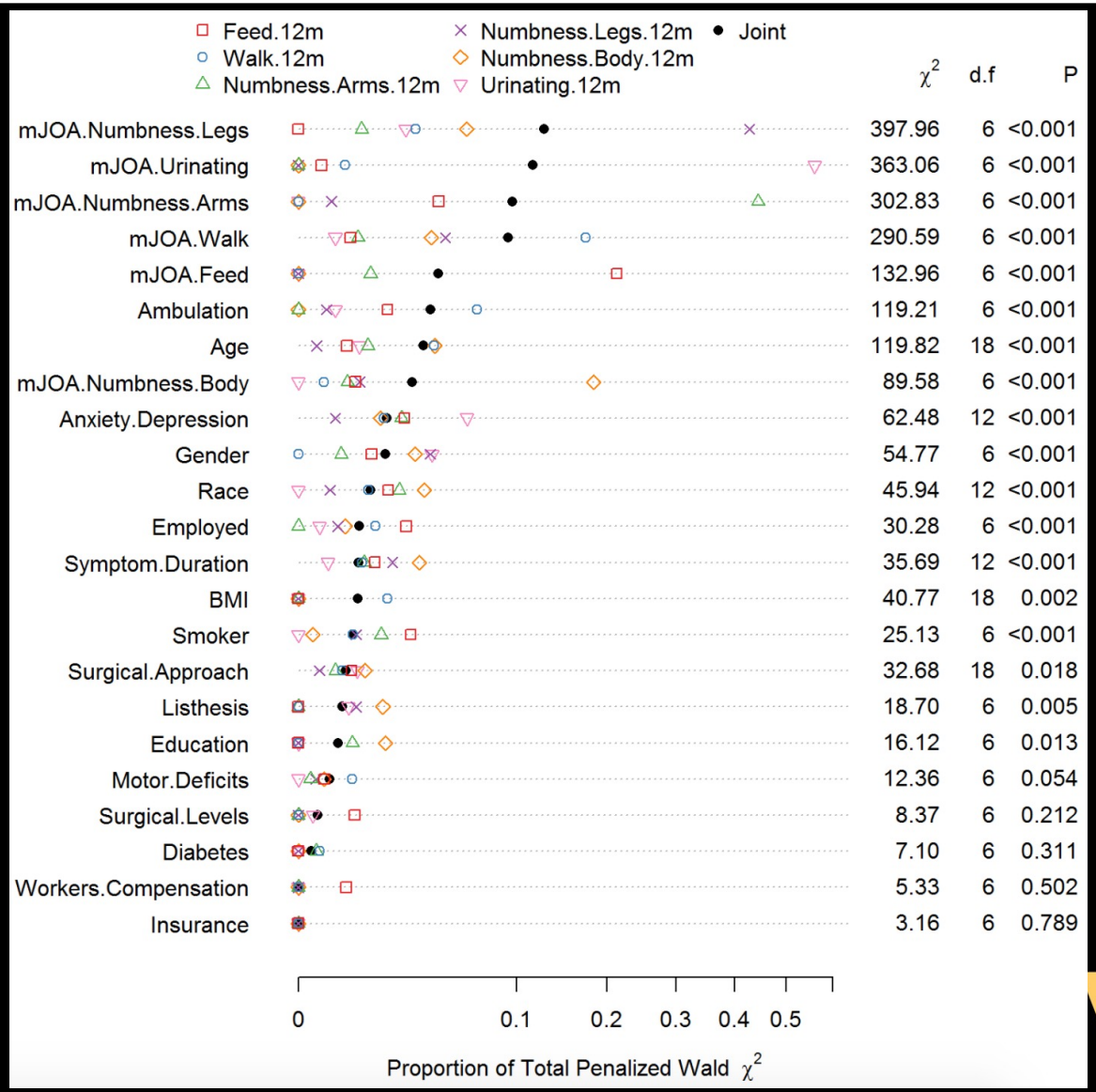
Results

- 5000 pts undergoing elective surgery for DCM were enrolled in the registry and had 12 m f/u
- Mean age : 60.9 y (+/- 11.4)
- 53% male
- Overall, patients' mJOA scores significantly improved from baseline to 12 m in all subdomains (p<0.001)



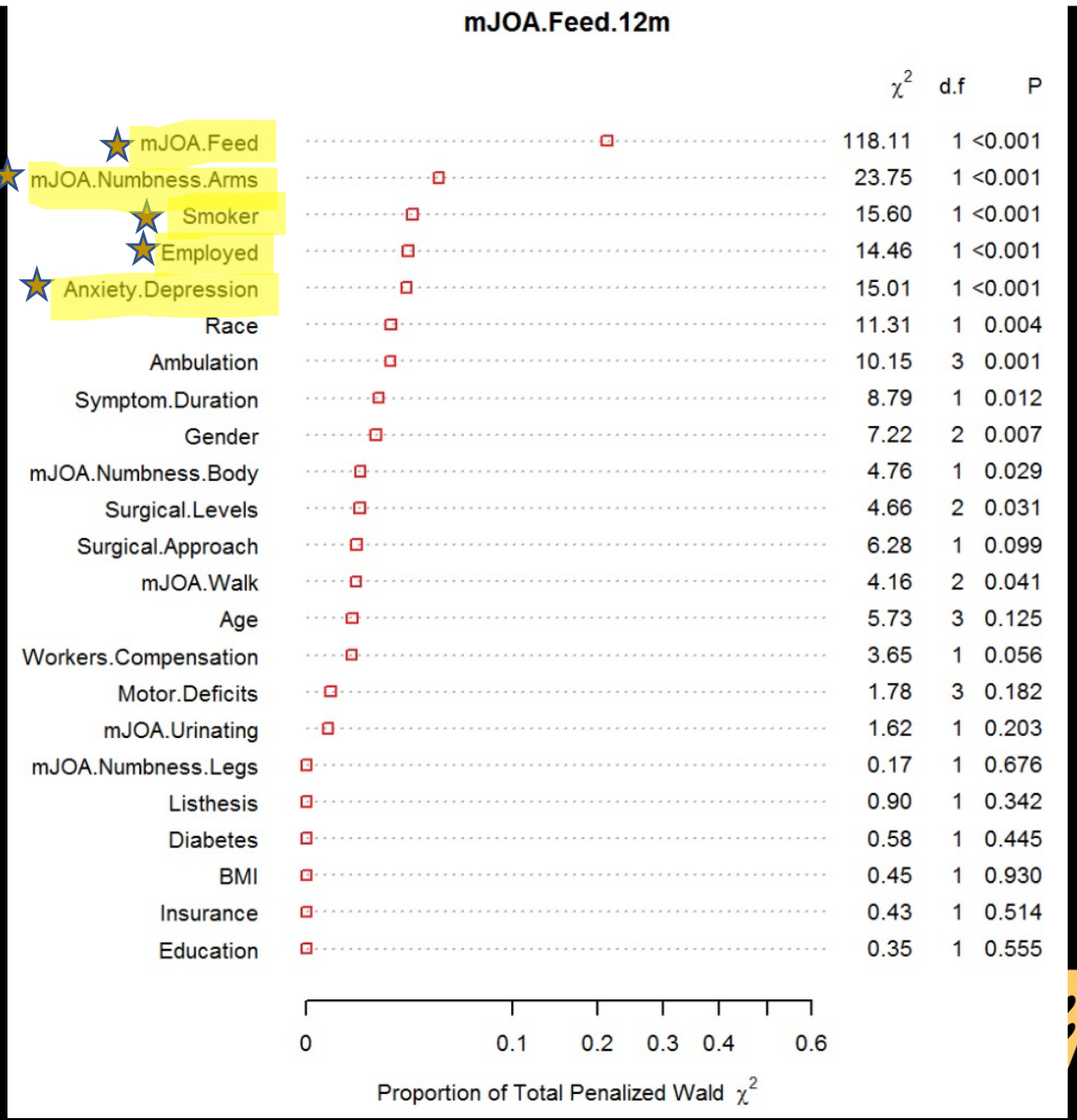
Results

- *Multivariate analysis of each subdomain revealed that baseline score was the most important factor in predicting subsequent improvement*



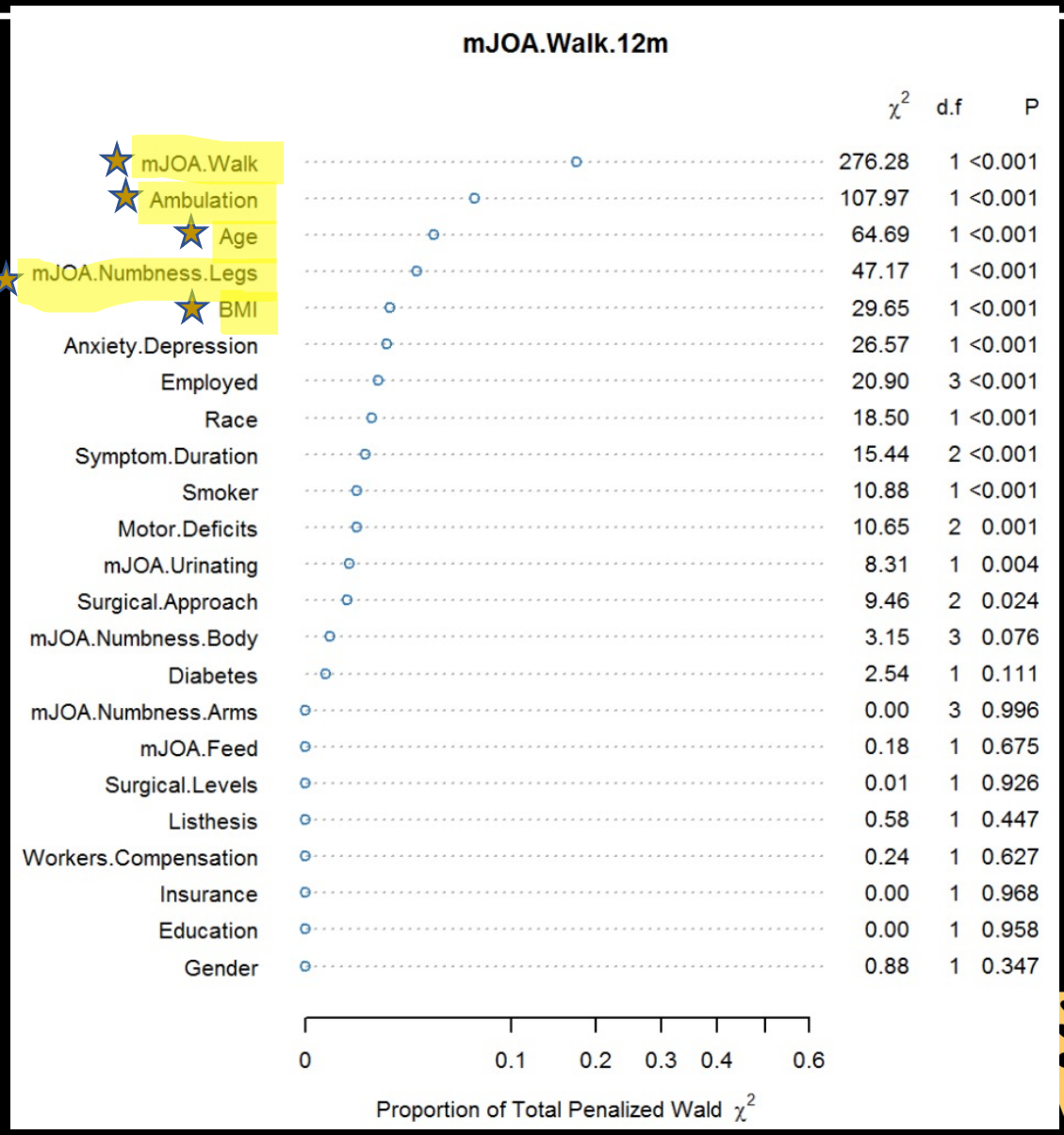
Results – Feed

- Top 5 predictors of 12 month mJOA feed scores :
  - Baseline mJOA feed score
  - mJOA numbness arms score
  - Smoking
  - Employment status
  - Anxiety / Depression



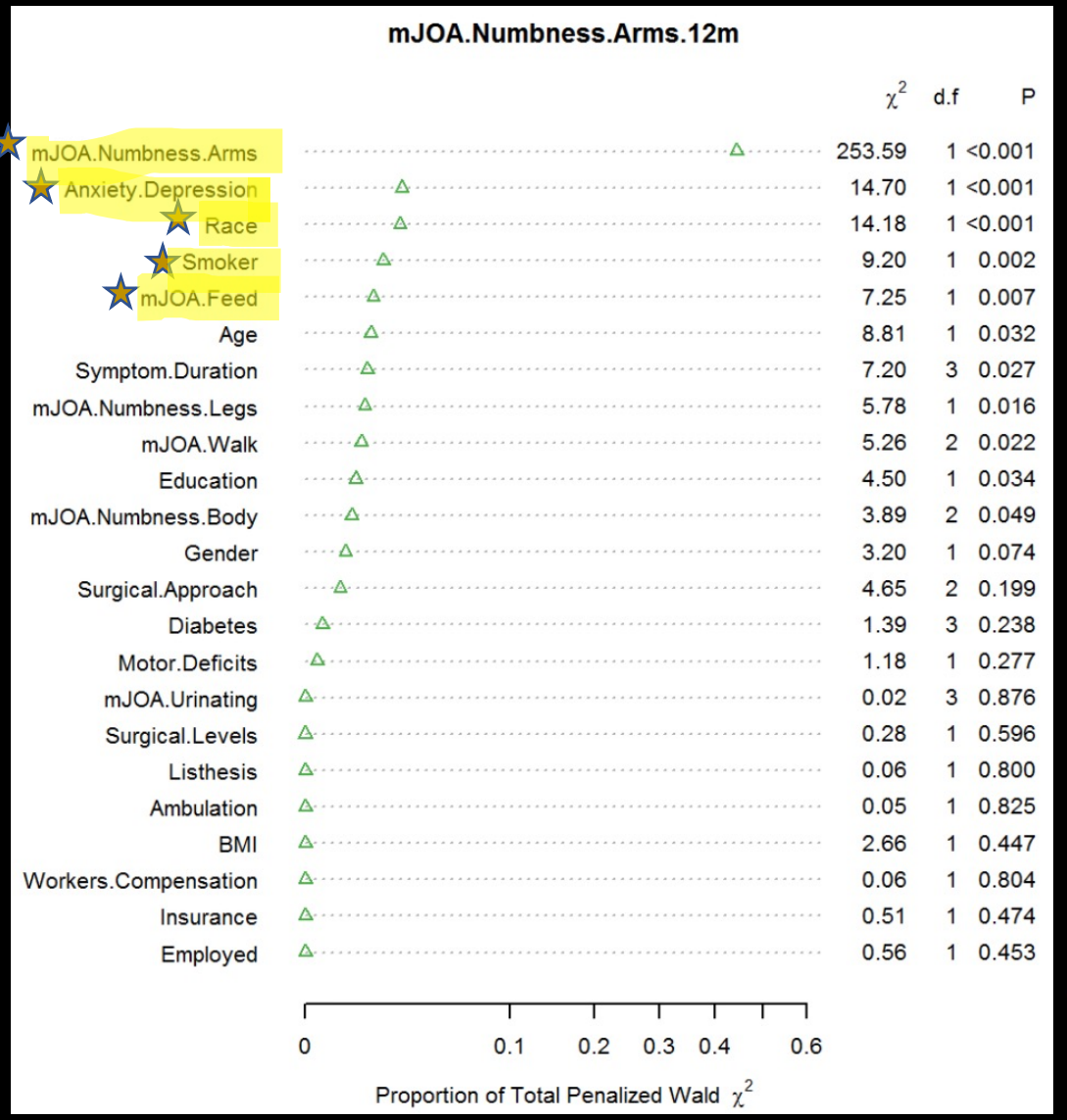
Results - Walk

- Top 5 predictors of 12 month mJOA walk scores :
  - Baseline mJOA walk score
  - Ambulatory status preop
  - Age
  - Baseline mJOA Numbness legs score
  - BMI



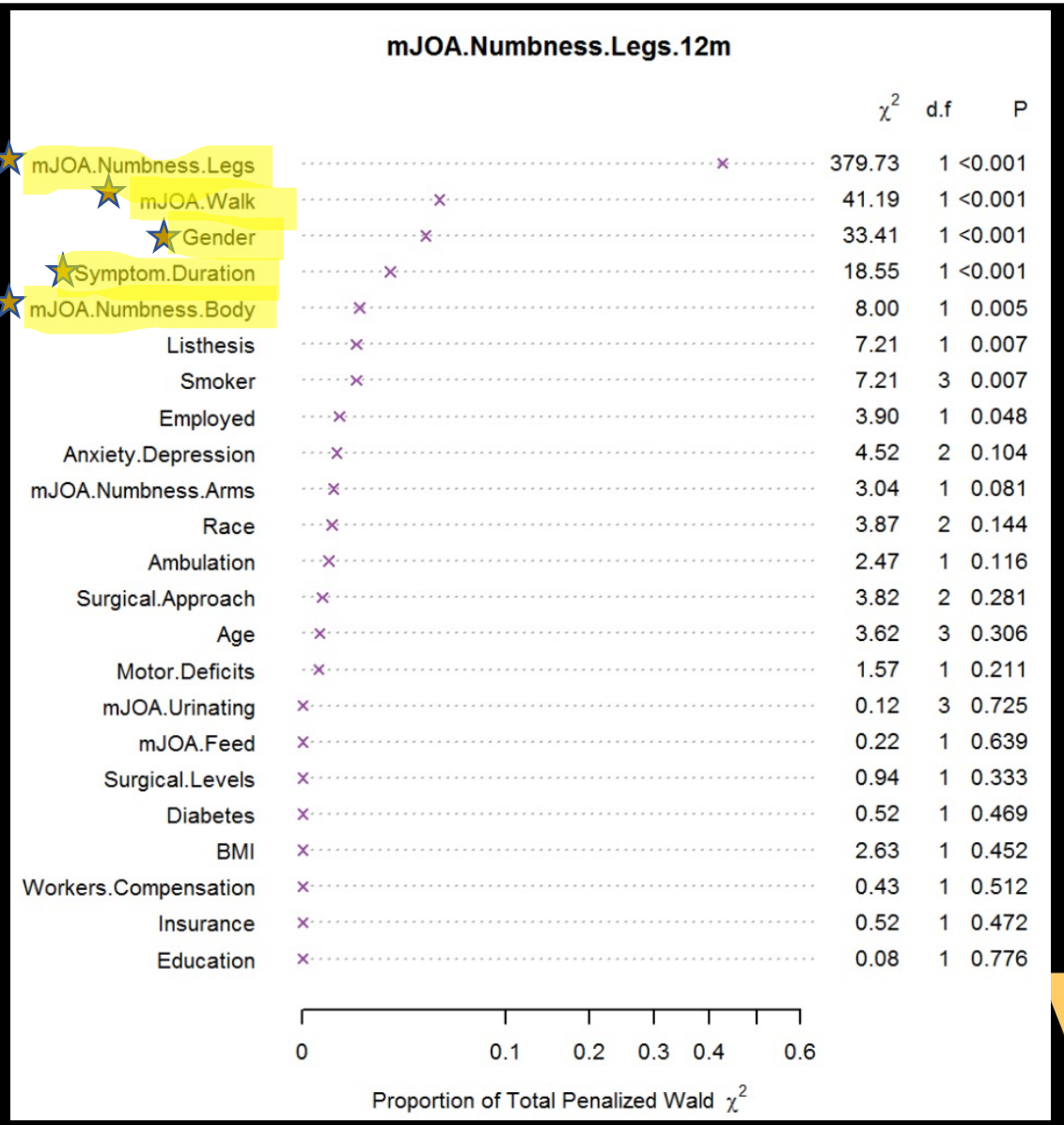
Results – Numbness in Arms

- Top 5 predictors of 12 month mJOA Numbness in Arm scores :
  - Baseline mJOA Numbness Arms score
  - Anxiety / Depression
  - Race
  - Smoking status
  - Baseline mJOA Feed score



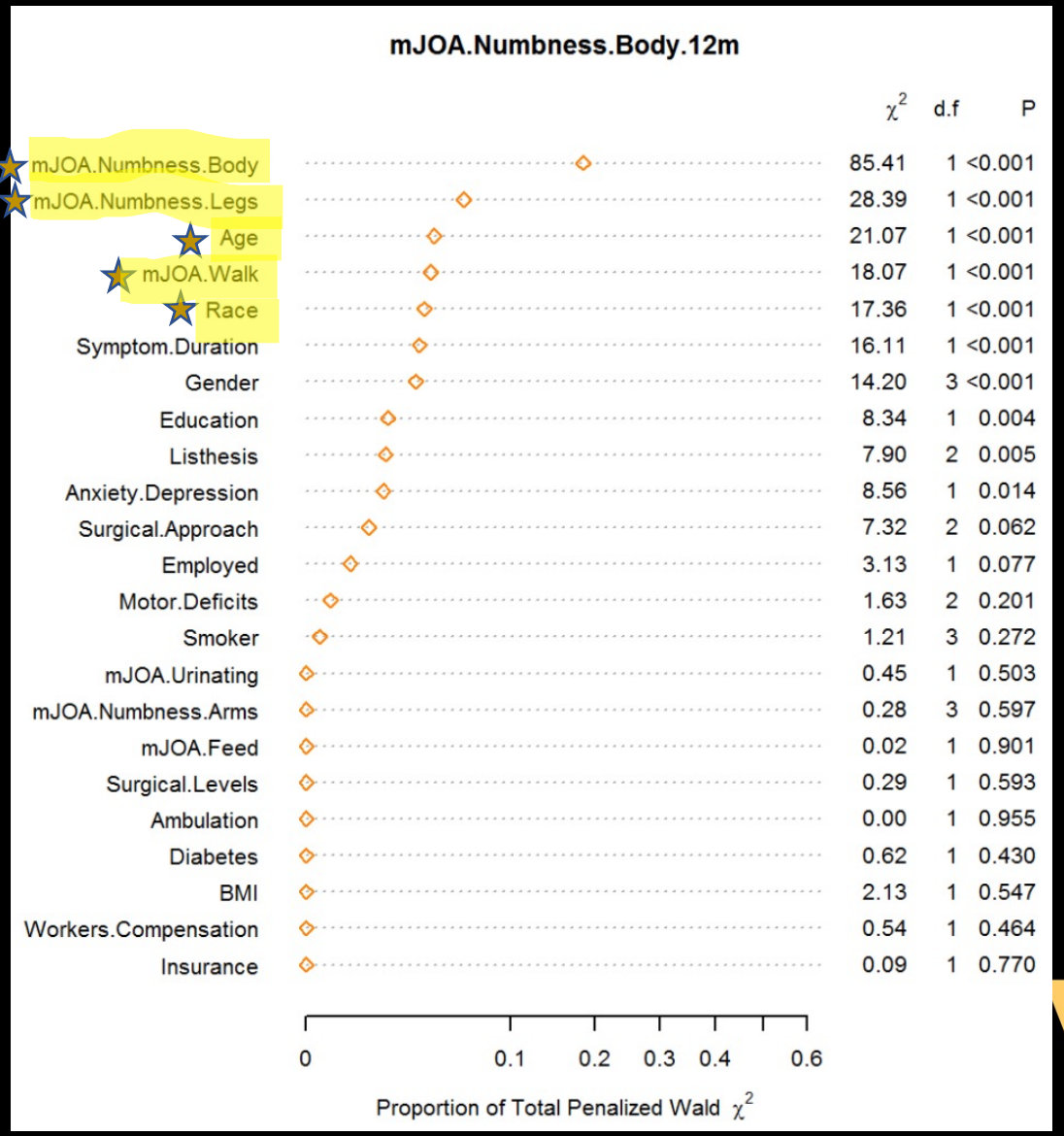
Results – Numbness in Legs

- Top 5 predictors of 12 month mJOA Numbness in Legs scores :
  - Baseline mJOA Numbness in Legs score
  - Baseline mJOA Walk score
  - Gender
  - Symptom Duration
  - Baseline mJOA Numbness in Body score



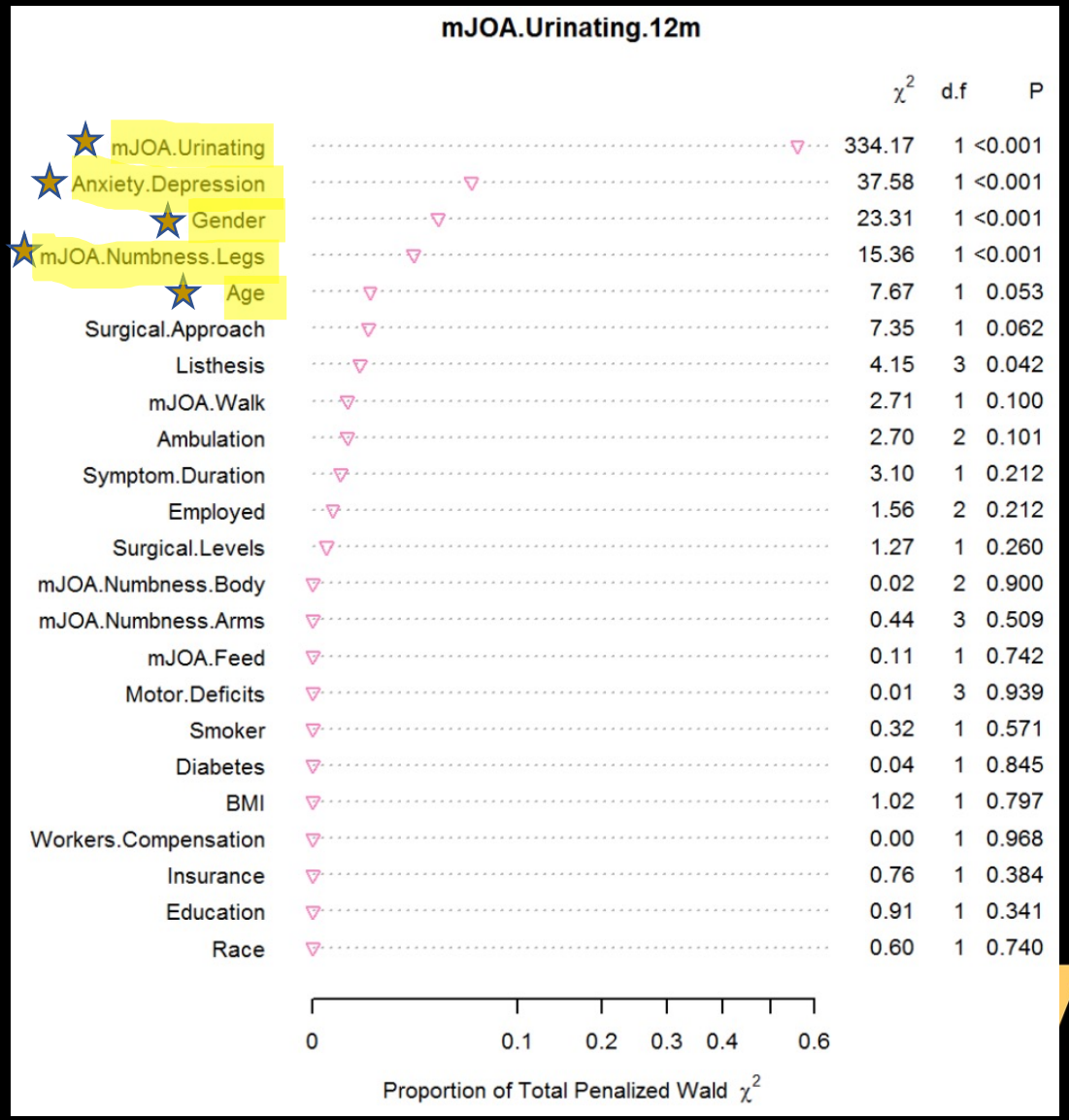
Results – Numbness in Body

- Top 5 predictors of 12 month mJOA Numbness in Body scores :
  - Baseline mJOA Numbness in Body score
  - Baseline mJOA Numbness in Legs score
  - Age
  - Baseline mJOA Walk score
  - Race



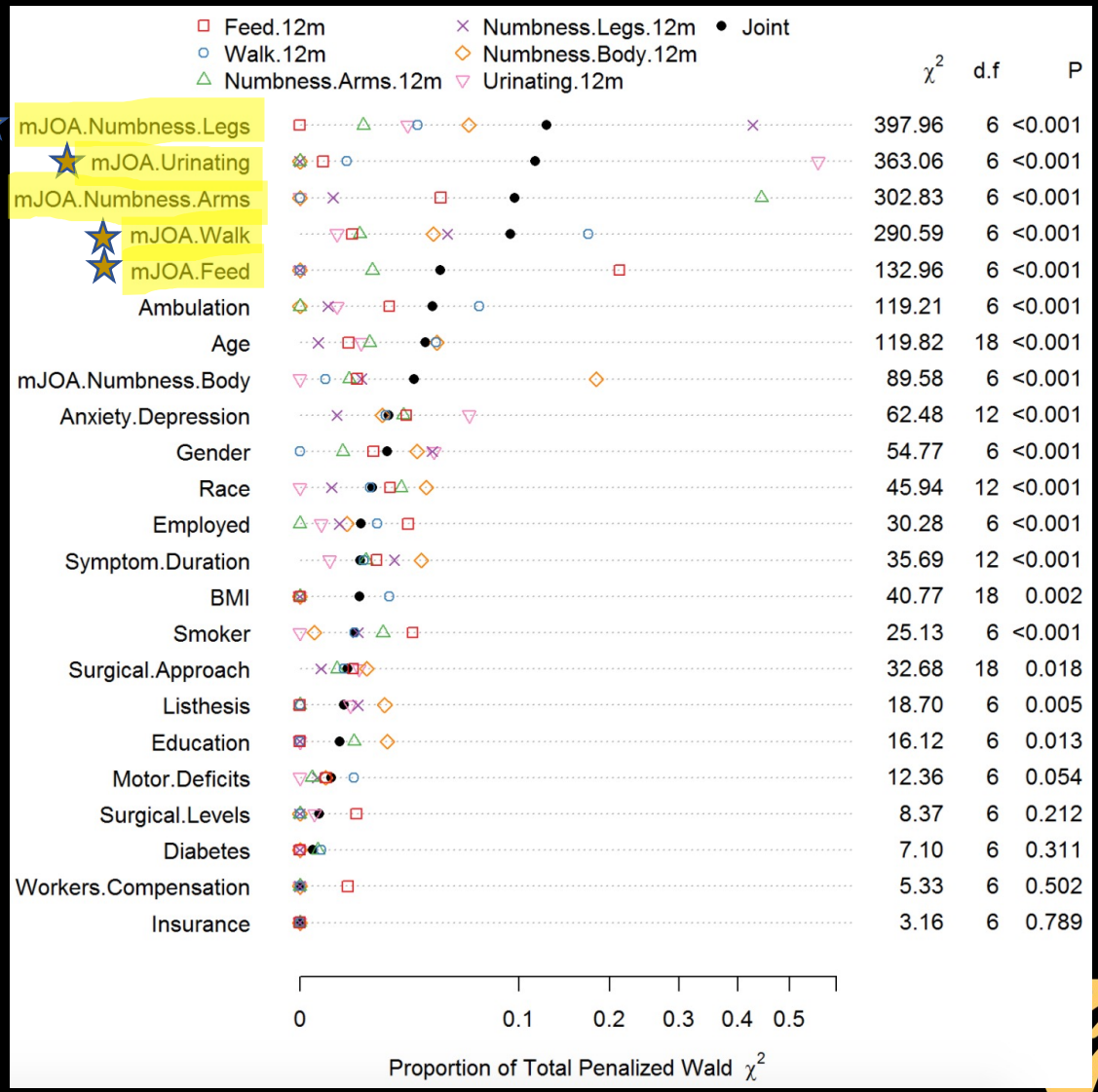
Results - Urination

- Top 5 predictors of 12 month mJOA Urination scores :
  - Baseline mJOA Urination score
  - Anxiety / Depression
  - Gender
  - Baseline mJOA Numbness in Legs score
  - Age



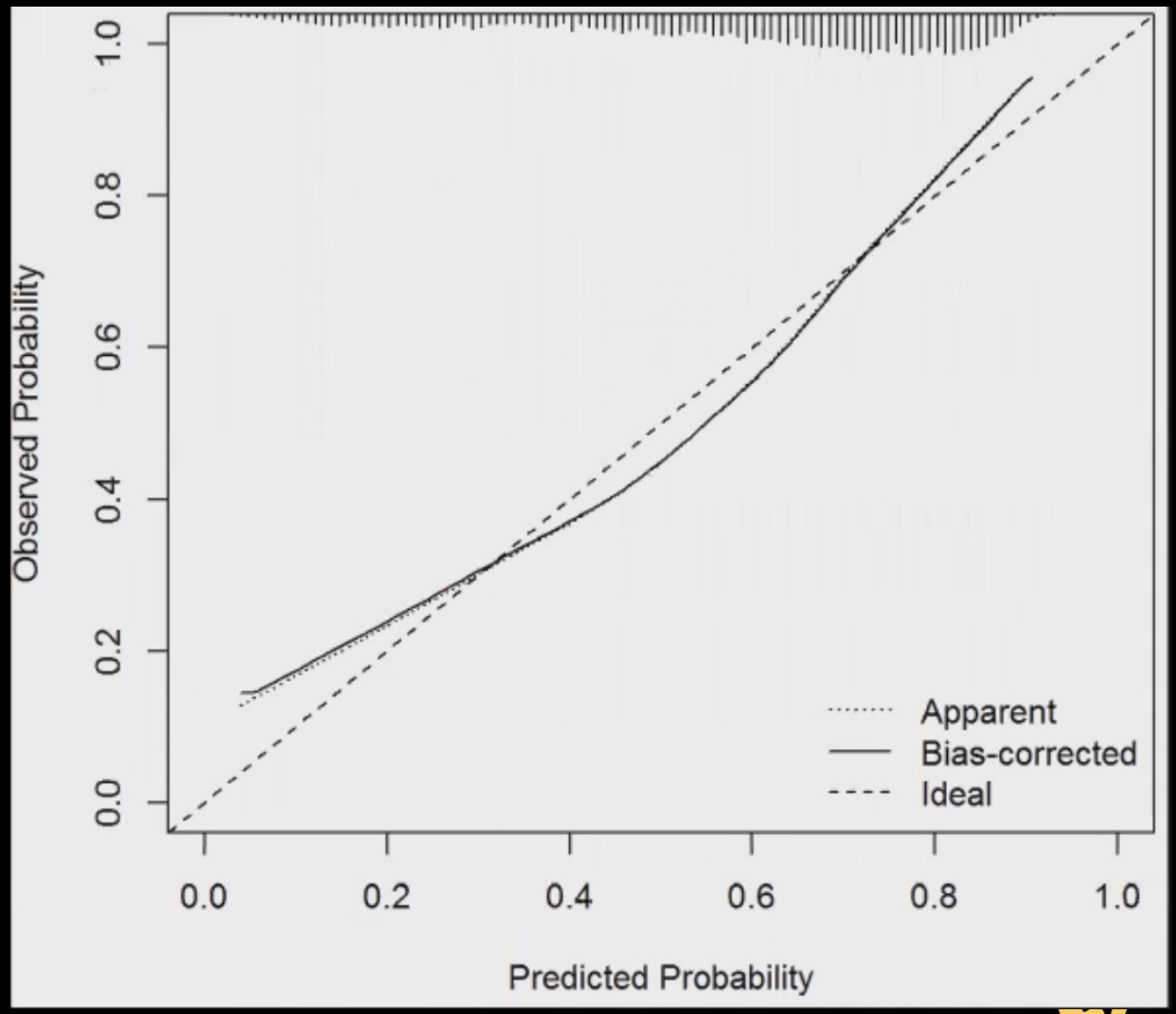
Results

- Multivariable analysis demonstrated that the *baseline subdomain mJOA score* was the strongest predictor for 12 m scores
- *Numbness in the legs* and *Ability to walk* predicted *5 of the 6* subdomain scores
- Additional Covariates that Predicted 3 or more of the subdomain scores at 12 m :
  - Age
  - Preoperative anxiety / depression
  - Gender
  - Race
  - Employment status
  - Duration of symptoms
  - Smoking status
  - Presence of spondylolisthesis



Results

- The following were NOT predictive of the 12 m mJOA subdomain scores :
  - Surgical approach
  - Presence of motor deficits ★
  - Number of surgical levels
  - Diabetes ★
  - Worker's compensation status
  - Insurance status
- Discriminative ability of the model (C-index) was 0.753



Online Predictive Calculator

https://statcomp2.app.vumc.org/mJOA/

Conclusions

- Our clinical model is the first of its kind to predict mJOA subdomain score at 12 m postop
- Our results highlight the importance of assessing preoperative numbness and ability to walk in these pts
- Modifiable factors important for our model include anxiety/depression and smoking
- Additional important variables include age, gender, race, employment status, symptom duration, and spondylolisthesis
- Future work will include prospective validation and the development of an EMR-embedded tool to assist in counseling patients facing surgery for DCM

Thank You

VANDERBILT Orthopaedics