**ML Models (MLR, LASSO, RF, GBM, MLP, SVR):**

**Feature Selection:**

* We selected the features based on domain knowledge and from previously running LASSO regression with the MIDUS Refresher data set (analysis from the summer) and seeing feature importance.

Selected Features:

|  |  |  |  |
| --- | --- | --- | --- |
| **DXA** | **BIS** | **Demographics** | **Muscle Function** |
| Lean Mass:   * COMB4DALM * COMB4IALM * COMB4ILLM   Bone Mass:   * COMB4DABM * COMB4DTBBM * COMB4DLBM   Fat Mass:   * COMB4DAFM * COMB4DTBFM * COMB4DLFM   Radius BMD:   * COMB4DLR3MD   Femur BMD:   * COMB4DLFNMD   Spine BMD:   * COMB4DLSL14MD | ECF:   * COMB4IMECF   ICF:   * COMB4IMICF   Fat Free Mass:   * COMB4IMFFM   Resistance at 0:   * COMB4IRES0   Resistance at Infinity:   * COMB4IRESINF   Resistance at ECF:   * COMB4IRESEXC   Resistance at ICF:   * COMB4IRESINC   Characteristic Frequency:   * COMB4IFCHAR   Cellular Capacitance:   * COMB4IMCAP | Sex:   * COMB1PRSEX   Race:   * COMB1PF7A   Age:   * COMB1PRAGE   Height:   * COMB4P1A | Handgrip Strength:   * tCOMB4IMaxGrip   Jump Power:   * tjumppownums |

How we put the features into each model:

\*Note: We did analysis INCLUDING the race feature (COMB1PF7A) vs EXCLUDING it…the features that we put into the models are the same (just whether we included COMB1PF7A or not)

These are the features for when we **INCLUDED** race (COMB1PF7A):

**DXA Only:**

* **Handgrip Strength (Arms):** COMB4DALM, COMB4DABM, COMB4DAFM, COMB4DLR3MD, COMB1PRSEX, COMB1PRAGE, COMB4P1A, COMB1PF7A, tCOMB4IMaxGrip
* **Handgrip Strength (Total Body):** COMB4IALM, COMB4DTBBM, COMB4DTBFM, COMB4DLR3MD, COMB4DLFNMD, COMB4DLSL14MD, COMB1PRSEX, COMB1PRAGE, COMB4P1A, COMB1PF7A, tCOMB4IMaxGrip
* **Jump Power (Legs):** COMB4ILLM, COMB4DLBM, COMB4DLFM, COMB4DLFNMD, COMB1PRSEX, COMB1PRAGE, COMB4P1A, COMB1PF7A, tjumppownums
* **Jump Power (Total Body):** COMB4IALM, COMB4DTBBM, COMB4DTBFM, COMB4DLR3MD, COMB4DLFNMD, COMB4DLSL14MD, COMB1PRSEX, COMB1PRAGE, COMB4P1A, COMB1PF7A, tjumppownums

**BIS Only:**

* **Handgrip Strength:** COMB4IMECF, COMB4IMICF, COMB4IMFFM, COMB4DTBFM, COMB4IRES0, COMB4IRESINF, COMB4IRESEXC, COMB4IRESINC, COMB4IFCHAR, COMB4IMCAP, COMB1PRSEX, COMB1PRAGE, COMB4P1A, COMB1PF7A, tCOMB4IMaxGrip
* **Jump Power:** COMB4IMECF, COMB4IMICF, COMB4IMFFM, COMB4DTBFM, COMB4IRES0, COMB4IRESINF, COMB4IRESEXC, COMB4IRESINC, COMB4IFCHAR, COMB4IMCAP, COMB1PRSEX, COMB1PRAGE, COMB4P1A, COMB1PF7A, tjumppownums

**Combination (DXA + BIS):**

* **Handgrip Strength (Arms):** COMB4DALM, COMB4DABM, COMB4DAFM, COMB4DLR3MD, COMB1PRSEX, COMB1PRAGE, COMB4P1A, COMB1PF7A, COMB4IMECF, COMB4IMICF, COMB4IMFFM, COMB4DTBFM, COMB4IRES0, COMB4IRESINF, COMB4IRESEXC, COMB4IRESINC, COMB4IFCHAR, COMB4IMCAP, tCOMB4IMaxGrip
* **Handgrip Strength (Total Body):** COMB4IALM, COMB4DTBBM, COMB4DTBFM, COMB4DLR3MD, COMB4DLFNMD, COMB4DLSL14MD, COMB1PRSEX, COMB1PRAGE, COMB4P1A, COMB1PF7A, COMB4IMECF, COMB4IMICF, COMB4IMFFM, COMB4DTBFM, COMB4IRES0, COMB4IRESINF, COMB4IRESEXC, COMB4IRESINC, COMB4IFCHAR, COMB4IMCAP, tCOMB4IMaxGrip
* **Jump Power (Legs):** COMB4ILLM, COMB4DLBM, COMB4DLFM, COMB4DLFNMD, COMB1PRSEX, COMB1PRAGE, COMB4P1A, COMB1PF7A, COMB4IMECF, COMB4IMICF, COMB4IMFFM, COMB4DTBFM, COMB4IRES0, COMB4IRESINF, COMB4IRESEXC, COMB4IRESINC, COMB4IFCHAR, COMB4IMCAP, tjumppownums
* **Jump Power (Total Body):** COMB4IALM, COMB4DTBBM, COMB4DTBFM, COMB4DLR3MD, COMB4DLFNMD, COMB4DLSL14MD, COMB1PRSEX, COMB1PRAGE, COMB4P1A, COMB1PF7A, COMB4IMECF, COMB4IMICF, COMB4IMFFM, COMB4DTBFM, COMB4IRES0, COMB4IRESINF, COMB4IRESEXC, COMB4IRESINC, COMB4IFCHAR, COMB4IMCAP, tjumppownums

\*We then ran ML models using the feature selection as shown above for each muscle function prediction (10 models for MLR, 10 for LASSO, 10 for RF, 10 for GBM, 10 for MLP, 10 for SVR)