Objective of prediction step

- To test the ability of the candidate domains, individually and in combination, to predict adverse outcomes
Testing the predictive ability

Adverse Outcomes

Mortality
ADL/IADL disability
Hospitalization
Fracture/Falls

Domains

1 2 3 4 5 6 7
Baseline independent variables

- **Predictors**
  - Fried’s 5
  - Fried’s 5 + cognition
  - Fried’s 5 + mood
  - All 7 domains

- **Confounders**
  - Demographics (age, sex, education)
  - Baseline ADL
  - Number of comorbidities (likely variability across studies)

- **Other risk factors where available**
  - Sensory
  - Social (likely variability across studies)
## Outcome variables

<table>
<thead>
<tr>
<th>Outcome</th>
<th>SIPA</th>
<th>UN</th>
<th>CSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Incident ADL disability</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Institutionalization</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Hospitalization</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Falls/Fracture</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Utilization of health care</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Utilization of home care services</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Statistical analyses (1/2)

- Test whether domains predict adverse outcomes, individually and in combination
  - Longitudinal data analyses for repeated measures, if more than one follow-up point
  - Exact model will depend on nature of outcome variable
    - Survival analysis
    - (Repeated measures) logistic regression (GEE)
    - (Repeated measures) ANOVA (for continuous outcomes)

- Test whether addition of cognition and/or mood better predicts the outcomes
  - Interested in both model prediction AND explanation
  - Prediction: Choose best prediction models, use of c-statistic, AIC, BIC
  - Explanation: Assess statistical significance of domain variables
Statistical analyses (2/2)

- Assess relative importance of each significant domain based on model coefficients

- **Major issue**: Multicollinearity among domains
  - Will need to be dealt with on a database by database basis
  - Assess correlation through
    - Regressing each domain on all others predictors
    - Rule of thumb for bivariate correlations $> 0.90$
  - Recommend combining domains that are too highly correlated
Other exploratory analyses of interest?

Assessing whether the whole of the 7 candidate domains of frailty is greater than the sum of its parts
Is the whole more than the sum of its parts?

Case 1: Whole = Sum of its parts
Is the whole more than the sum of its parts?

Case 2: Whole < Sum of its parts
Is the whole more than the sum of its parts?

Case 3: Whole > Sum of its parts

Worsening disability

# frailty markers