Version 1.2-Results

# Results

* The table below (Table \_) shows the estimate, standard error, test statistic, and p-values associated with the fixed-effect slope parameter as estimated by each modeling method.

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* The fixed effect slope parameter is being considered for comparison because:
  + It has been estimated in all models, so the effects on the parameter itself can be interpreted as effects due to model-approach changes
  + It will allow us to diagnose effects due to subject-level clustering when we compare properties of the parameter across different modeling techniques
* Displayed:
  + percent change in: parameter estimate, standard error, and test statistic for the MALAT1~CD19 variable pairing as defined by:

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* Displayed:
  + percent change in: parameter estimate, standard error, and test statistic for the FBLN1~CD34 variable pairing

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* Camparison of parameter estimates
  + We compare changes in the parameter estimate values because:
    - magnitude of change when comparing two model estimates can be indicative of the amount of subject-level correlation in the data
  + Findings:
    - Models LM and GEE have similar estimates -indicates that models with population-average interpretation parameters are more similar to each other
    - Models LM-FE, LM-RI, and LM-RS are also all similar -indicates that models with subject-specific interpretation parameters are more similar to each other
    - Estimates are less similar when comparing between the two clusters of similarity mentionioned
    - Accounting for subject-specific outcomes, results in a different estimate than when modeling population-averages, i.e. there is an effect from subject-level correlation
    - The effect is more pronounced in the FBLN1~CD34 pairing than the MALAT1~CD19 pairing

## Standard Error Estimates

* Comparison of standard error of estimates
  + We compare changes in the standard error of estimates because:
    - a change in a parameter’s SE across modeling methodologies represents a revision in the underlying evidence the method is using to support its result.
    - e.g. increase SE between two models indicates a decrease in an estimate’s precision
  + Findings:
    - The standard error of the fixed effect slope parameter estimate is highest for the random slope model, which differs from all models with the incorperation of subject-specific variablility relationships between predictor and response
    - The SE is lowest for the random intercept model, which differs from all models either by lacking the incorperation of subject-specific varibility relationships between predictor and response (i.e. nested within LMM-RS model), or incorperating subject-specific variability information independent of predictors
    - The fixed-effect subject-specific intercept had a lower SE than either of the population-average parameter interpretaion models LM and GEE. The LM-FE model incorperates subject-specific predictor-independent information into the mean-effect of the model.

## Test Statistics

* Comparison of test statistics
  + we compare changes in the test-statistics of estimates because:
    - patterns we observe in test statistic percent change matrices can serve to reinforce previous conclusions we have made using estimated coefficients and standard errors.
  + Findings:
    - Changes in test statistics for the fixed-effect main-effect slope were smaller between LM and GEE, as well as between LM-FE, LMM-RI, and LMM-RS with few exceptions.
    - There was undetectable change between LM and GEE
    - Changes to the LMM-RS resulted in loss of significance (larger p-value)

## Nested Model Comparisons

### Test for FE Subject Specific Intercept

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The table above is a nested model comparison, the result of which is an F-test statistic telling us that there is very strong evidence to support the inclusion of the subject-specific fixed-effect intercept into the LM model.

### Test for RE Subject Specific Intercept

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The table above is a nested model comparison, the result of which is a likelihood ratio statistic telling us that there is very strong evidence to support the inclusion of the subject-specific random effect intercept into the LM model.

### Test for RE Subject Specific Slope

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The table above is a nested model comparison, the result of which is a likelihood ratio statistic telling us that there is very strong evidence to support the inclusion of the subject-specific random effect slope into the LMM-RI model for the MALAT1~CD19 variable pairing. However, there is insufficient evidence to support the inclusion of the subject-specific random effect slope into the LMM-RI model for the FBLN~CD34 variable pairing.

# References