The general fixed effects model has the general form:

Y = β0 + β1\*IE-Bike 2 #1 + β2\*IE-Bike 3 #1 +

β3\*IRegular #2 + β5\*IE-Bike 2 #2+ β6\*IE-Bike 3 #2 +

β4\* IRegular #3 + β7\*IE-Bike 2 #3+ β8\*IE-Bike 3 #3 +

εSubject + εRandom

where:

I is an indicator variable for the bike type and which order it was ridden in- for example, IE-Bike 2 #3 is if the subject rode an E-Bike at assist level 2 third during the testing

β0 is the estimator for a subject riding a regular bike first

β1 is the estimator for a subject riding an E-Bike at assist level 2 first

β2 is the estimator for a subject riding an E-Bike at assist level 3 first

β3 is the estimator for a subject riding a regular bike second

β4 is the estimator for a subject riding a regular bike third

β5 is the estimator for a subject riding an E-Bike at assist level 2 second

β6 is the estimator for a subject riding an E-Bike at assist level 3 second

β7 is the estimator for a subject riding an E-Bike at assist level 2 third

β8 is the estimator for a subject riding an E-Bike at assist level 3 third

εSubject is the random effect due to individual subjects, and follows N(0, σ2subject)

εRandom is the random effect due to other differences, and follows N(0, σ2random)

|  |  |  |  |
| --- | --- | --- | --- |
| Heart Rate | | | |
| Estimator | Estimate | Variance | Test Statistic |
| β0 | 125 | 12 | 10 |
| β1 | -13 | 12 | -1 |
| β2 | -13 | 12 | -1 |
| β3 | 11 | 12 | 1 |
| β4 | -4 | 13 | -.5 |
| β5 | 11 | 19 | .5 |
| β6 | -18 | 18 | -1 |
| β7 | 19 | 18 | 1 |
| β8 | 9 | 18 | .5 |
| σ2subject | 24 |  |  |
| σ2residual | 11 |  |  |

An example of the model for heart rate when the E-Bike at assist level 2 was ridden second is HR= 125 + 11

|  |  |  |  |
| --- | --- | --- | --- |
| %VO2 Max | | | |
| Estimator | Estimate | Variance | Test Statistic |
| β0 | 53 | 8 | 6 |
| β1 | -16 | 9 | -2 |
| β2 | -15 | 9 | -2 |
| β3 | 5 | 8 | .5 |
| β4 | -5 | 9 | -.5 |
| β5 | 14 | 13 | 1 |
| β6 | -11 | 13 | -1 |
| β7 | 17 | 13 | 1 |
| β8 | 12 | 13 | 1 |
| σ2subject | 16 |  |  |
| σ2residual | 8 |  |  |

An example of the model for VO2 Max % when the regular bike was ridden first is

%VO2 Max = 53

|  |  |  |  |
| --- | --- | --- | --- |
| Rate of Perceived Effort (RPE) | | | |
| Estimator | Estimate | Variance | Test Statistic |
| β0 | 11 | 1.1 | 10 |
| β1 | -2 | 1.3 | -2 |
| β2 | -1 | 1.3 | -1 |
| β3 | 3 | 1.3 | 2 |
| β4 | 1 | 1.3 | 1 |
| β5 | -2 | 1.9 | -1 |
| β6 | -4 | 1.8 | -2 |
| β7 | 1 | 1.8 | 1 |
| β8 | 0 | 1.9 | 0 |
| σ2subject | 1.5 |  |  |
| σ2residual | 1.2 |  |  |

An example of the model for heart rate when the E-Bike at assist level 3 was ridden third is RPE= 11 + 0

|  |  |  |  |
| --- | --- | --- | --- |
| RF | | | |
| Estimator | Estimate | Variance | Test Statistic |
| β0 | 28 | 2.5 | 10 |
| β1 | -3 | 2.5 | -1 |
| β2 | -4 | 2.5 | -2 |
| β3 | 0 | 2.5 | 0 |
| β4 | -1.5 | 2.5 | -.5 |
| β5 | 4 | 3.5 | 1 |
| β6 | .7 | 3.5 | 0 |
| β7 | 5 | 3.5 | 1 |
| β8 | 7 | 3.5 | 2 |
| σ2subject | 6 |  |  |
| σ2residual | 2 |  |  |

An example of the model for RF when the E-Bike at assist level 2 was ridden first is

RF= 28 – 3

|  |  |  |  |
| --- | --- | --- | --- |
| RQ | | | |
| Estimator | Estimate | Variance | Test Statistic |
| β0 | .9 | .02 | 33 |
| β1 | -.02 | .03 | -1 |
| β2 | -.01 | .03 | -1 |
| β3 | 0 | .03 | 0 |
| β4 | -.01 | .03 | -.5 |
| β5 | .02 | .04 | .5 |
| β6 | -.03 | .04 | -1 |
| β7 | -.02 | .04 | -.5 |
| β8 | -.02 | .04 | -.5 |
| σ2subject | .04 |  |  |
| σ2residual | .02 |  |  |

An example of the model for RQ when the regular bike was ridden first is

RQ= .9

|  |  |  |  |
| --- | --- | --- | --- |
| EEm | | | |
| Estimator | Estimate | Variance | Test Statistic |
| β0 | 9 | 2 | 4 |
| β1 | -2 | 2 | -1 |
| β2 | -1 | 2 | 0 |
| β3 | 1.5 | 2 | .5 |
| β4 | 0 | 2 | 0 |
| β5 | 1 | 3 | 0 |
| β6 | -4 | 3 | -1 |
| β7 | 1.5 | 3 | .5 |
| β8 | 0 | 3 | 0 |
| σ2subject | 2.4 |  |  |
| σ2residual | 2.2 |  |  |

An example of the model for EEm when the E-Bike at assist level 2 was ridden third is

EEm= 9 + 1.5

|  |  |  |  |
| --- | --- | --- | --- |
| Time (seconds) | | | |
| Estimator | Estimate | Variance | Test Statistic |
| β0 | 788 | 67 | 12 |
| β1 | 8 | 76 | 0 |
| β2 | -44 | 72 | -.5 |
| β3 | 110 | 72 | 1.5 |
| β4 | 131 | 76 | 1.5 |
| β5 | -209 | 112 | -1.8 |
| β6 | -113 | 105 | -1 |
| β7 | -129 | 106 | -1 |
| β8 | -271 | 112 |  |
| σ2subject | 104 |  |  |
| σ2residual | 71 |  |  |

An example of the model for time when the E-Bike at assist level 3 was ridden second is

Time= 788 - 113