Clusters Descriptives

```
$vars
 [1] "Weight (kgs)_First Visit"       "Age"
 [3] "Sagittal Balance"               "Coronal Balance (C7PL to CSVL)"
 [5] "Static Major curve Cobb angle"  "Pelvic Tilt"
 [7] "ODI - Score (%)"                "SRS22 - Function / Activity"
 [9] "SRS22 - Mental health"          "SRS22 - Pain"
[11] "SRS22 - Self image / Appearance" "SRS22 - SRS Subtotal score"
```

Initial Patients: 372

Complications

```
complication_data <- read_excel(xls_path, sheet = 'Complications') %>%
  as.data.table() %>%
  .['Complication Type'=='Primary']
```

Clustering Creation

Number of patients

```
   cluster   N
1:       1 205
2:       2  63
3:       3 104
```

Coefficients of multinomial regression (p-values in parenthesis)

```
                           variable              2              3
 1:                     (Intercept)  -7.58 (0.6373) -6.03 (0.3282)
 2:       'Weight (kgs)_First Visit'   0.82 (0.0529)   0.09 (0.032)
 3:                            Age  -0.25 (0.1488)   -0.1 (0.0313)
 4:               'Sagittal Balance'   0.17 (0.102) -0.04 (0.0052)
 5:  'Coronal Balance (C7PL to CSVL)'   0.29 (0.0596)  -0.04 (0.264)
 6:   'Static Major curve Cobb angle'  -0.16 (0.1599)   0.15 (9e-04)
 7:                    'Pelvic Tilt'  -0.18 (0.2777) -0.15 (0.0772)
 8:                'ODI - Score (%)'   0.46 (0.0867) -0.14 (0.0307)
 9:     'SRS22 - Function / Activity'   1.15 (0.6342)       5.44 (0)
10:          'SRS22 - Mental health'  -8.83 (0.1503)      2.8 (0.001)
11:                   'SRS22 - Pain' -14.83 (0.1052)       5.36 (0)
12: 'SRS22 - Self image / Appearance'   1.08 (0.5645)  1.05 (0.2927)
13:       'SRS22 - SRS Subtotal score' -11.16 (0.0054)      -13.49 (0)
```

Radiology

Static Major curve Cobb angle standard error confidence intervals
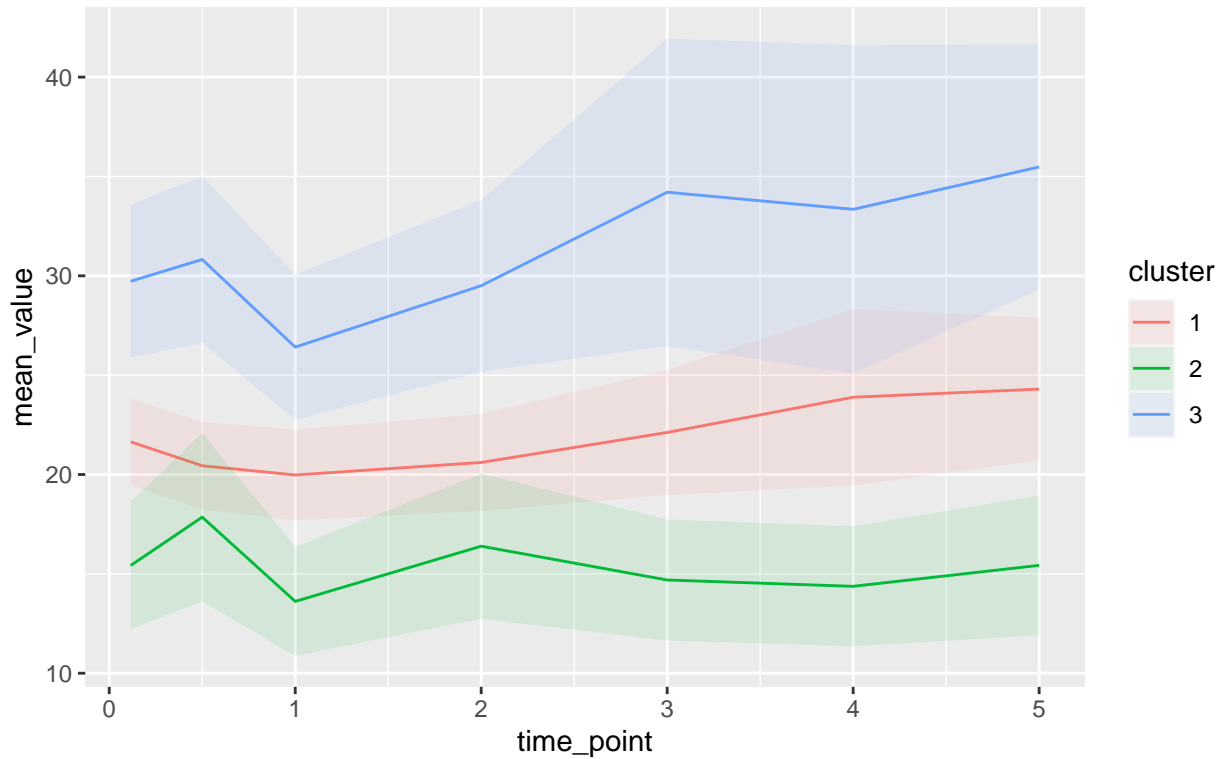

```
Global differences between clusters
  cluster   emmean         SE         df lower.CL upper.CL
1       1 20.68462 0.6830407  629.8621 19.34331 22.02594
2       2 15.61045 1.0851776 1248.8625 13.48147 17.73942
3       3 29.17076 0.8579996 1012.5457 27.48710 30.85442
  contrast   estimate         SE       df    t.ratio      p.value
1  1 - 2   5.074179 1.1510630 1631.979   4.408255 3.301910e-05
2  1 - 3  -8.486137 0.9381524 1631.364  -9.045585 0.000000e+00
3  2 - 3 -13.560316 1.2643097 1630.907 -10.725470 6.715739e-13


Time point differences between clusters

        Year: 0.115384615384615
  cluster   emmean       SE  df lower.CL upper.CL
1       1 21.64364 1.173869 315 19.33402 23.95325
2       2 15.42100 2.202373 315 11.08778 19.75422
3       3 29.72587 1.623611 315 26.53138 32.92036
  contrast  estimate       SE  df   t.ratio      p.value
1  1 - 2   6.222636 2.495679 315   2.493364 3.505689e-02
2  1 - 3  -8.082233 2.003517 315  -4.034023 2.029415e-04
```

```
3    2 - 3 -14.304870 2.736158 315 -5.228087 9.349948e-07

        Year: 0.5
  cluster   emmean       SE  df lower.CL upper.CL
1       1 20.44089 1.270451 303 17.94086 22.94091
2       2 17.85500 2.383859 303 13.16399 22.54601
3       3 30.82157 1.750677 303 27.37655 34.26660
  contrast   estimate       SE  df    t.ratio      p.value
1    1 - 2   2.585888 2.701264 303  0.9572879 6.044537e-01
2    1 - 3 -10.380685 2.163080 303 -4.7990291 7.476698e-06
3    2 - 3 -12.966573 2.957643 303 -4.3840894 4.772126e-05

        Year: 1
  cluster   emmean       SE  df lower.CL upper.CL
1       1 19.97665 1.165125 324 17.68448 22.26881
2       2 13.61400 2.101928 324  9.47885 17.74915
3       3 26.41183 1.616433 324 23.23180 29.59186
  contrast   estimate       SE  df    t.ratio      p.value
1    1 - 2   6.362648 2.403252 324  2.647516 2.307493e-02
2    1 - 3  -6.435180 1.992579 324 -3.229573 3.897852e-03
3    2 - 3 -12.797828 2.651595 324 -4.826464 6.397897e-06

        Year: 2
  cluster   emmean       SE  df lower.CL upper.CL
1       1 20.60705 1.363467 277 17.92298 23.29113
2       2 16.39200 2.329894 277 11.80545 20.97855
3       3 29.50202 1.797552 277 25.96343 33.04062
  contrast   estimate       SE  df    t.ratio      p.value
1    1 - 2   4.215055 2.699528 277  1.561405 2.642078e-01
2    1 - 3  -8.894969 2.256156 277 -3.942534 3.002819e-04
3    2 - 3 -13.110024 2.942720 277 -4.455070 3.617872e-05

        Year: 3
  cluster   emmean       SE  df  lower.CL upper.CL
1       1 22.11689 1.637476 141 18.879710 25.35407
2       2 14.69269 3.046559 141  8.669853 20.71553
3       3 34.20643 2.935738 141 28.402676 40.01018
  contrast   estimate       SE  df    t.ratio      p.value
1    1 - 2   7.424197 3.458736 141  2.146506 8.428700e-02
2    1 - 3 -12.089540 3.361530 141 -3.596439 1.287670e-03
3    2 - 3 -19.513736 4.230849 141 -4.612251 2.627858e-05

        Year: 4
  cluster   emmean       SE  df  lower.CL upper.CL
1       1 23.88972 2.053078 120 19.824770 27.95467
2       2 14.37276 3.234988 120  7.967707 20.77781
3       3 33.34500 3.714158 120 25.991225 40.69877
  contrast   estimate       SE  df    t.ratio      p.value
1    1 - 2   9.516964 3.831485 120  2.483884 0.0379569877
2    1 - 3  -9.455278 4.243831 120 -2.228005 0.0705681643
3    2 - 3 -18.972241 4.925456 120 -3.851875 0.0005527011

        Year: 5
  cluster   emmean       SE  df  lower.CL upper.CL
```

```
1        1 24.29842 1.830841 139 20.678524 27.91832
2        2 15.42893 3.016326 139  9.465115 21.39274
3        3 35.47737 2.589200 139 30.358060 40.59668
  contrast   estimate       SE  df   t.ratio       p.value
1   1 - 2   8.869492 3.528484 139  2.513683 3.474550e-02
2   1 - 3 -11.178947 3.171109 139 -3.525248 1.652352e-03
3   2 - 3 -20.048440 3.975196 139 -5.043384 4.184415e-06


Predictive Capability   time_point    rmse relative_rmse
1:            2 17.59239    1.0281157
2:            5 16.85922    0.9751844
```

Coronal Balance (C7PL to CSVL)
standard error confidence intervals
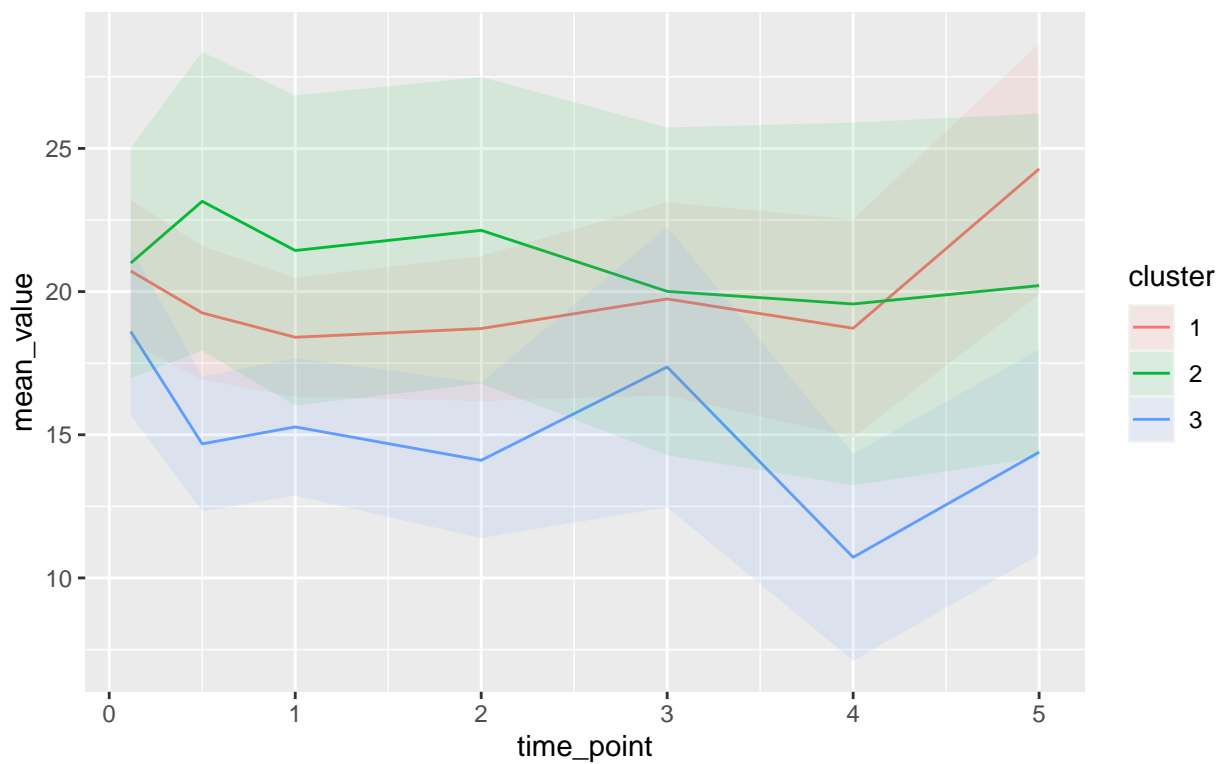

```
Global differences between clusters
  cluster   emmean       SE       df lower.CL upper.CL
1       1 18.90094 0.6281919  685.0136 17.66752 20.13435
2       2 21.36103 1.0072427 1165.4502 19.38482 23.33724
3       3 15.65295 0.8124659 1058.8274 14.05873 17.24718
  contrast   estimate       SE       df   t.ratio       p.value
1   1 - 2 -2.460091 1.1105266 1485.274 -2.215247 6.894229e-02
2   1 - 3  3.247982 0.9331155 1502.317  3.480793 1.491254e-03
3   2 - 3  5.708073 1.2221436 1493.798  4.670543 9.766939e-06


Time point differences between clusters
```

```
        Year: 0.115384615384615
   cluster   emmean        SE  df lower.CL upper.CL
1        1 20.72019 1.211375 291 18.33603 23.10436
2        2 20.99538 2.091428 291 16.87914 25.11163
3        3 18.60655 1.616906 291 15.42424 21.78887
   contrast   estimate        SE  df    t.ratio    p.value
1   1 - 2 -0.2751911 2.416919 291 -0.1138603 0.9928783
2   1 - 3  2.1136418 2.020350 291  1.0461758 0.5483737
3   2 - 3  2.3888329 2.643569 291  0.9036394 0.6384378

        Year: 0.5
   cluster   emmean        SE  df lower.CL upper.CL
1        1 19.25513 1.167060 281 16.95784 21.55242
2        2 23.15229 2.090417 281 19.03743 27.26716
3        3 14.68268 1.599361 281 11.53443 17.83093
   contrast   estimate        SE  df   t.ratio      p.value
1   1 - 2 -3.897162 2.394133 281 -1.627797 0.235621996
2   1 - 3  4.572447 1.979895 281  2.309439 0.056117667
3   2 - 3  8.469609 2.632071 281  3.217849 0.004108632

        Year: 1
   cluster   emmean        SE  df lower.CL upper.CL
1        1 18.40553 1.121571 276 16.19761 20.61345
2        2 21.43396 1.982675 276 17.53087 25.33705
3        3 15.27457 1.526264 276 12.26997 18.27917
   contrast   estimate        SE  df   t.ratio     p.value
1   1 - 2 -3.028425 2.277921 276 -1.329469 0.38002874
2   1 - 3  3.130965 1.894044 276  1.653058 0.22534575
3   2 - 3  6.159390 2.502096 276  2.461692 0.03826289

        Year: 2
   cluster   emmean        SE  df lower.CL upper.CL
1        1 18.70912 1.309868 258 16.12973 21.28852
2        2 22.13904 2.126112 258 17.95230 26.32578
3        3 14.10722 1.806848 258 10.54918 17.66527
   contrast   estimate        SE  df   t.ratio     p.value
1   1 - 2 -3.429914 2.497220 258 -1.373493 0.35633344
2   1 - 3  4.601902 2.231693 258  2.062068 0.09986914
3   2 - 3  8.031816 2.790170 258  2.878611 0.01200882

        Year: 3
   cluster   emmean        SE  df lower.CL upper.CL
1        1 19.74374 1.642041 145 16.49831 22.98916
2        2 20.00769 3.071977 145 13.93605 26.07933
3        3 17.36935 2.813350 145 11.80888 22.92983
   contrast   estimate        SE  df     t.ratio   p.value
1   1 - 2 -0.263956 3.483294 145 -0.07577771 0.9968392
2   1 - 3  2.374381 3.257489 145  0.72889929 0.7467692
3   2 - 3  2.638337 4.165571 145  0.63336761 0.8020026

        Year: 4
   cluster   emmean        SE  df  lower.CL upper.CL
1        1 18.71945 1.829821 124 15.097724 22.34118
```

5

```
2        2 19.56828 2.903160 124 13.822109 25.31444
3        3 10.72120 3.126799 124  4.532389 16.91001
  contrast    estimate       SE  df    t.ratio    p.value
1    1 - 2 -0.8488238 3.431702 124 -0.2473477 0.96684489
2    1 - 3  7.9982521 3.622860 124  2.2077176 0.07380563
3    2 - 3  8.8470759 4.266756 124  2.0734899 0.09956287

         Year: 5
  cluster   emmean       SE  df  lower.CL upper.CL
1       1 24.28480 1.953662 138 20.421817 28.14778
2       2 20.20857 3.197430 138 13.886281 26.53086
3       3 14.39158 2.744658 138  8.964556 19.81860
  contrast estimate       SE  df  t.ratio    p.value
1    1 - 2 4.076229 3.747046 138 1.087851 0.52320178
2    1 - 3 9.893221 3.368968 138 2.936573 0.01079249
3    2 - 3 5.816992 4.213871 138 1.380439 0.35393686

Predictive Capability   time_point      rmse relative_rmse
1:              2 14.44033       0.929947
2:              5 20.60558       1.189876
```

Sagittal Balance
standard error confidence intervals
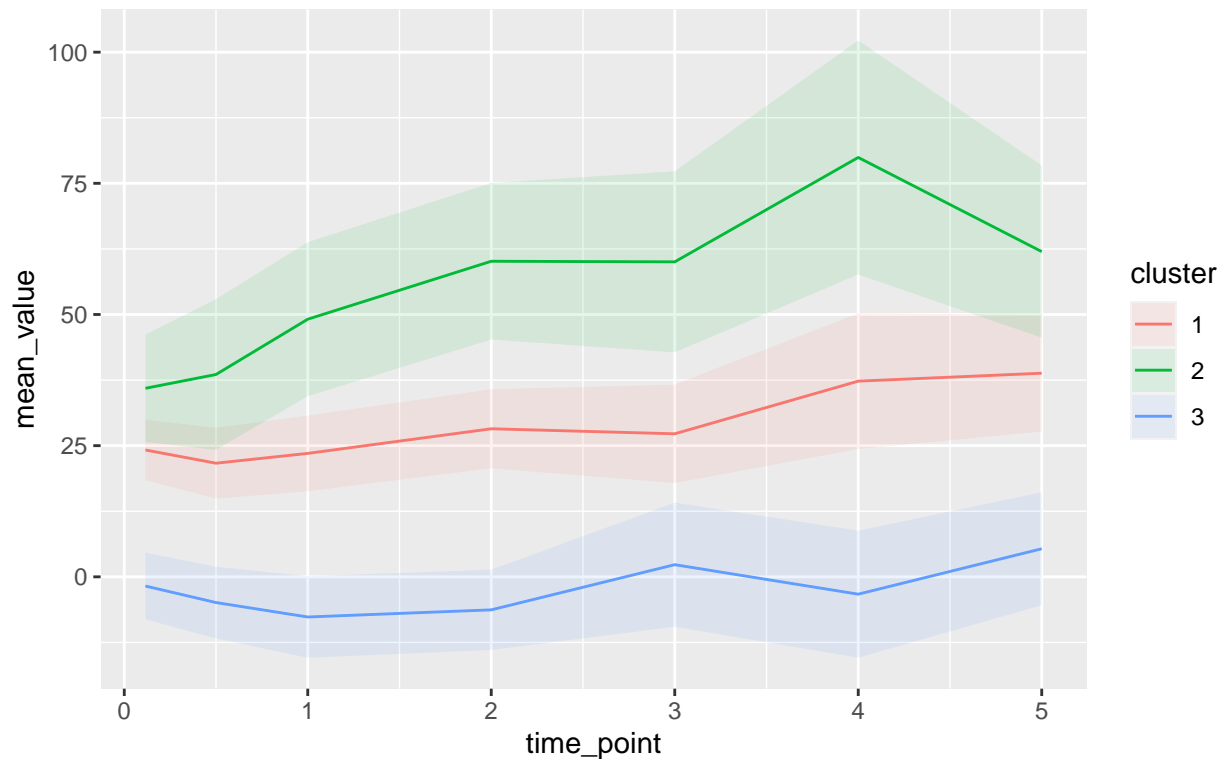

```
Global differences between clusters
  cluster      emmean       SE        df  lower.CL  upper.CL
1       1 28.0033029 1.852564  661.1004 24.365685 31.640921
```

```
2        2 47.5259261 2.875562 1184.2930 41.884163 53.167689
3        3 -0.3700156 2.346002 1035.0807 -4.973477  4.233446
  contrast  estimate       SE       df   t.ratio       p.value
1   1 - 2 -19.52262 3.120928 1542.675 -6.255391 1.535479e-09
2   1 - 3  28.37332 2.640787 1545.362 10.744266 0.000000e+00
3   2 - 3  47.89594 3.438115 1543.119 13.930874 0.000000e+00


Time point differences between clusters

        Year: 0.115384615384615
  cluster    emmean       SE  df  lower.CL  upper.CL
1       1 24.174750 2.800067 296 18.664188 29.685312
2       2 35.934630 4.819828 296 26.449156 45.420103
3       3 -1.752588 3.841661 296 -9.313017  5.807841
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -11.75988 5.574148 296 -2.109718 8.958430e-02
2   1 - 3  25.92734 4.753812 296  5.454010 3.114483e-07
3   2 - 3  37.68722 6.163530 296  6.114551 9.154669e-09


        Year: 0.5
  cluster    emmean       SE  df  lower.CL  upper.CL
1       1 21.654204 3.361409 292  15.03854 28.269864
2       2 38.565882 5.897746 292  26.95840 50.173363
3       3 -4.900345 4.515559 292 -13.78751  3.986824
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -16.91168 6.788408 292 -2.491259 3.534798e-02
2   1 - 3  26.55455 5.629329 292  4.717178 1.105960e-05
3   2 - 3  43.46623 7.427899 292  5.851753 3.909006e-08


        Year: 1
  cluster    emmean       SE  df  lower.CL  upper.CL
1       1 23.528654 3.602385 288  16.43831 30.618994
2       2 49.104038 6.239513 288  36.82321 61.384867
3       3 -7.655181 4.938708 288 -17.37572  2.065357
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -25.57538 7.204769 288 -3.549785 1.304757e-03
2   1 - 3  31.18383 6.112938 288  5.101285 1.832014e-06
3   2 - 3  56.75922 7.957535 288  7.132764 2.453981e-11


        Year: 2
  cluster    emmean       SE  df  lower.CL  upper.CL
1       1 28.219776 3.807739 259  20.72171 35.717844
2       2 60.146731 6.112486 259  48.11023 72.183228
3       3 -6.290789 5.056066 259 -16.24702  3.665442
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -31.92695 7.201483 259 -4.433386 4.070508e-05
2   1 - 3  34.51057 6.329509 259  5.452329 3.468942e-07
3   2 - 3  66.43752 7.932609 259  8.375242 2.088330e-13


        Year: 3
  cluster    emmean       SE  df  lower.CL upper.CL
1       1 27.264382 4.549190 143  18.27203 36.25673
2       2 60.033077 8.416710 143  43.39583 76.67032
```

```
3       3  2.316774 7.708115 143 -12.91980 17.55335
  contrast  estimate        SE  df   t.ratio       p.value
1   1 - 2 -32.76869  9.567452 143 -3.425018 2.302035e-03
2   1 - 3  24.94761  8.950428 143  2.787309 1.653077e-02
3   2 - 3  57.71630 11.412977 143  5.057077 3.829040e-06


        Year: 4
  cluster   emmean        SE  df  lower.CL upper.CL
1       1 37.29292  6.259187 121  24.90120 49.68463
2       2 79.93393 10.037029 121  60.06298 99.80488
3       3 -3.30375 10.841231 121 -24.76683 18.15933
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -42.64101 11.82875 121 -3.604861 1.313059e-03
2   1 - 3  40.59667 12.51837 121  3.242966 4.332714e-03
3   2 - 3  83.23768 14.77411 121  5.634024 3.490296e-07


        Year: 5
  cluster   emmean        SE  df  lower.CL upper.CL
1       1 38.80859 5.106005 140 28.713743 48.90344
2       2 61.98407 8.678541 140 44.826133 79.14201
3       3  5.35000 7.315378 140 -9.112896 19.81290
  contrast  estimate        SE  df   t.ratio       p.value
1   1 - 2 -23.17548 10.069179 140 -2.301626 5.884594e-02
2   1 - 3  33.45859  8.921101 140  3.750500 7.492221e-04
3   2 - 3  56.63407 11.350411 140  4.989606 5.263658e-06

Predictive Capability   time_point     rmse relative_rmse
1:            2 44.68402     0.9001314
2:            5 48.25520     0.9878718
```
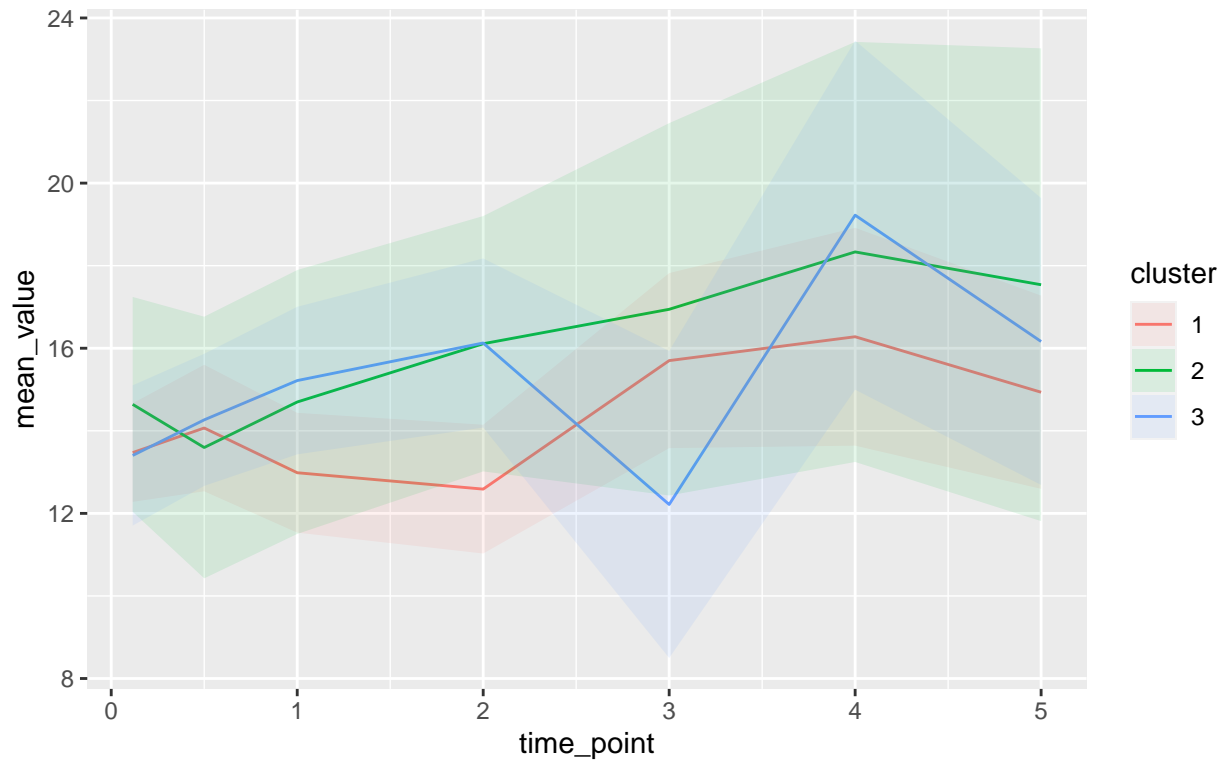
Sagittal T2–T5
standard error confidence intervals


```
Global differences between clusters
  cluster   emmean        SE        df lower.CL upper.CL
1       1 14.11930 0.4009805  679.5634 13.33199 14.90661
2       2 15.07057 0.6385945 1205.7442 13.81769 16.32345
3       3 15.05529 0.5112838 1055.3079 14.05205 16.05854
  contrast     estimate        SE       df    t.ratio   p.value
1   1 - 2 -0.95126221 0.6965998 1555.692 -1.36557918 0.3593381
2   1 - 3 -0.93598937 0.5803963 1565.546 -1.61267292 0.2405245
3   2 - 3  0.01527284 0.7651636 1558.694  0.01996023 0.9997804


Time point differences between clusters

        Year: 0.115384615384615
  cluster   emmean        SE  df lower.CL upper.CL
1       1 13.47282 0.6418660 299 12.20967 14.73597
2       2 14.64058 1.1364138 299 12.40419 16.87696
3       3 13.40264 0.8785744 299 11.67367 15.13162
  contrast     estimate       SE  df     t.ratio   p.value
1   1 - 2 -1.16775484 1.305154 299 -0.89472540 0.6440575
2   1 - 3  0.07017841 1.088065 299  0.06449838 0.9977091
3   2 - 3  1.23793324 1.436429 299  0.86181286 0.6647884


        Year: 0.5
```

```
   cluster    emmean        SE  df lower.CL upper.CL
1        1 14.06718 0.7553226 301 12.58080 15.55356
2        2 13.59520 1.3637706 301 10.91147 16.27893
3        3 14.26538 1.0108940 301 12.27607 16.25470
   contrast   estimate        SE  df    t.ratio   p.value
1    1 - 2  0.4719779 1.558968 301   0.3027502 0.9507395
2    1 - 3 -0.1982067 1.261911 301  -0.1570687 0.9864918
3    2 - 3 -0.6701846 1.697580 301  -0.3947883 0.9177080


        Year: 1
   cluster    emmean       SE  df lower.CL upper.CL
1        1 12.98434 0.758395 291 11.49170 14.47697
2        2 14.69811 1.313579 291 12.11279 17.28343
3        3 15.21634 1.056056 291 13.13786 17.29482
   contrast    estimate       SE  df    t.ratio   p.value
1    1 - 2 -1.7137736 1.516790 291 -1.1298687 0.4964521
2    1 - 3 -2.2320018 1.300161 291 -1.7167122 0.2006441
3    2 - 3 -0.5182283 1.685451 291 -0.3074716 0.9492319


        Year: 2
   cluster    emmean        SE  df lower.CL upper.CL
1        1 12.58741 0.8326176 271 10.94819 14.22663
2        2 16.10922 1.3745733 271 13.40302 18.81542
3        3 16.12726 1.0710589 271 14.01861 18.23592
   contrast     estimate       SE  df     t.ratio    p.value
1    1 - 2 -3.52180561 1.607079 271 -2.19143233 0.07444512
2    1 - 3 -3.53985183 1.356621 271 -2.60931608 0.02584611
3    2 - 3 -0.01804622 1.742590 271 -0.01035598 0.99994087


        Year: 3
   cluster   emmean       SE  df  lower.CL upper.CL
1        1 15.70056 1.115199 143 13.496151 17.90496
2        2 16.94296 2.036065 143 12.918288 20.96764
3        3 12.21517 1.964602 143  8.331759 16.09859
   contrast  estimate       SE  df    t.ratio   p.value
1    1 - 2 -1.242407 2.321472 143 -0.5351809 0.8541567
2    1 - 3  3.485383 2.259055 143  1.5428500 0.2741126
3    2 - 3  4.727791 2.829350 143  1.6709809 0.2199060


        Year: 4
   cluster   emmean       SE  df lower.CL upper.CL
1        1 16.27877 1.389004 122 13.52910 19.02844
2        2 18.33286 2.242776 122 13.89306 22.77266
3        3 19.22333 2.422475 122 14.42780 24.01886
   contrast   estimate       SE  df    t.ratio   p.value
1    1 - 2 -2.0540900 2.638063 122 -0.7786358 0.7168301
2    1 - 3 -2.9445662 2.792439 122 -1.0544782 0.5441332
3    2 - 3 -0.8904762 3.301277 122 -0.2697369 0.9606990


        Year: 5
   cluster   emmean       SE  df lower.CL upper.CL
1        1 14.93449 1.321517 141 12.32194 17.54704
2        2 17.53778 2.246147 141 13.09730 21.97826
3        3 16.16256 1.868907 141 12.46786 19.85727
```
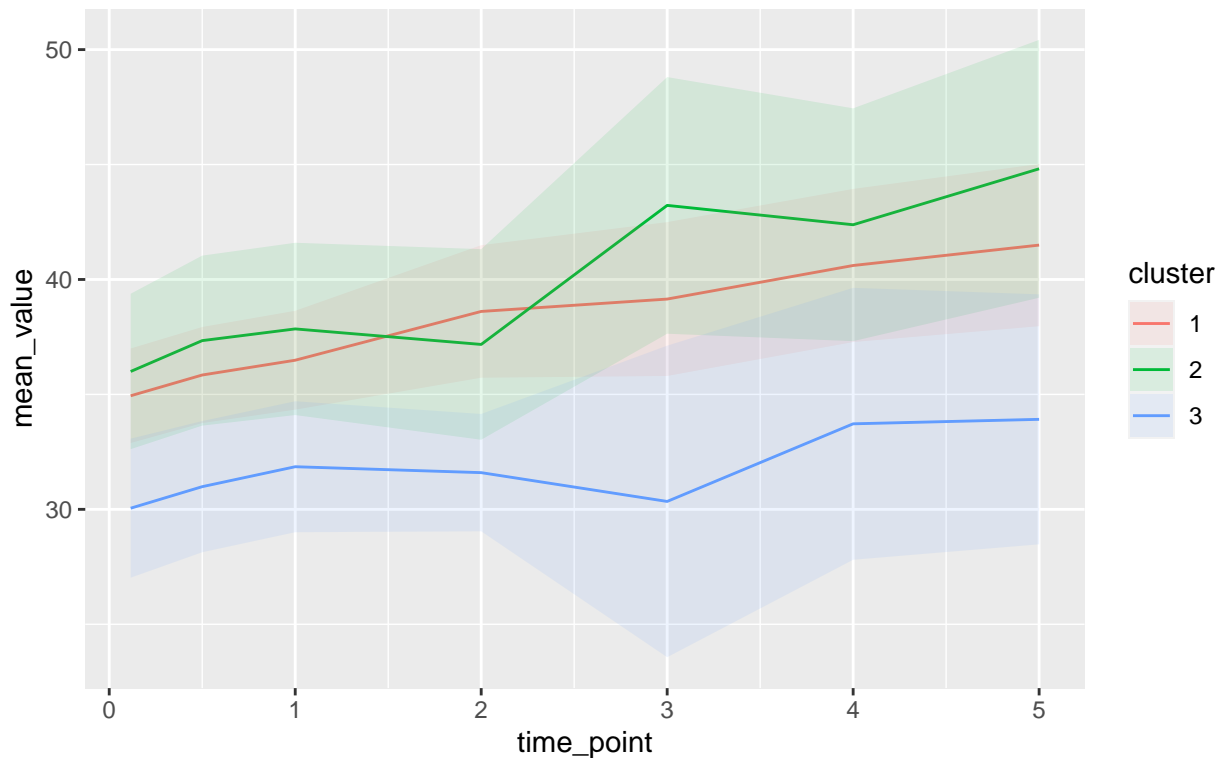
```
  contrast  estimate       SE  df    t.ratio   p.value
1   1 - 2 -2.603291 2.606066 141 -0.9989349 0.5787552
2   1 - 3 -1.228077 2.288934 141 -0.5365278 0.8534817
3   2 - 3  1.375214 2.921984 141  0.4706438 0.8851845


Predictive Capability  time_point     rmse relative_rmse
1:            2 10.93234     1.099923
2:            5 12.86797     1.106159
```

Sagittal T5–T12
standard error confidence intervals


```
Global differences between clusters
  cluster   emmean        SE         df lower.CL upper.CL
1       1 36.86901 0.6400935  612.3437 35.61196 38.12605
2       2 37.92200 0.9623059 1208.1804 36.03402 39.80998
3       3 31.80484 0.7868187  966.9841 30.26077 33.34891
  contrast  estimate        SE       df  t.ratio      p.value
1   1 - 2 -1.052992 1.0074363 1602.187 -1.045220 5.484163e-01
2   1 - 3  5.064169 0.8450105 1603.000  5.993024 7.611570e-09
3   2 - 3  6.117161 1.1086245 1602.826  5.517794 1.197523e-07


Time point differences between clusters

        Year: 0.115384615384615
  cluster   emmean       SE  df lower.CL upper.CL
```

```
1        1 34.94114 1.061065 306 32.85324 37.02905
2        2 35.99836 1.843379 306 32.37106 39.62567
3        3 30.05045 1.457319 306 27.18282 32.91809
  contrast  estimate       SE  df    t.ratio    p.value
1   1 - 2 -1.057219 2.126948 306 -0.4970593 0.87276945
2   1 - 3  4.890690 1.802675 306  2.7130176 0.01924575
3   2 - 3  5.947909 2.349857 306  2.5311794 0.03174971


        Year: 0.5
  cluster  emmean       SE  df lower.CL upper.CL
1       1 35.84335 1.070572 304 33.73668 37.95002
2       2 37.34058 1.901237 304 33.59933 41.08183
3       3 30.98637 1.437200 304 28.15825 33.81449
  contrast  estimate       SE  df    t.ratio    p.value
1   1 - 2 -1.497223 2.181932 304 -0.6861916 0.77173112
2   1 - 3  4.856980 1.792113 304  2.7101975 0.01940673
3   2 - 3  6.354203 2.383327 304  2.6661069 0.02197190


        Year: 1
  cluster  emmean       SE  df lower.CL upper.CL
1       1 36.48714 1.080406 293 34.36080 38.61348
2       2 37.84904 1.901071 293 34.10755 41.59052
3       3 31.85337 1.504738 293 28.89191 34.81484
  contrast  estimate       SE  df    t.ratio    p.value
1   1 - 2 -1.361896 2.186629 293 -0.6228289 0.80772141
2   1 - 3  4.633769 1.852434 293  2.5014486 0.03440901
3   2 - 3  5.995665 2.424522 293  2.4729269 0.03707952


        Year: 2
  cluster  emmean       SE  df lower.CL upper.CL
1       1 38.60979 1.310014 273 36.03077 41.18880
2       2 37.17373 2.170475 273 32.90073 41.44672
3       3 31.59576 1.681243 273 28.28592 34.90561
  contrast estimate       SE  df   t.ratio     p.value
1   1 - 2 1.436060 2.535172 273 0.5664547 0.838055591
2   1 - 3 7.014021 2.131364 273 3.2908600 0.003232429
3   2 - 3 5.577961 2.745458 273 2.0317051 0.106598107


        Year: 3
  cluster  emmean       SE  df lower.CL upper.CL
1       1 39.14811 1.754319 145 35.68077 42.61545
2       2 43.22259 3.202933 145 36.89212 49.55306
3       3 30.34323 2.989158 145 24.43528 36.25118
  contrast  estimate       SE  df   t.ratio    p.value
1   1 - 2 -4.074481 3.651906 145 -1.115714 0.50595481
2   1 - 3  8.804885 3.465934 145  2.540407 0.03230846
3   2 - 3 12.879367 4.381078 145  2.939771 0.01061755


        Year: 4
  cluster  emmean       SE  df lower.CL upper.CL
1       1 40.60811 1.679498 123 37.28365 43.93257
2       2 42.38143 2.730337 123 36.97689 47.78596
3       3 33.72083 2.949101 123 27.88327 39.55840
  contrast  estimate       SE  df    t.ratio    p.value
```

```
1    1 - 2 -1.773320 3.205535 123 -0.5532058 0.84502765
2    1 - 3  6.887275 3.393805 123  2.0293667 0.10948892
3    2 - 3  8.660595 4.018948 123  2.1549410 0.08322378

        Year: 5
  cluster   emmean       SE  df lower.CL upper.CL
1       1 41.49538 1.829274 142 37.87926 45.11151
2       2 44.81500 3.053142 142 38.77951 50.85049
3       3 33.91564 2.586984 142 28.80166 39.02962
  contrast   estimate       SE  df    t.ratio     p.value
1    1 - 2 -3.319615 3.559202 142 -0.9326852 0.62056996
2    1 - 3  7.579744 3.168396 142  2.3922971 0.04715767
3    2 - 3 10.899359 4.001770 142  2.7236344 0.01976983

Predictive Capability   time_point    rmse relative_rmse
1:            2 13.23725      0.8402341
2:            5 14.19047      0.8586616
```
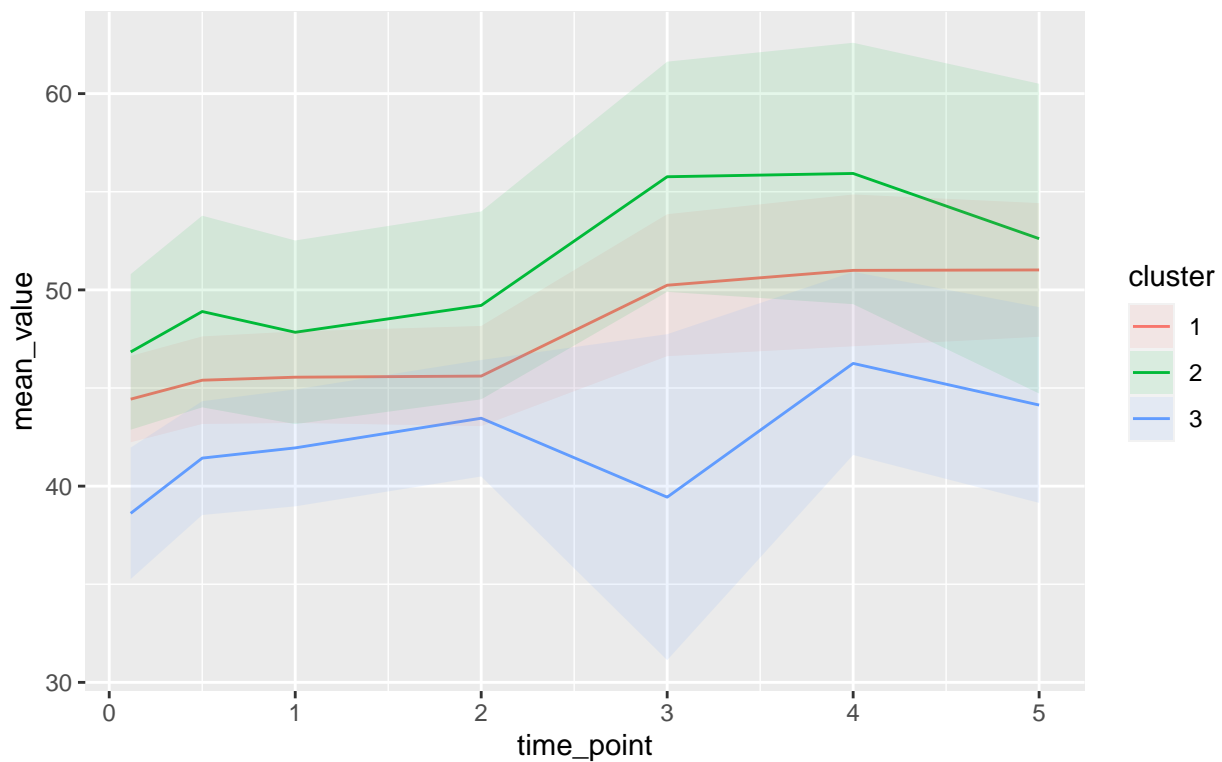
Sagittal T2–T12
standard error confidence intervals


```
Global differences between clusters
  cluster   emmean        SE        df lower.CL upper.CL
1       1 46.37251 0.6703844  640.9027 45.05609 47.68892
2       2 49.09079 1.0299320 1216.6160 47.07015 51.11143
3       3 41.92747 0.8306016  999.5894 40.29754 43.55739
  contrast   estimate        SE        df  t.ratio     p.value
```

```
1    1 - 2 -2.718279 1.0982159 1606.861 -2.475177 3.577080e-02
2    1 - 3  4.445044 0.9125767 1607.552  4.870872 3.646971e-06
3    2 - 3  7.163323 1.2029746 1606.506  5.954675 9.577678e-09


Time point differences between clusters

        Year: 0.115384615384615
  cluster   emmean       SE  df lower.CL upper.CL
1       1 44.43259 1.168503 307 42.13330 46.73188
2       2 46.83833 2.048740 307 42.80698 50.86968
3       3 38.61378 1.586947 307 35.49111 41.73645
  contrast  estimate       SE  df    t.ratio       p.value
1   1 - 2 -2.405743 2.358545 307 -1.020012 0.564789084
2   1 - 3  5.818813 1.970736 307  2.952609 0.009484360
3   2 - 3  8.224556 2.591474 307  3.173698 0.004709093

        Year: 0.5
  cluster   emmean       SE  df lower.CL upper.CL
1       1 45.39703 1.175430 307 43.08411 47.70995
2       2 48.89706 2.114238 307 44.73683 53.05729
3       3 41.42777 1.557310 307 38.36341 44.49212
  contrast  estimate       SE  df    t.ratio   p.value
1   1 - 2 -3.500029 2.419016 307 -1.446881 0.3182428
2   1 - 3  3.969264 1.951115 307  2.034357 0.1057729
3   2 - 3  7.469293 2.625874 307  2.844498 0.0131386

        Year: 1
  cluster   emmean       SE  df lower.CL upper.CL
1       1 45.55006 1.203033 296 43.18248 47.91764
2       2 47.83943 2.090256 296 43.72579 51.95308
3       3 41.94849 1.640923 296 38.71913 45.17784
  contrast  estimate       SE  df    t.ratio    p.value
1   1 - 2 -2.289371 2.411733 296 -0.949264 0.60954879
2   1 - 3  3.601574 2.034678 296  1.770095 0.18147538
3   2 - 3  5.890946 2.657404 296  2.216804 0.07000184

        Year: 2
  cluster   emmean       SE  df lower.CL upper.CL
1       1 45.60787 1.305197 276 43.03847 48.17728
2       2 49.20811 2.128862 276 45.01724 53.39898
3       3 43.45894 1.681032 276 40.14967 46.76822
  contrast  estimate       SE  df    t.ratio    p.value
1   1 - 2 -3.600241 2.497117 276 -1.441759 0.32095932
2   1 - 3  2.148931 2.128241 276  1.009722 0.57134346
3   2 - 3  5.749172 2.712550 276  2.119472 0.08776074

        Year: 3
  cluster   emmean       SE  df lower.CL upper.CL
1       1 50.23789 1.947888 144 46.38774 54.08803
2       2 55.76481 3.556340 144 48.73544 62.79419
3       3 39.43733 3.373840 144 32.76868 46.10598
  contrast  estimate       SE  df    t.ratio       p.value
1   1 - 2 -5.526926 4.054851 144 -1.363040 0.363050239
```

```
2      1 - 3 10.800556 3.895775 144  2.772377 0.017228366
3      2 - 3 16.327481 4.902076 144  3.330728 0.003140681


        Year: 4
  cluster   emmean       SE  df lower.CL upper.CL
1       1 50.99384 1.905260 122 47.22218 54.76549
2       2 55.93179 3.076356 122 49.84183 62.02174
3       3 46.25333 3.322844 122 39.67543 52.83124
  contrast  estimate       SE  df    t.ratio    p.value
1    1 - 2 -4.937950 3.618560 122 -1.364617 0.36267365
2    1 - 3  4.740502 3.830314 122  1.237628 0.43342348
3    2 - 3  9.678452 4.528273 122  2.137338 0.08659657


        Year: 5
  cluster   emmean       SE  df lower.CL upper.CL
1       1 51.01577 1.885897 141 47.28748 54.74406
2       2 52.61074 3.205409 141 46.27387 58.94762
3       3 44.13231 2.667062 141 38.85971 49.40491
  contrast  estimate       SE  df     t.ratio    p.value
1    1 - 2 -1.594972 3.719040 141 -0.4288665 0.90366972
2    1 - 3  6.883462 3.266470 141  2.1073088 0.09197757
3    2 - 3  8.478433 4.169876 141  2.0332577 0.10804202


Predictive Capability   time_point     rmse relative_rmse
1:            2 14.83030    0.9526332
2:            5 17.31163    1.0264047
```

Lordosis (top of L1–S1)
standard error confidence intervals
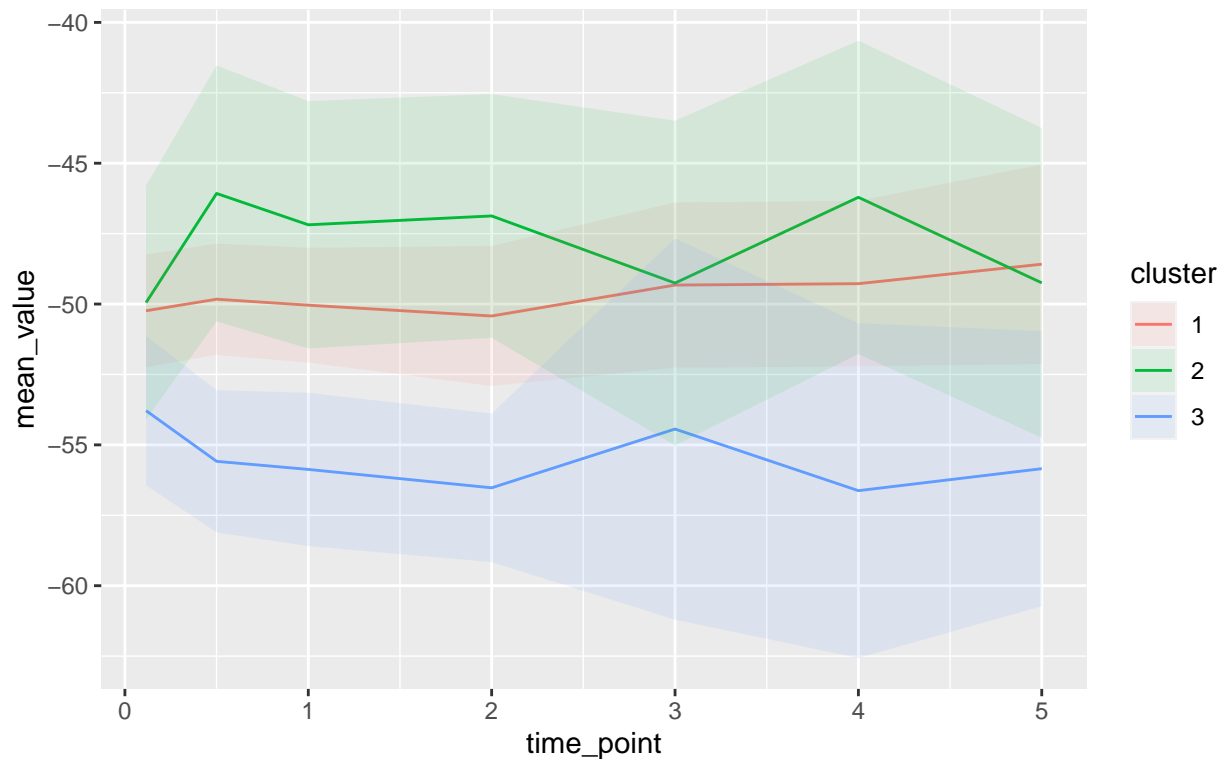
```
Global differences between clusters
  cluster     emmean          SE         df  lower.CL  upper.CL
1       1 -49.70368 0.6062364   640.2325 -50.89413 -48.51323
2       2 -47.43239 0.9508191  1294.3533 -49.29771 -45.56707
3       3 -54.55093 0.7616083  1043.0203 -56.04539 -53.05647
  contrast  estimate          SE        df   t.ratio       p.value
1   1 - 2 -2.271289 1.0020495  1714.193 -2.266643 6.085286e-02
2   1 - 3  4.847251 0.8237855  1714.063  5.884118 1.440398e-08
3   2 - 3  7.118540 1.1046986  1713.431  6.443875 4.569976e-10


Time point differences between clusters

        Year: 0.115384615384615
  cluster     emmean       SE  df  lower.CL  upper.CL
1       1 -50.23891 1.022096 341 -52.24931 -48.22850
2       2 -49.94722 1.927283 341 -53.73808 -46.15636
3       3 -53.78571 1.430637 341 -56.59970 -50.97173
  contrast  estimate       SE  df    t.ratio   p.value
1   1 - 2 -0.291684 2.181537 341 -0.1337058 0.9901928
2   1 - 3  3.546808 1.758239 341  2.0172508 0.1095954
3   2 - 3  3.838492 2.400238 341  1.5992130 0.2473579


        Year: 0.5
  cluster     emmean       SE  df  lower.CL  upper.CL
1       1 -49.82798 1.031879 330 -51.85787 -47.79809
2       2 -46.07352 1.899579 330 -49.81033 -42.33671
3       3 -55.58385 1.424684 330 -58.38646 -52.78125
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -3.754460 2.161753 330 -1.736766 0.1930848196
2   1 - 3  5.755876 1.759119 330  3.272022 0.0033761445
3   2 - 3  9.510336 2.374474 330  4.005239 0.0002255961


        Year: 1
  cluster     emmean       SE  df  lower.CL  upper.CL
1       1 -50.04067 1.062234 319 -52.13054 -47.95080
2       2 -47.18673 1.910948 319 -50.94638 -43.42707
3       3 -55.87157 1.502226 319 -58.82710 -52.91605
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -2.853947 2.186336 319 -1.305356 0.393217882
2   1 - 3  5.830899 1.839844 319  3.169236 0.004762129
3   2 - 3  8.684846 2.430721 319  3.572950 0.001182849


        Year: 2
  cluster     emmean       SE  df  lower.CL  upper.CL
1       1 -50.42453 1.211821 288 -52.80968 -48.03938
2       2 -46.87204 2.019702 288 -50.84728 -42.89679
3       3 -56.52483 1.591199 288 -59.65668 -53.39297
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -3.552496 2.355357 288 -1.508263 0.2885265883
2   1 - 3  6.100294 2.000106 288  3.049985 0.0070420957
3   2 - 3  9.652791 2.571208 288  3.754186 0.0006147028
```

```
        Year: 3
  cluster    emmean        SE  df  lower.CL  upper.CL
1       1 -49.32611 1.614434 150 -52.51607 -46.13614
2       2 -49.25481 3.028308 150 -55.23847 -43.27116
3       3 -54.43774 2.826189 150 -60.02202 -48.85346
  contrast     estimate        SE  df      t.ratio   p.value
1   1 - 2 -0.07129045 3.431770 150 -0.02077367 0.9997621
2   1 - 3  5.11163667 3.254802 150  1.57049073 0.2616030
3   2 - 3  5.18292712 4.142221 150  1.25124357 0.4250856


        Year: 4
  cluster    emmean        SE  df  lower.CL  upper.CL
1       1 -49.27679 1.577555 127 -52.39849 -46.15510
2       2 -46.21000 2.633012 127 -51.42025 -40.99975
3       3 -56.62542 2.843978 127 -62.25314 -50.99770
  contrast  estimate       SE  df     t.ratio    p.value
1   1 - 2 -3.066795 3.069435 127 -0.9991399 0.57876142
2   1 - 3  7.348622 3.252213 127  2.2595759 0.06536156
3   2 - 3 10.415417 3.875688 127  2.6873722 0.02210314


        Year: 5
  cluster    emmean        SE  df  lower.CL  upper.CL
1       1 -48.58525 1.762409 144 -52.06878 -45.10172
2       2 -49.24750 2.979015 144 -55.13575 -43.35925
3       3 -55.84436 2.524175 144 -60.83358 -50.85514
  contrast estimate       SE  df    t.ratio    p.value
1   1 - 2 0.662250 3.461303 144 0.1913297 0.98002410
2   1 - 3 7.259109 3.078562 144 2.3579543 0.05127047
3   2 - 3 6.596859 3.904612 144 1.6895046 0.21269626


Predictive Capability    time_point     rmse relative_rmse
1:          2 14.75976      0.9713092
2:          5 15.58950      0.9762456
```

Pelvic Incidence
standard error confidence intervals
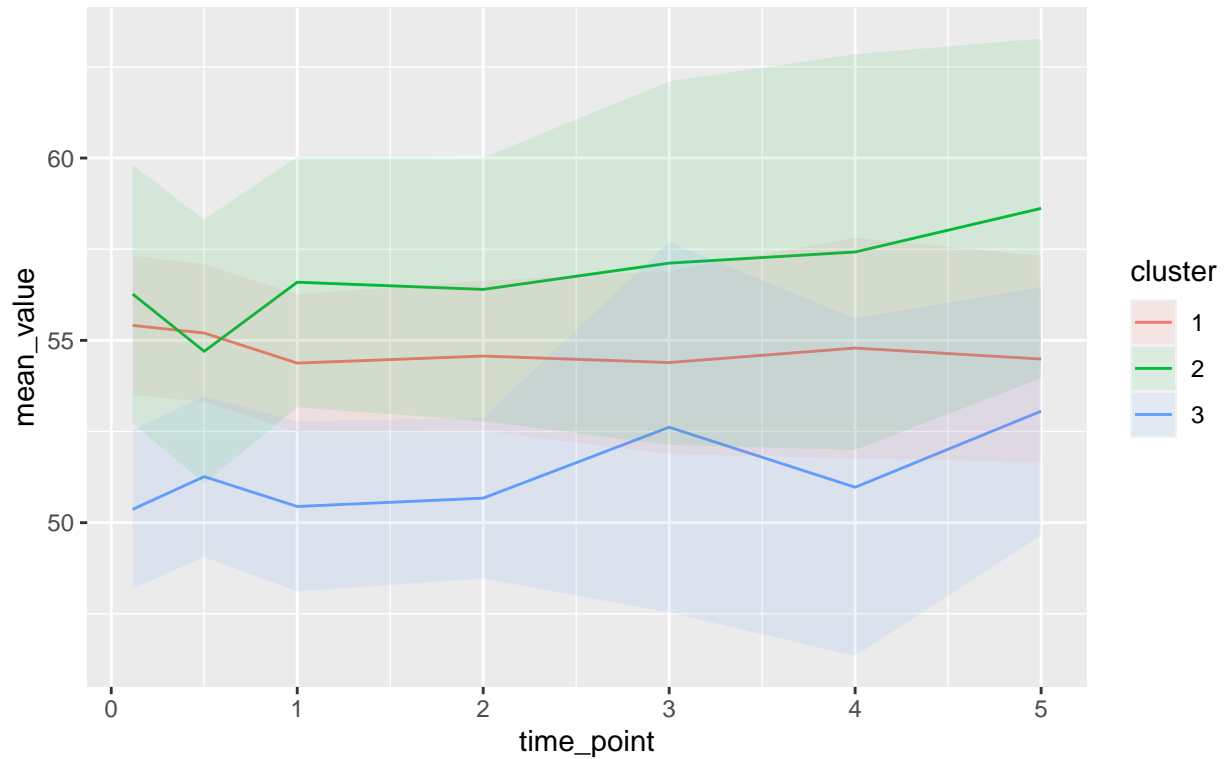

```
Global differences between clusters
  cluster    emmean        SE        df lower.CL upper.CL
1       1  54.93968 0.5131477  649.2645 53.93205 55.94731
2       2  55.80375 0.8137161 1291.3043 54.20740 57.40010
3       3  50.61129 0.6517943 1061.3287 49.33234 51.89025
  contrast    estimate        SE       df    t.ratio        p.value
1   1 - 2  -0.8640681 0.8625419 1701.183 -1.001769 5.758298e-01
2   1 - 3   4.3283839 0.7109373 1701.738  6.088278 4.222667e-09
3   2 - 3   5.1924520 0.9532569 1700.110  5.447064 1.758531e-07


Time point differences between clusters

        Year: 0.115384615384615
  cluster   emmean        SE  df lower.CL upper.CL
1       1 55.40984 0.9216794 336 53.59685 57.22283
2       2 56.27074 1.7334036 336 52.86105 59.68043
3       3 50.36723 1.3138103 336 47.78290 52.95156
  contrast    estimate       SE  df    t.ratio     p.value
1   1 - 2  -0.8608978 1.963207 336 -0.4385161 0.899476885
2   1 - 3   5.0426089 1.604865 336  3.1420774 0.005180385
3   2 - 3   5.9035067 2.175037 336  2.7142099 0.019095658


        Year: 0.5
```

```
   cluster    emmean         SE  df lower.CL upper.CL
1        1 55.20120 0.9262228 329 53.37913 57.02326
2        2 54.69830 1.7257841 329 51.30334 58.09327
3        3 51.26316 1.2890287 329 48.72738 53.79894
   contrast  estimate        SE  df   t.ratio     p.value
1    1 - 2 0.5028938 1.958627 329 0.2567583 0.96431511
2    1 - 3 3.9380378 1.587288 329 2.4809847 0.03616202
3    2 - 3 3.4351440 2.154049 329 1.5947383 0.24933003


         Year: 1
   cluster    emmean         SE  df lower.CL upper.CL
1        1 54.37629 0.9311982 318 52.54420 56.20838
2        2 56.59463 1.6906561 318 53.26835 59.92091
3        3 50.44449 1.3169132 318 47.85353 53.03546
   contrast  estimate        SE  df   t.ratio     p.value
1    1 - 2 -2.218337 1.930142 318 -1.149313 0.48451565
2    1 - 3  3.931798 1.612883 318  2.437746 0.04050733
3    2 - 3  6.150135 2.143030 318  2.869831 0.01215864


         Year: 2
   cluster    emmean         SE  df lower.CL upper.CL
1        1 54.57007 1.009841 285 52.58237 56.55776
2        2 56.39704 1.671810 285 53.10637 59.68770
3        3 50.67326 1.324752 285 48.06572 53.28080
   contrast  estimate        SE  df    t.ratio     p.value
1    1 - 2 -1.826969 1.953133 285 -0.9354045 0.61834700
2    1 - 3  3.896812 1.665757 285  2.3393633 0.05211247
3    2 - 3  5.723781 2.133054 285  2.6833740 0.02100065


         Year: 3
   cluster    emmean         SE  df lower.CL upper.CL
1        1 54.39116 1.335642 150 51.75206 57.03026
2        2 57.11815 2.505358 150 52.16780 62.06850
3        3 52.61742 2.338142 150 47.99747 57.23737
   contrast  estimate        SE  df    t.ratio    p.value
1    1 - 2 -2.726990 2.839148 150 -0.9604961 0.6029426
2    1 - 3  1.773739 2.692740 150  0.6587115 0.7877128
3    2 - 3  4.500729 3.426913 150  1.3133480 0.3899843


         Year: 4
   cluster    emmean         SE  df lower.CL upper.CL
1        1 54.78885 1.529028 127 51.76318 57.81452
2        2 57.42357 2.552018 127 52.37359 62.47355
3        3 50.97125 2.756495 127 45.51664 56.42586
   contrast  estimate        SE  df   t.ratio    p.value
1    1 - 2 -2.634725 2.975016 127 -0.885617 0.6503529
2    1 - 3  3.817596 3.152172 127  1.211100 0.4488228
3    2 - 3  6.452321 3.756469 127  1.717656 0.2025647


         Year: 5
   cluster    emmean         SE  df lower.CL upper.CL
1        1 54.48800 1.379959 144 51.76041 57.21559
2        2 58.61964 2.332556 144 54.00917 63.23012
3        3 53.05846 1.976418 144 49.15192 56.96500
```
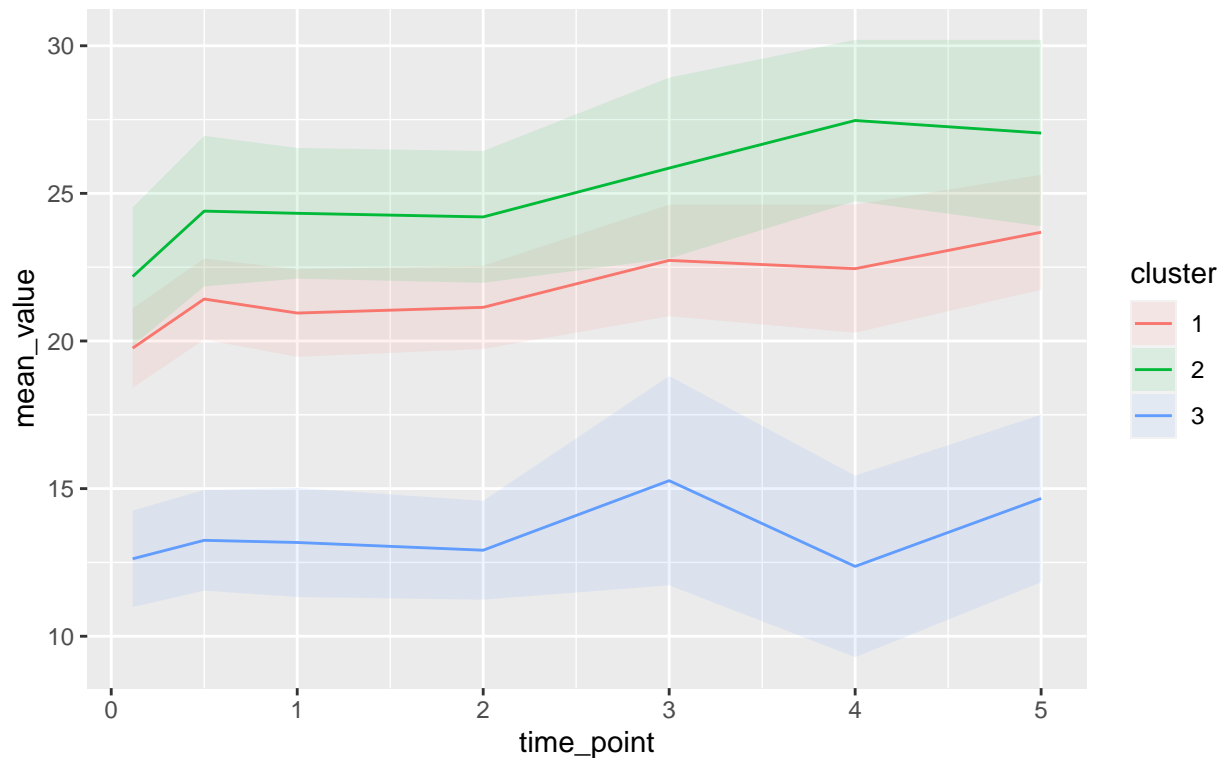
```
  contrast  estimate       SE  df    t.ratio   p.value
1   1 - 2 -4.131643 2.710185 144 -1.5244871 0.2825002
2   1 - 3  1.429538 2.410501 144  0.5930462 0.8240705
3   2 - 3  5.561181 3.057294 144  1.8189880 0.1670139


Predictive Capability   time_point      rmse relative_rmse
1:            2 11.73308    0.9443224
2:            5 11.63515    0.9378659
```

Pelvic Tilt
standard error confidence intervals


```
Global differences between clusters
  cluster   emmean        SE         df lower.CL upper.CL
1       1 21.18218 0.3635481  688.5935 20.46839 21.89598
2       2 24.06150 0.5929109 1286.0427 22.89832 25.22468
3       3 13.44697 0.4733158 1118.1113 12.51828 14.37566
  contrast  estimate        SE       df    t.ratio      p.value
1   1 - 2 -2.879313 0.6410320 1669.446 -4.491684 2.248551e-05
2   1 - 3  7.735213 0.5308797 1678.915 14.570558 1.045386e-12
3   2 - 3 10.614526 0.7099888 1670.222 14.950272 9.772183e-13


Time point differences between clusters

       Year: 0.115384615384615
  cluster   emmean        SE  df lower.CL upper.CL
```

```
1        1 19.76021 0.6509893 335 18.47967 21.04075
2        2 22.18296 1.2243163 335 19.77465 24.59128
3        3 12.62344 0.9329299 335 10.78830 14.45858
   contrast  estimate        SE  df  t.ratio       p.value
1    1 - 2 -2.422754 1.386628 335 -1.747227 1.893035e-01
2    1 - 3  7.136769 1.137605 335  6.273503 3.269035e-09
3    2 - 3  9.559522 1.539256 335  6.210483 4.689827e-09


        Year: 0.5
   cluster  emmean        SE  df lower.CL upper.CL
1        1 21.42185 0.6781625 327 20.08774 22.75596
2        2 24.39887 1.2635859 327 21.91308 26.88465
3        3 13.24914 0.9538964 327 11.37259 15.12569
   contrast  estimate        SE  df  t.ratio       p.value
1    1 - 2 -2.977020 1.434069 327 -2.075925 9.643953e-02
2    1 - 3  8.172708 1.170394 327  6.982867 4.939649e-11
3    2 - 3 11.149728 1.583214 327  7.042463 3.434286e-11


        Year: 1
   cluster  emmean        SE  df lower.CL upper.CL
1        1 20.94691 0.7095209 316 19.55093 22.34289
2        2 24.32463 1.2881853 316 21.79013 26.85913
3        3 13.17575 1.0148821 316 11.17897 15.17253
   contrast  estimate        SE  df  t.ratio       p.value
1    1 - 2 -3.377720 1.470660 316 -2.296737 5.770198e-02
2    1 - 3  7.771163 1.238308 316  6.275632 3.439605e-09
3    2 - 3 11.148883 1.639941 316  6.798343 1.597498e-10


        Year: 2
   cluster  emmean        SE  df lower.CL upper.CL
1        1 21.14048 0.6948042 284 19.77286 22.50810
2        2 24.20204 1.1463685 284 21.94558 26.45849
3        3 12.91372 0.9083891 284 11.12569 14.70175
   contrast  estimate        SE  df  t.ratio       p.value
1    1 - 2 -3.061561 1.340490 284 -2.283912 5.969601e-02
2    1 - 3  8.226755 1.143645 284  7.193453 1.737366e-11
3    2 - 3 11.288316 1.462645 284  7.717740 1.091349e-12


        Year: 3
   cluster  emmean        SE  df lower.CL upper.CL
1        1 22.72947 0.9572578 150 20.83802 24.62092
2        2 25.85704 1.7955969 150 22.30911 29.40497
3        3 15.26968 1.6757526 150 11.95855 18.58081
   contrast  estimate        SE  df  t.ratio       p.value
1    1 - 2 -3.127563 2.034825 150 -1.537019 2.766180e-01
2    1 - 3  7.459796 1.929894 150  3.865393 4.812819e-04
3    2 - 3 10.587360 2.456077 150  4.310679 8.668116e-05


        Year: 4
   cluster  emmean        SE  df  lower.CL upper.CL
1        1 22.45000 1.013897 127 20.443681 24.45632
2        2 27.46893 1.692240 127 24.120290 30.81757
3        3 12.36583 1.827829 127  8.748891 15.98278
   contrast  estimate        SE  df  t.ratio       p.value
```

```
1     1 - 2 -5.018929 1.972730 127 -2.544154 3.235322e-02
2     1 - 3 10.084167 2.090202 127  4.824494 1.174342e-05
3     2 - 3 15.103095 2.490910 127  6.063283 4.243105e-08

        Year: 5
  cluster  emmean        SE  df lower.CL upper.CL
1       1 23.68325 0.9909823 144 21.72450 25.64200
2       2 27.04357 1.6750659 144 23.73268 30.35446
3       3 14.66667 1.4193144 144 11.86129 17.47205
  contrast  estimate        SE  df   t.ratio       p.value
1    1 - 2 -3.360321 1.946251 144 -1.726561 1.988140e-01
2    1 - 3  9.016583 1.731040 144  5.208767 1.926219e-06
3    2 - 3 12.376905 2.195518 144  5.637351 2.636707e-07

Predictive Capability   time_point      rmse relative_rmse
1:              2 8.308940      0.8807057
2:              5 9.405982      0.9487983
```

Sacral Slope
standard error confidence intervals
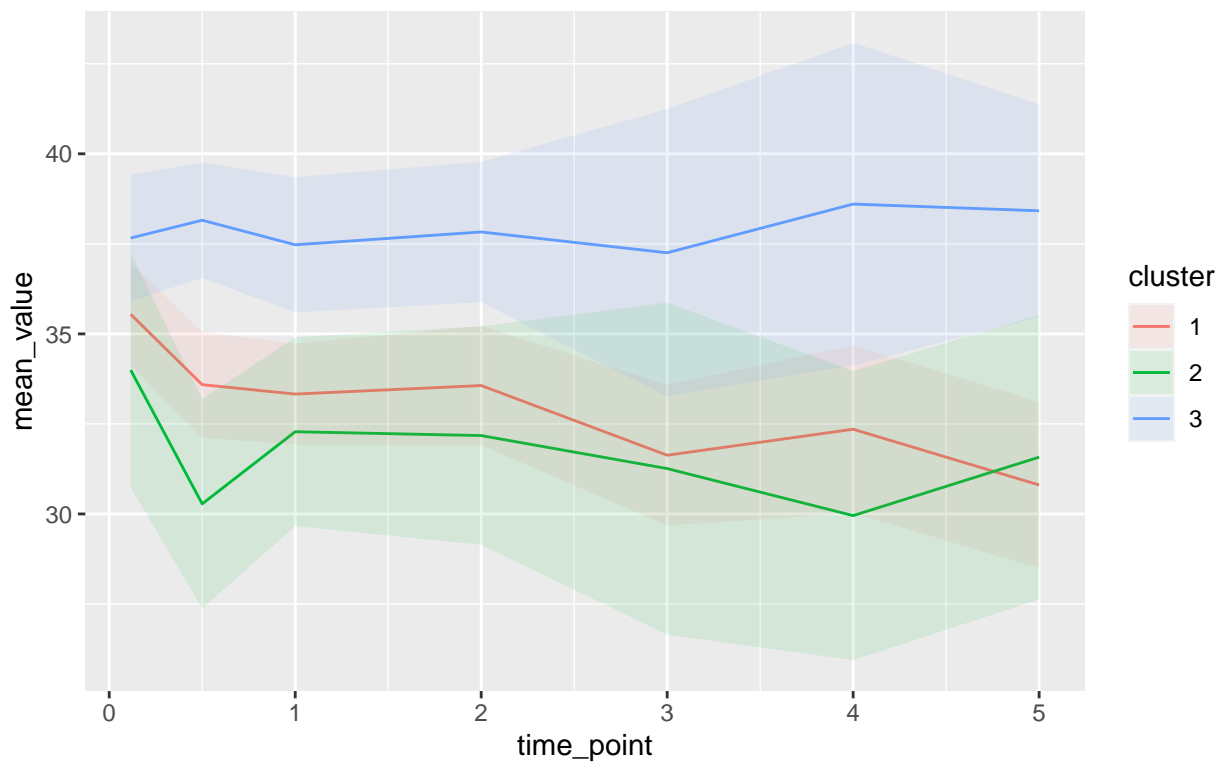

```
Global differences between clusters
  cluster  emmean        SE        df lower.CL upper.CL
1       1 33.69001 0.4023615  670.6585 32.89997 34.48005
2       2 31.75983 0.6465370 1291.9691 30.49145 33.02821
3       3 37.18846 0.5154092 1088.7884 36.17715 38.19977
  contrast  estimate        SE        df   t.ratio       p.value
```

```
1    1 - 2   1.930174 0.6926568 1693.553   2.786624 1.487992e-02
2    1 - 3  -3.498456 0.5704184 1698.696  -6.133141 3.211165e-09
3    2 - 3  -5.428631 0.7646541 1693.495  -7.099459 7.688294e-12
```

Time point differences between clusters

```
        Year: 0.115384615384615
  cluster   emmean        SE  df lower.CL upper.CL
1       1 35.54487 0.7300177 338 34.10892 36.98082
2       2 33.99556 1.3729452 338 31.29496 36.69615
3       3 37.66188 1.0297089 338 35.63643 39.68732
  contrast  estimate        SE  df    t.ratio    p.value
1    1 - 2  1.549314 1.554961 338   0.996368 0.57966000
2    1 - 3 -2.117006 1.262231 338  -1.677194 0.21545092
3    2 - 3 -3.666319 1.716181 338  -2.136324 0.08413597

        Year: 0.5
  cluster   emmean        SE  df lower.CL upper.CL
1       1 33.58918 0.7148924 329 32.18285 34.99552
2       2 30.28038 1.3320229 329 27.66002 32.90073
3       3 38.15600 0.9949192 329 36.19879 40.11321
  contrast  estimate        SE  df    t.ratio      p.value
1    1 - 2  3.308807 1.511739 329   2.188742 7.459096e-02
2    1 - 3 -4.566815 1.225127 329  -3.727627 6.644558e-04
3    2 - 3 -7.875623 1.662573 329  -4.737008 9.630857e-06

        Year: 1
  cluster   emmean        SE  df lower.CL upper.CL
1       1 33.32837 0.7107339 319 31.93005 34.72669
2       2 32.28345 1.2786030 319 29.76789 34.79901
3       3 37.47461 1.0051296 319 35.49709 39.45213
  contrast  estimate        SE  df    t.ratio     p.value
1    1 - 2  1.044916 1.462863 319   0.7142953 0.755218718
2    1 - 3 -4.146236 1.231027 319  -3.3681105 0.002442055
3    2 - 3 -5.191152 1.626380 319  -3.1918452 0.004421928

        Year: 2
  cluster   emmean       SE  df lower.CL upper.CL
1       1 33.56574 0.837398 285 31.91747 35.21401
2       2 32.17630 1.386328 285 29.44756 34.90504
3       3 37.82965 1.098534 285 35.66738 39.99192
  contrast  estimate        SE  df    t.ratio     p.value
1    1 - 2  1.389447 1.619611 285   0.8578893 0.667269656
2    1 - 3 -4.263908 1.381308 285  -3.0868618 0.006271942
3    2 - 3 -5.653355 1.768808 285  -3.1961382 0.004406418

        Year: 3
  cluster   emmean       SE  df lower.CL upper.CL
1       1 31.63021 1.079401 150 29.49742 33.76300
2       2 31.26000 2.024709 150 27.25937 35.26063
3       3 37.25258 1.889573 150 33.51896 40.98620
  contrast  estimate        SE  df    t.ratio    p.value
1    1 - 2  0.3702105 2.294461 150   0.1613497 0.98575152
```

```
2     1 - 3 -5.6223701 2.176141 150 -2.5836422 0.02875466
3     2 - 3 -5.9925806 2.769464 150 -2.1638053 0.08085023


        Year: 4
  cluster   emmean       SE  df lower.CL upper.CL
1       1 32.35231 1.210822 127 29.95631 34.74831
2       2 29.95464 2.020918 127 25.95561 33.95367
3       3 38.60417 2.182840 127 34.28472 42.92361
  contrast  estimate       SE  df   t.ratio   p.value
1   1 - 2  2.397665 2.355886 127  1.017734 0.56706945
2   1 - 3 -6.251859 2.496174 127 -2.504577 0.03583195
3   2 - 3 -8.649524 2.974710 127 -2.907686 0.01188725


        Year: 5
  cluster   emmean       SE  df lower.CL upper.CL
1       1 30.80425 1.147912 144 28.53532 33.07318
2       2 31.57679 1.940325 144 27.74159 35.41198
3       3 38.41821 1.644073 144 35.16857 41.66784
  contrast   estimate       SE  df    t.ratio     p.value
1   1 - 2 -0.7725357 2.254454 144 -0.3426709 0.9373546540
2   1 - 3 -7.6139551 2.005163 144 -3.7971756 0.0006269143
3   2 - 3 -6.8414194 2.543194 144 -2.6900892 0.0216542998


Predictive Capability  time_point     rmse relative_rmse
1:           2 10.30334     0.992167
2:           5 11.28046     1.052625
```

RLL
standard error confidence intervals
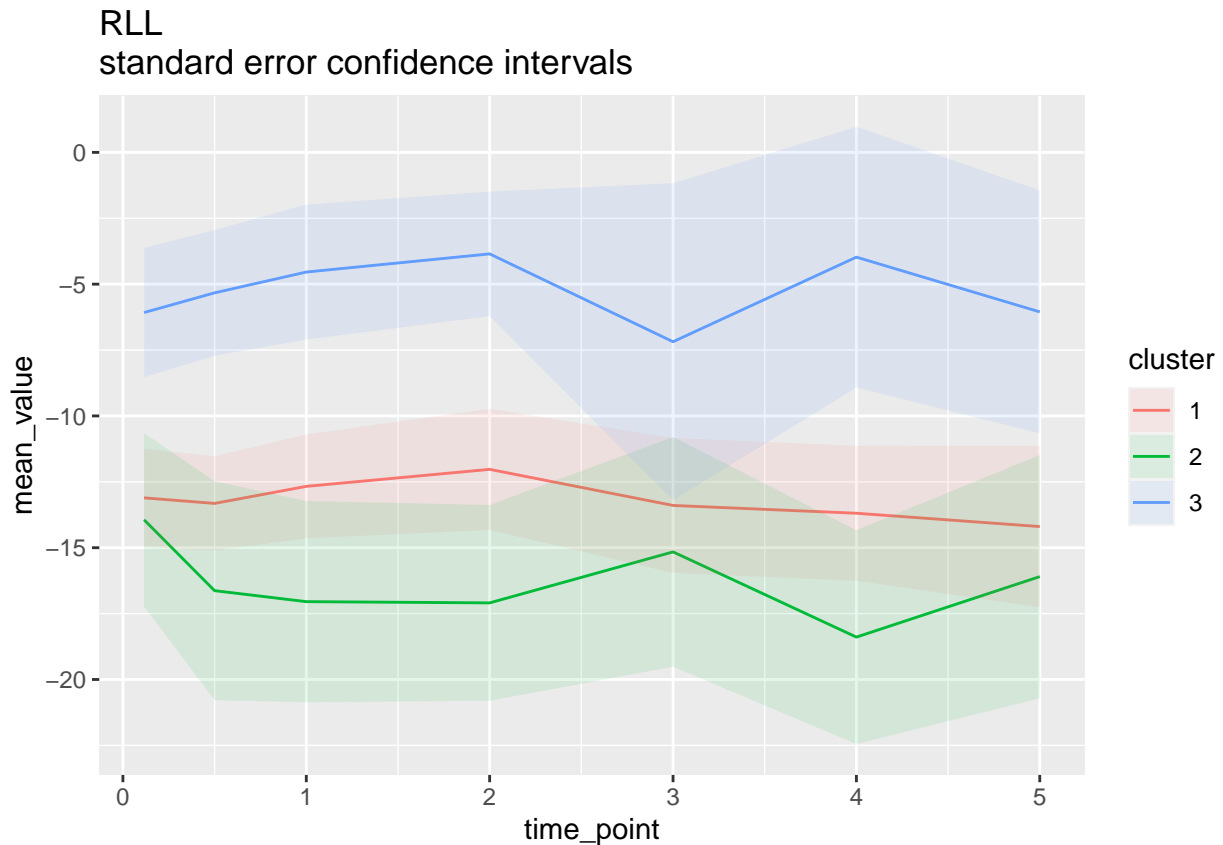
```
Global differences between clusters
   cluster      emmean         SE        df    lower.CL    upper.CL
1        1 -13.254931 0.5445728   652.332 -14.324258 -12.185604
2        2 -16.112198 0.8659136  1287.461 -17.810954 -14.413441
3        3  -5.671141 0.6951663  1072.677  -7.035181  -4.307101
   contrast    estimate         SE        df     t.ratio       p.value
1    1 - 2    2.857267 0.9210222  1692.813    3.102278 5.538776e-03
2    1 - 3   -7.583790 0.7617560  1694.227   -9.955668 2.446154e-12
3    2 - 3  -10.441057 1.0191663  1691.991  -10.244704 2.141620e-12


Time point differences between clusters

          Year: 0.115384615384615
   cluster      emmean         SE  df   lower.CL    upper.CL
1        1 -13.108421 0.9214669 334 -14.921031 -11.295811
2        2 -13.940370 1.7284613 334 -17.340413 -10.540328
3        3  -6.077419 1.3170888 334  -8.668254  -3.486584
   contrast    estimate         SE  df    t.ratio       p.value
1    1 - 2    0.8319493 1.958744 334   0.424736 9.053873e-01
2    1 - 3   -7.0310017 1.607428 334  -4.374070 4.842714e-05
3    2 - 3   -7.8629510 2.173086 334  -3.618334 9.958910e-04


          Year: 0.5
   cluster      emmean         SE  df   lower.CL    upper.CL
1        1 -13.319672 0.9436303 328 -15.176003 -11.463341
2        2 -16.630377 1.7534342 328 -20.079773 -13.180981
3        3  -5.330211 1.3096813 328  -7.906645  -2.753776
   contrast    estimate         SE  df    t.ratio       p.value
1    1 - 2    3.310705 1.991223 328   1.662649 2.212262e-01
2    1 - 3   -7.989462 1.614219 328  -4.949428 3.560738e-06
3    2 - 3  -11.300167 2.188560 328  -5.163288 1.260740e-06


          Year: 1
   cluster     emmean         SE  df   lower.CL    upper.CL
1        1 -12.67287 0.9923836 315 -14.625403 -10.720327
2        2 -17.04648 1.8017424 315 -20.591452 -13.501511
3        3  -4.54093 1.4277111 315  -7.349985  -1.731875
   contrast    estimate         SE  df    t.ratio       p.value
1    1 - 2    4.373616 2.056964 315   2.126248 8.619790e-02
2    1 - 3   -8.131935 1.738731 315  -4.676938 1.288875e-05
3    2 - 3  -12.505551 2.298833 315  -5.439956 3.208272e-07


          Year: 2
   cluster      emmean         SE  df   lower.CL    upper.CL
1        1 -12.027095 1.097679 285 -14.187681  -9.866508
2        2 -17.093704 1.817227 285 -20.670594 -13.516814
3        3  -3.851744 1.439982 285  -6.686093  -1.017396
   contrast    estimate         SE  df    t.ratio       p.value
1    1 - 2    5.066609 2.123020 285   2.386510 4.632154e-02
2    1 - 3   -8.175350 1.810648 285  -4.515152 2.755584e-05
3    2 - 3  -13.241960 2.318591 285  -5.711211 8.441556e-08
```

```
         Year: 3
   cluster     emmean        SE  df  lower.CL   upper.CL
1        1 -13.396737 1.388622 150 -16.14052 -10.65295
2        2 -15.158519 2.604737 150 -20.30523 -10.01181
3        3  -7.184194 2.430887 150 -11.98740  -2.38099
   contrast  estimate        SE  df    t.ratio    p.value
1   1 - 2   1.761782 2.951766 150  0.5968568 0.82201286
2   1 - 3  -6.212543 2.799551 150 -2.2191216 0.07121773
3   2 - 3  -7.974325 3.562845 150 -2.2381901 0.06812498

         Year: 4
   cluster     emmean        SE  df  lower.CL    upper.CL
1        1 -13.692949 1.310687 127 -16.28656 -11.0993349
2        2 -18.391786 2.187597 127 -22.72065 -14.0629252
3        3  -3.975417 2.362875 127  -8.65112   0.7002871
   contrast  estimate        SE  df    t.ratio      p.value
1   1 - 2   4.698837 2.550193 127  1.842542 1.600347e-01
2   1 - 3  -9.717532 2.702051 127 -3.596354 1.330436e-03
3   2 - 3 -14.416369 3.220056 127 -4.477055 4.927309e-05

         Year: 5
   cluster     emmean        SE  df  lower.CL   upper.CL
1        1 -14.197875 1.553406 144 -17.26830 -11.127452
2        2 -16.097143 2.625735 144 -21.28711 -10.907181
3        3  -6.052308 2.224834 144 -10.44986  -1.654756
   contrast  estimate        SE  df    t.ratio    p.value
1   1 - 2   1.899268 3.050828 144  0.6225417 0.808010623
2   1 - 3  -8.145567 2.713477 144 -3.0018933 0.008829875
3   2 - 3 -10.044835 3.441565 144 -2.9186824 0.011309346

Predictive Capability  time_point     rmse relative_rmse
1:          2 12.72129    0.9001875
2:          5 14.69614    1.0250317
```
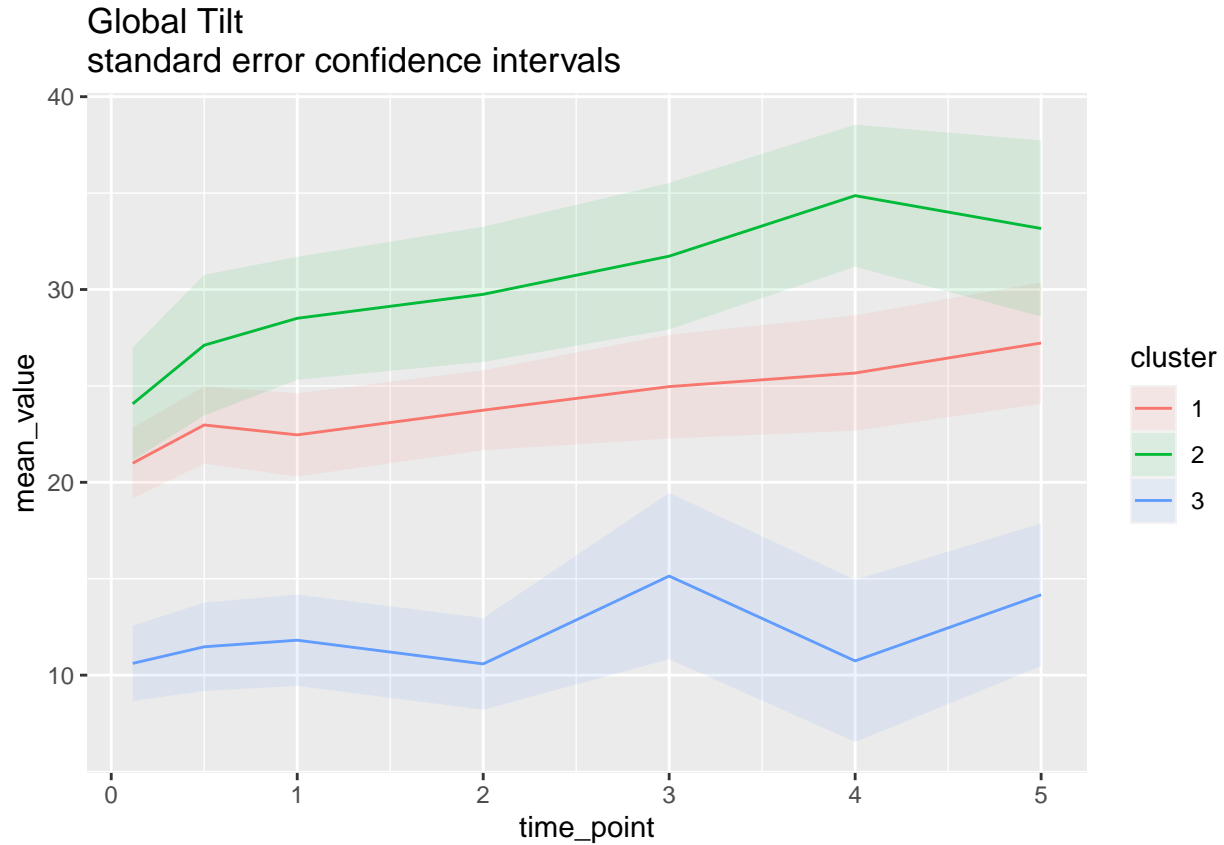
26

Global Tilt
standard error confidence intervals


```
Global differences between clusters
  cluster   emmean         SE         df lower.CL upper.CL
1       1 23.30125 0.5207818   640.2854 22.27860 24.32389
2       2 27.88780 0.8075473 1191.9838 26.30343 29.47218
3       3 12.28199 0.6633500 1031.7595 10.98032 13.58366
  contrast  estimate         SE        df   t.ratio        p.value
1   1 - 2 -4.586559 0.8657258 1562.726 -5.297935 4.007307e-07
2   1 - 3 11.019257 0.7337658 1564.219 15.017402 0.000000e+00
3   2 - 3 15.605815 0.9604318 1562.002 16.248749 0.000000e+00


Time point differences between clusters


        Year: 0.115384615384615
  cluster   emmean        SE  df  lower.CL upper.CL
1       1 20.99282 0.8641098 295 19.292221 22.69342
2       2 24.06885 1.5298930 295 21.057959 27.07973
3       3 10.61000 1.2109429 295  8.226818 12.99318
  contrast  estimate       SE  df   t.ratio        p.value
1   1 - 2 -3.076024 1.757060 295 -1.750666 1.882900e-01
2   1 - 3 10.382822 1.487639 295  6.979398 5.951672e-11
3   2 - 3 13.458846 1.951142 295  6.897933 9.725099e-11


        Year: 0.5
```

```
   cluster   emmean        SE  df lower.CL upper.CL
1        1 22.97327 0.9779086 294 21.04868 24.89786
2        2 27.11078 1.7428928 294 23.68066 30.54091
3        3 11.47071 1.3580511 294  8.79798 14.14345
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -4.137513 1.998495 294 -2.070315 9.782519e-02
2   1 - 3 11.502557 1.673502 294  6.873346 1.133880e-10
3   2 - 3 15.640070 2.209520 294  7.078492 3.293810e-11


         Year: 1
   cluster   emmean       SE  df lower.CL upper.CL
1        1 22.46037 1.005079 284 20.482023 24.43872
2        2 28.50706 1.785781 284 24.992013 32.02210
3        3 11.81160 1.472593 284  8.913019 14.71018
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -6.046686 2.049194 284 -2.950763 9.590942e-03
2   1 - 3 10.648773 1.782895 284  5.972744 2.085766e-08
3   2 - 3 16.695459 2.314636 284  7.212994 1.544531e-11


         Year: 2
   cluster   emmean       SE  df lower.CL upper.CL
1        1 23.74052 1.035358 266 21.701979 25.77906
2        2 29.75058 1.668229 266 26.465964 33.03519
3        3 10.58268 1.328466 266  7.967037 13.19833
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -6.010058 1.963404 266 -3.061041 6.847825e-03
2   1 - 3 13.157836 1.684276 266  7.812159 6.400436e-13
3   2 - 3 19.167894 2.132559 266  8.988211 2.490230e-13


         Year: 3
   cluster   emmean       SE  df lower.CL upper.CL
1        1 24.96385 1.298112 145 22.39818 27.52951
2        2 31.72778 2.383147 145 27.01758 36.43797
3        3 15.13967 2.260852 145 10.67118 19.60815
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -6.763932 2.713758 145 -2.492459 3.657986e-02
2   1 - 3  9.824179 2.607018 145  3.768358 6.941614e-04
3   2 - 3 16.588111 3.284941 145  5.049743 3.902327e-06


         Year: 4
   cluster   emmean       SE  df lower.CL upper.CL
1        1 25.66787 1.396402 124 22.903996 28.43174
2        2 34.86536 2.285399 124 30.341912 39.38880
3        3 10.73792 2.468513 124  5.852038 15.62380
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -9.19749 2.678243 124 -3.434150 2.317864e-03
2   1 - 3 14.92995 2.836106 124  5.264243 1.790462e-06
3   2 - 3 24.12744 3.364016 124  7.172213 1.761377e-10


         Year: 5
   cluster   emmean       SE  df lower.CL upper.CL
1        1 27.22463 1.494102 144 24.27142 30.17783
2        2 33.16321 2.525494 144 28.17139 38.15504
3        3 14.16795 2.139898 144  9.93828 18.39762
```

```
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -5.938589 2.934359 144 -2.023812 1.101643e-01
2   1 - 3 13.056676 2.609886 144  5.002776 4.836051e-06
3   2 - 3 18.995266 3.310179 144  5.738441 1.627127e-07


Predictive Capability   time_point    rmse relative_rmse
1:              2 12.24425    0.8757785
2:              5 11.85187    0.7937252
```

T1 Sagittal Tilt
standard error confidence intervals
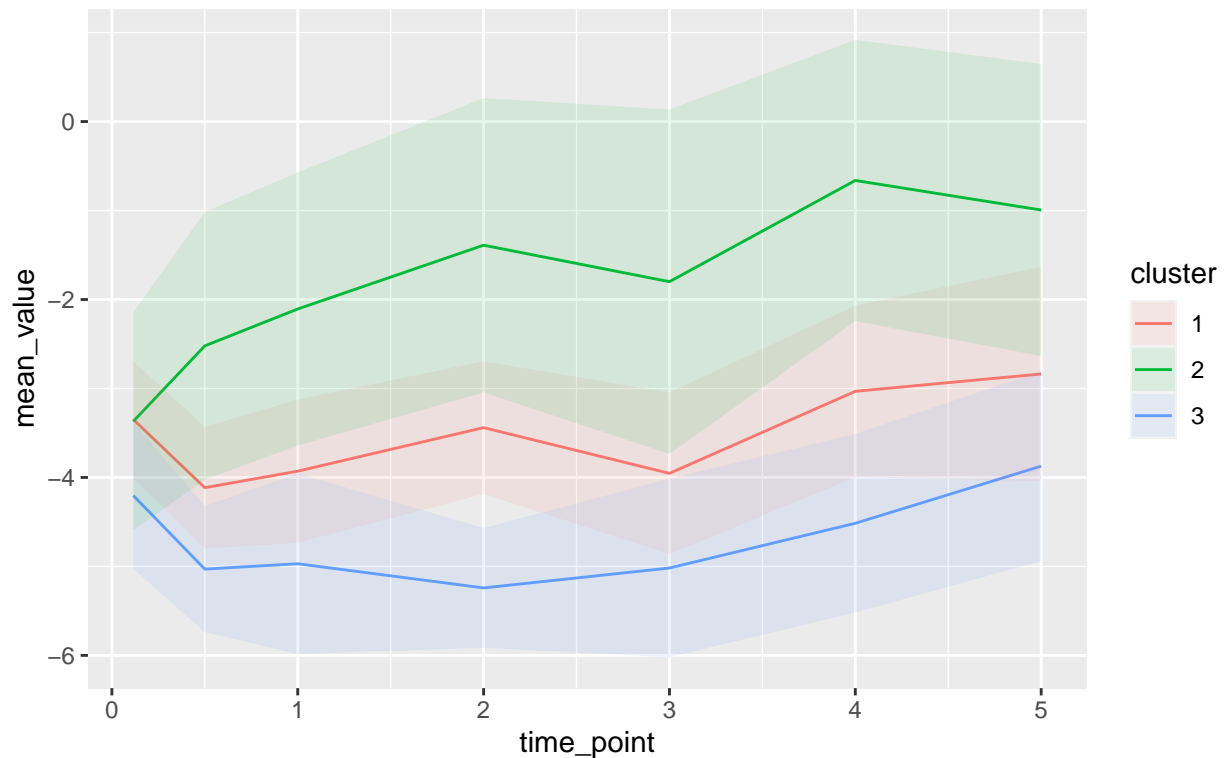

```
Global differences between clusters
  cluster   emmean        SE        df  lower.CL  upper.CL
1       1 -3.472769 0.1806754  693.5762 -3.827505 -3.118033
2       2 -2.181906 0.3018855 1139.4012 -2.774220 -1.589592
3       3 -4.603700 0.2412452 1074.8454 -5.077064 -4.130335
  contrast  estimate        SE       df   t.ratio      p.value
1   1 - 2 -1.290863 0.3347831 1411.370 -3.855818 3.544294e-04
2   1 - 3  1.130931 0.2799551 1444.129  4.039686 1.664595e-04
3   2 - 3  2.421793 0.3708958 1424.866  6.529580 2.738708e-10


Time point differences between clusters

        Year: 0.115384615384615
  cluster    emmean        SE df  lower.CL  upper.CL
```

```
1        1 -3.348714 0.3257491 268 -3.990067 -2.707361
2        2 -3.368648 0.5967128 268 -4.543490 -2.193807
3        3 -4.203310 0.4622118 268 -5.113339 -3.293282
   contrast   estimate        SE  df   t.ratio    p.value
1   1 - 2 0.01993456 0.6798372 268 0.02932254 0.9995261
2   1 - 3 0.85459666 0.5654663 268 1.51131309 0.2872061
3   2 - 3 0.83466211 0.7547887 268 1.10582226 0.5113059


         Year: 0.5
  cluster   emmean        SE  df lower.CL  upper.CL
1       1 -4.115468 0.3403283 282 -4.785374 -3.445561
2       2 -2.521124 0.6180377 282 -3.737677 -1.304572
3       3 -5.030439 0.4650770 282 -5.945902 -4.114976
   contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2 -1.5943432 0.7055451 282 -2.259732 0.063288380
2   1 - 3  0.9149716 0.5762985 282  1.587670 0.252624811
3   2 - 3  2.5093149 0.7734774 282  3.244200 0.003764092


         Year: 1
  cluster   emmean        SE  df lower.CL  upper.CL
1       1 -3.929554 0.4012133 265 -4.719526 -3.1395828
2       2 -2.106594 0.7191423 265 -3.522554 -0.6906344
3       3 -4.969865 0.5892706 265 -6.130113 -3.8096165
   contrast estimate        SE  df   t.ratio      p.value
1   1 - 2 -1.82296 0.8234912 265 -2.213697 0.070708590
2   1 - 3  1.04031 0.7128898 265  1.459286 0.312296256
3   2 - 3  2.86327 0.9297341 265  3.079666 0.006458852


         Year: 2
  cluster   emmean        SE  df lower.CL  upper.CL
1       1 -3.439941 0.3684038 254 -4.165457 -2.7144263
2       2 -1.389844 0.6476901 254 -2.665370 -0.1143167
3       3 -5.241577 0.4896077 254 -6.205785 -4.2773694
   contrast   estimate        SE  df t.ratio      p.value
1   1 - 2 -2.050098 0.7451334 254 -2.751317 1.743563e-02
2   1 - 3  1.801636 0.6127292 254  2.940346 9.985668e-03
3   2 - 3  3.851734 0.8119224 254  4.743967 1.042531e-05


         Year: 3
  cluster   emmean        SE  df lower.CL  upper.CL
1       1 -3.953961 0.4478095 143 -4.839142 -3.0687791
2       2 -1.799897 0.8331590 143 -3.446796 -0.1529977
3       3 -5.017697 0.7756288 143 -6.550877 -3.4845180
   contrast   estimate        SE  df t.ratio    p.value
1   1 - 2 -2.154064 0.9458791 143 -2.277314 0.06227986
2   1 - 3  1.063737 0.8956190 143  1.187711 0.46242191
3   2 - 3  3.217801 1.1383119 143  2.826818 0.01477436


         Year: 4
  cluster   emmean        SE  df lower.CL  upper.CL
1       1 -3.031987 0.4624616 123 -3.947402 -2.1165730
2       2 -0.662130 0.7518177 123 -2.150307  0.8260471
3       3 -4.514991 0.8120560 123 -6.122406 -2.9075762
   contrast   estimate        SE  df   t.ratio    p.value
```

```
1    1 - 2 -2.369857 0.8826668 123 -2.684883 0.022332842
2    1 - 3  1.483004 0.9345082 123  1.586935 0.255112109
3    2 - 3  3.852861 1.1066457 123  3.481567 0.001983844

        Year: 5
  cluster    emmean        SE  df  lower.CL   upper.CL
1       1 -2.8371544 0.5393379 143 -3.903259 -1.7710495
2       2 -0.9943177 0.9116474 143 -2.796364  0.8077285
3       3 -3.8728404 0.7825536 143 -5.419708 -2.3259728
  contrast  estimate        SE  df   t.ratio    p.value
1    1 - 2 -1.842837 1.0592385 143 -1.739775 0.19404698
2    1 - 3  1.035686 0.9504081 143  1.089728 0.52198521
3    2 - 3  2.878523 1.2014537 143  2.395866 0.04672166

Predictive Capability   time_point      rmse relative_rmse
1:              2 4.097067      0.9166639
2:              5 5.115427      1.0468099
```

Thoracolumbar L2−T10
standard error confidence intervals
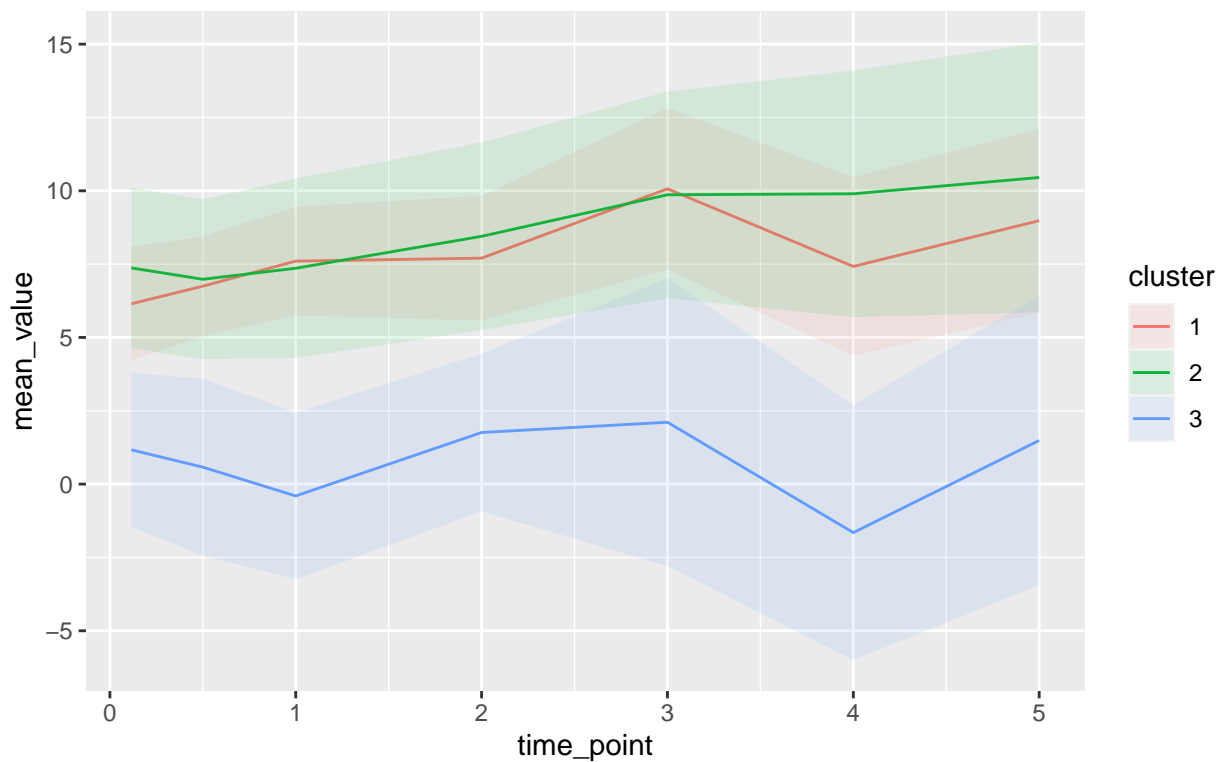

```
Global differences between clusters
  cluster   emmean        SE       df   lower.CL upper.CL
1       1 7.399424 0.5107063  693.3384  6.39670716 8.402140
2       2 7.869286 0.8237771 1218.4481  6.25310680 9.485465
3       3 1.210597 0.6595787 1079.4499 -0.08360489 2.504798
  contrast   estimate        SE       df   t.ratio    p.value
```

31

```
1    1 - 2 -0.4698622 0.9000091 1553.675 -0.5220638 8.605667e-01
2    1 - 3  6.1888268 0.7504587 1564.070  8.2467253 0.000000e+00
3    2 - 3  6.6586890 0.9919662 1556.951  6.7126171 7.953294e-11


Time point differences between clusters

        Year: 0.115384615384615
  cluster    emmean        SE  df  lower.CL  upper.CL
1       1 6.146667 0.9575285 303  4.262419  8.030914
2       2 7.370192 1.7056583 303  4.013757 10.726628
3       3 1.168652 1.3037631 303 -1.396925  3.734228
  contrast  estimate        SE  df     t.ratio       p.value
1   1 - 2 -1.223526 1.956050 303 -0.6255084 0.806233571
2   1 - 3  4.978015 1.617609 303  3.0773906 0.006430533
3   2 - 3  6.201541 2.146874 303  2.8886373 0.011526401


        Year: 0.5
  cluster    emmean        SE  df  lower.CL  upper.CL
1       1 6.7484431 0.9178337 297  4.942162  8.554725
2       2 6.9832000 1.6774022 297  3.682100 10.284300
3       3 0.5778313 1.3019166 297 -1.984319  3.139982
  contrast   estimate        SE  df     t.ratio       p.value
1   1 - 2 -0.2347569 1.912092 297 -0.1227749 0.9917243827
2   1 - 3  6.1706118 1.592924 297  3.8737651 0.0003868899
3   2 - 3  6.4053687 2.123362 297  3.0166167 0.0077995467


        Year: 1
  cluster     emmean        SE  df  lower.CL  upper.CL
1       1  7.6018868 0.9665376 290  5.699569  9.504205
2       2  7.3582000 1.7235835 290  3.965881 10.750519
3       3 -0.4039286 1.3297735 290 -3.021159  2.213302
  contrast  estimate        SE  df   t.ratio      p.value
1   1 - 2 0.2436868 1.976091 290 0.1233176 9.916514e-01
2   1 - 3 8.0058154 1.643926 290 4.8699367 5.484079e-06
3   2 - 3 7.7621286 2.176933 290 3.5656257 1.231155e-03


        Year: 2
  cluster   emmean       SE  df  lower.CL  upper.CL
1       1 7.702929 1.057728 271  5.6205206  9.785337
2       2 8.447308 1.735546 271  5.0304400 11.864175
3       3 1.759268 1.382073 271 -0.9616964  4.480233
  contrast   estimate       SE  df    t.ratio     p.value
1   1 - 2 -0.7443791 2.032464 271 -0.3662447 0.928753997
2   1 - 3  5.9436603 1.740377 271  3.4151561 0.002116740
3   2 - 3  6.6880394 2.218614 271  3.0145129 0.007908575


        Year: 3
  cluster     emmean       SE  df  lower.CL upper.CL
1       1 10.067614 1.358808 142  7.381508 12.75372
2       2  9.863077 2.499842 142  4.921361 14.80479
3       3  2.109032 2.289383 142 -2.416645  6.63471
  contrast  estimate       SE  df    t.ratio     p.value
1   1 - 2 0.2045367 2.845271 142 0.07188654 0.997155055
```

```
2       1 - 3 7.9585814 2.662261 142 2.98940719 0.009186244
3       2 - 3 7.7540447 3.389762 142 2.28748946 0.060816040


         Year: 4
  cluster     emmean       SE  df  lower.CL  upper.CL
1       1   7.420676 1.454221 123   4.542135 10.299216
2       2   9.897500 2.364107 123   5.217895 14.577105
3       3  -1.653750 2.553527 123  -6.708301  3.400801
  contrast   estimate       SE  df    t.ratio       p.value
1    1 - 2 -2.476824 2.775565 123 -0.8923677 0.646138192
2    1 - 3  9.074426 2.938581 123  3.0880295 0.006985787
3    2 - 3 11.551250 3.479871 123  3.3194474 0.003380138


         Year: 5
  cluster     emmean       SE  df  lower.CL  upper.CL
1       1   8.980127 1.609661 143   5.798322 12.161931
2       2  10.452143 2.703765 143   5.107631 15.796655
3       3   1.487692 2.290951 143  -3.040812  6.016196
  contrast   estimate       SE  df    t.ratio       p.value
1    1 - 2 -1.472016 3.146642 143 -0.4678054 0.88648067
2    1 - 3  7.492434 2.799904 143  2.6759610 0.02252312
3    2 - 3  8.964451 3.543840 143  2.5295868 0.03326860


Predictive Capability   time_point      rmse relative_rmse
1:            2 12.39797      0.9695733
2:            5 16.46348      1.1243489
```

RSA
standard error confidence intervals
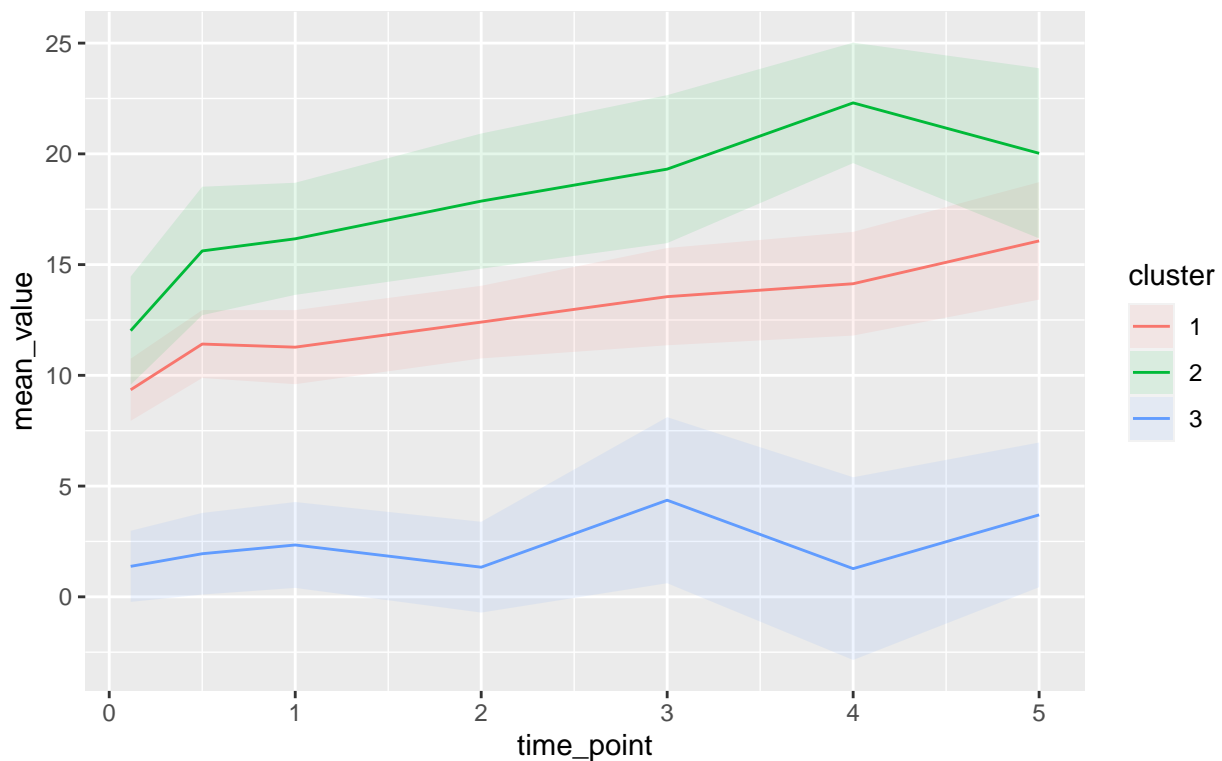
```
Global differences between clusters
  cluster   emmean        SE         df lower.CL upper.CL
1       1 11.899636 0.4219434  632.7409 11.071057 12.72821
2       2 16.002096 0.6505143 1190.9197 14.725814 17.27838
3       3  2.973355 0.5351424 1021.4335  1.923251  4.02346
  contrast  estimate        SE        df   t.ratio      p.value
1   1 - 2 -4.102460 0.6942306 1565.582 -5.909362 1.261068e-08
2   1 - 3  8.926281 0.5883846 1566.167 15.170827 0.000000e+00
3   2 - 3 13.028741 0.7702102 1564.771 16.915824 0.000000e+00


Time point differences between clusters


        Year: 0.115384615384615
  cluster   emmean        SE  df   lower.CL upper.CL
1       1  9.347669 0.6797802 295  8.0098353 10.685502
2       2 12.017115 1.2035404 295  9.6485021 14.385729
3       3  1.375783 0.9526279 295 -0.4990248  3.250591
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -2.669447 1.382248 295 -1.931235 1.317366e-01
2   1 - 3  7.971886 1.170300 295  6.811834 1.630143e-10
3   2 - 3 10.641332 1.534930 295  6.932781 7.884293e-11


        Year: 0.5
  cluster   emmean        SE  df   lower.CL upper.CL
1       1 11.413210 0.7628357 294  9.9118990 12.914521
2       2 15.616667 1.3595759 294 12.9409320 18.292401
3       3  1.944762 1.0593730 294 -0.1401537  4.029678
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -4.203457 1.558963 294 -2.696316 2.021776e-02
2   1 - 3  9.468448 1.305446 294  7.253036 1.161005e-11
3   2 - 3 13.671905 1.723577 294  7.932285 8.623102e-13


        Year: 1
  cluster   emmean        SE  df    lower.CL  upper.CL
1       1 11.271925 0.7886382 284  9.71960779 12.824243
2       2 16.164510 1.4012178 284 13.40641968 18.922600
3       3  2.340667 1.1554738 284  0.06628729  4.615046
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -4.892584 1.607906 284 -3.042830 7.210659e-03
2   1 - 3  8.931259 1.398953 284  6.384244 2.099730e-09
3   2 - 3 13.823843 1.816186 284  7.611469 1.688871e-12


        Year: 2
  cluster   emmean        SE  df   lower.CL upper.CL
1       1 12.403111 0.8567864 266 10.7161653 14.090057
2       2 17.866923 1.3805043 266 15.1488174 20.585029
3       3  1.337561 1.0993412 266 -0.8269565  3.502078
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -5.463812 1.624769 266 -3.362823 2.540883e-03
2   1 - 3 11.065550 1.393784 266  7.939214 4.215517e-13
3   2 - 3 16.529362 1.764750 266  9.366403 2.488010e-13
```

```
        Year: 3
  cluster    emmean       SE  df  lower.CL  upper.CL
1       1 13.552637 1.083904 145 11.410346 15.694929
2       2 19.311111 1.989892 145 15.378170 23.244052
3       3  4.362333 1.887777 145  0.631218  8.093449
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -5.758474 2.265947 145 -2.541310 3.223242e-02
2   1 - 3  9.190304 2.176821 145  4.221892 1.254897e-04
3   2 - 3 14.948778 2.742877 145  5.450036 6.307079e-07


        Year: 4
  cluster   emmean       SE  df  lower.CL  upper.CL
1       1 14.13653 1.127254 124 11.905382 16.367684
2       2 22.30250 1.844902 124 18.650922 25.954078
3       3  1.27250 1.992722 124 -2.671655  5.216655
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -8.165967 2.162028 124 -3.776994 7.128719e-04
2   1 - 3 12.864033 2.289463 124  5.618799 3.599714e-07
3   2 - 3 21.030000 2.715622 124  7.744081 8.857248e-12


        Year: 5
  cluster    emmean       SE  df   lower.CL  upper.CL
1       1 16.070125 1.270218 144 13.5594436 18.580806
2       2 20.025714 2.147060 144 15.7818881 24.269540
3       3  3.699231 1.819244 144  0.1033582  7.295103
  contrast  estimate       SE  df   t.ratio       p.value
1   1 - 2 -3.955589 2.494659 144 -1.585623 2.551207e-01
2   1 - 3 12.370894 2.218807 144  5.575472 3.534275e-07
3   2 - 3 16.326484 2.814164 144  5.801540 1.200803e-07


Predictive Capability   time_point     rmse relative_rmse
1:          2 10.11701      0.8667911
2:          5 10.50629      0.8185300
```

RPV
standard error confidence intervals
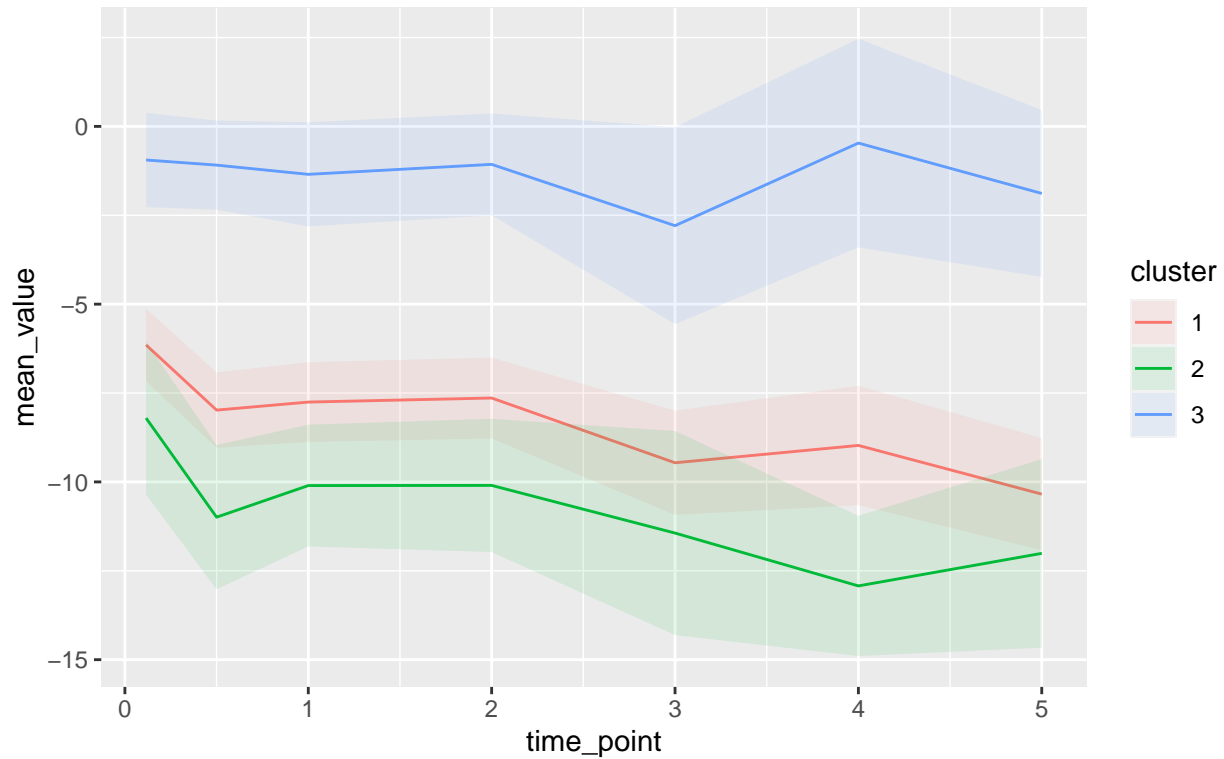
```
Global differences between clusters
  cluster      emmean          SE          df    lower.CL     upper.CL
1       1   -7.742325  0.2847406   705.5433   -8.301366   -7.1832852
2       2  -10.203099  0.4694770  1285.6542  -11.124124   -9.2820736
3       3   -1.600696  0.3725509  1134.4153   -2.331662   -0.8697299
  contrast  estimate          SE          df     t.ratio       p.value
1   1 - 2   2.460773  0.5109153  1658.342    4.816402  4.764110e-06
2   1 - 3  -6.141629  0.4217857  1675.243  -14.561017  1.493472e-12
3   2 - 3  -8.602403  0.5648774  1662.117  -15.228795  4.810596e-13


Time point differences between clusters

        Year: 0.115384615384615
  cluster      emmean         SE   df    lower.CL     upper.CL
1       1   -6.146963  0.5184031  336   -7.166688   -5.1272389
2       2   -8.204259  0.9749613  336  -10.122056   -6.2864623
3       3   -0.945000  0.7389590  336   -2.398569    0.5085688
  contrast  estimate         SE   df     t.ratio       p.value
1   1 - 2   2.057296  1.1042152  336    1.863129  1.511046e-01
2   1 - 3  -5.201963  0.9026639  336   -5.762902  5.607024e-08
3   2 - 3  -7.259259  1.2233601  336   -5.933870  2.207380e-08


        Year: 0.5
```

```
   cluster     emmean        SE  df   lower.CL  upper.CL
1        1  -7.979511 0.5214826 329   -9.005372 -6.953650
2        2 -10.991698 0.9716522 329  -12.903133 -9.080263
3        3  -1.089053 0.7257499 329   -2.516748  0.338643
   contrast  estimate        SE  df    t.ratio       p.value
1    1 - 2   3.012187 1.1027475 329   2.731529 1.819224e-02
2    1 - 3  -6.890458 0.8936761 329  -7.710241 9.877654e-13
3    2 - 3  -9.902645 1.2127740 329  -8.165285 5.621059e-13


         Year: 1
   cluster     emmean        SE  df   lower.CL  upper.CL
1        1  -7.753708 0.5452530 317   -8.826480 -6.6809358
2        2 -10.102407 0.9899453 317  -12.050101 -8.1547141
3        3  -1.347955 0.7754731 317   -2.873679  0.1777699
   contrast  estimate        SE  df    t.ratio       p.value
1    1 - 2   2.348700 1.1301737 317   2.078176 9.600895e-02
2    1 - 3  -6.405753 0.9479765 317  -6.757291 2.034418e-10
3    2 - 3  -8.754453 1.2575175 317  -6.961695 5.932721e-11


         Year: 2
   cluster     emmean        SE  df   lower.CL  upper.CL
1        1  -7.640000 0.5723720 286   -8.766596 -6.513404
2        2 -10.097778 0.9507682 286  -11.969168 -8.226387
3        3  -1.067791 0.7533942 286   -2.550691  0.415110
   contrast  estimate        SE  df    t.ratio       p.value
1    1 - 2   2.457778 1.1097611 286   2.214691 7.040876e-02
2    1 - 3  -6.572209 0.9461567 286  -6.946216 7.649081e-11
3    2 - 3  -9.029987 1.2130799 286  -7.443852 4.038658e-12


         Year: 3
   cluster     emmean        SE  df   lower.CL  upper.CL
1        1  -9.461158 0.765627 150 -10.973964 -7.9483515
2        2 -11.438889 1.436141 150 -14.276568 -8.6012099
3        3  -2.792258 1.340288 150  -5.440541 -0.1439756
   contrast  estimate        SE  df    t.ratio       p.value
1    1 - 2   1.977731 1.627478 150   1.215212 4.460567e-01
2    1 - 3  -6.668900 1.543553 150  -4.320486 8.334160e-05
3    2 - 3  -8.646631 1.964402 150  -4.401661 6.005584e-05


         Year: 4
   cluster     emmean        SE  df   lower.CL   upper.CL
1        1  -8.973974 0.8044375 127 -10.565811  -7.382138
2        2 -12.925357 1.3426431 127 -15.582206 -10.268509
3        3  -0.468750 1.4502203 127  -3.338474   2.400974
   contrast  estimate        SE  df    t.ratio       p.value
1    1 - 2    3.951383 1.565187 127   2.524544 3.403838e-02
2    1 - 3   -8.505224 1.658390 127  -5.128602 3.166733e-06
3    2 - 3  -12.456607 1.976317 127  -6.302939 1.321651e-08


         Year: 5
   cluster     emmean        SE  df  lower.CL  upper.CL
1        1 -10.343375 0.8120106 144 -11.94837 -8.7383750
2        2 -12.009286 1.3725485 144 -14.72223 -9.2963406
3        3  -1.885641 1.1629858 144  -4.18437  0.4130877
```

```
   contrast    estimate        SE  df    t.ratio        p.value
1    1 - 2    1.665911  1.594757  144   1.044617  5.500424e-01
2    1 - 3   -8.457734  1.418414  144  -5.962812  5.476418e-08
3    2 - 3  -10.123645  1.799007  144  -5.627352  2.764889e-07


Predictive Capability  time_point     rmse relative_rmse
1:                  2  6.786129     0.8742053
2:                  5  8.209677     0.9960849
```

Quality of Life

ODI – Score (%)
standard error confidence intervals
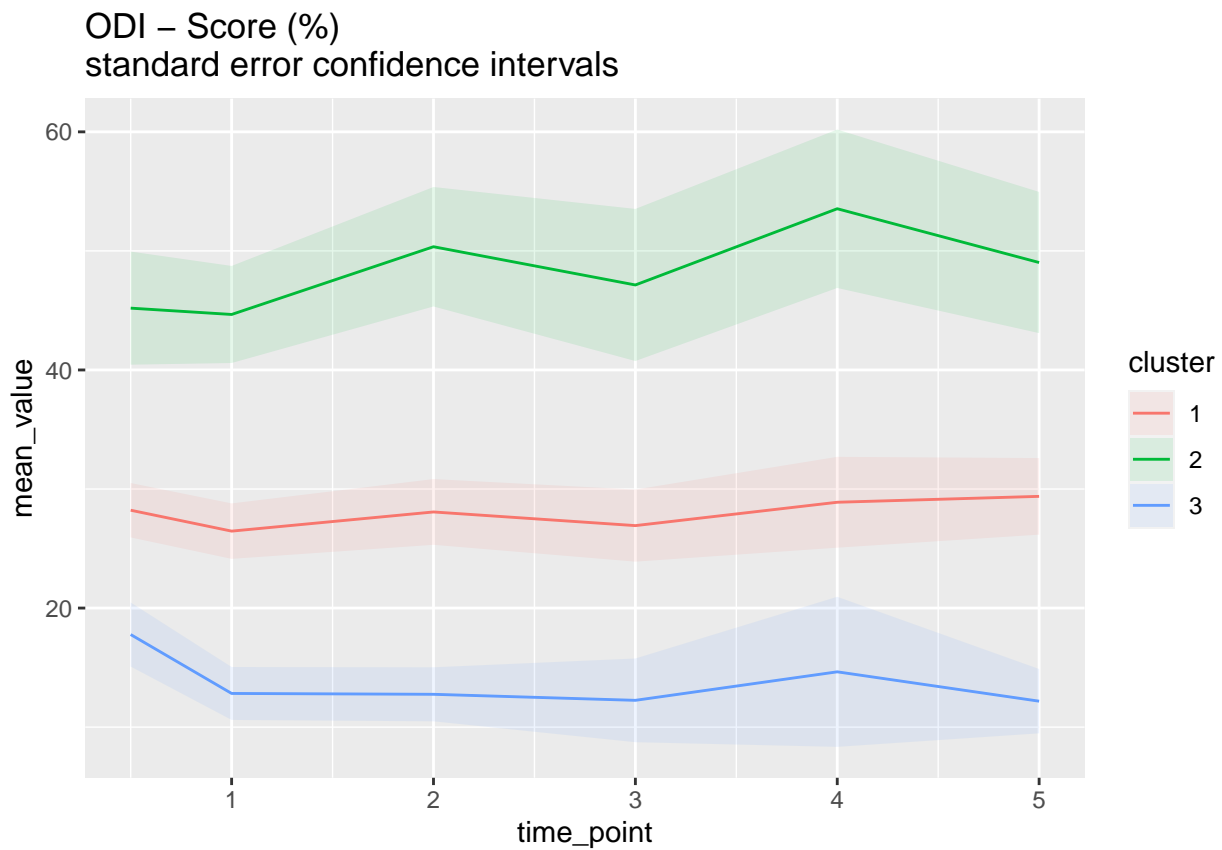
```
Global differences between clusters
   cluster    emmean         SE          df  lower.CL  upper.CL
1        1  27.99484  0.7490043    584.3790  26.52377  29.46591
2        2  46.88754  1.1789408  1186.7627  44.57450  49.20058
3        3  15.40190  0.9677215   976.3711  13.50284  17.30095
   contrast    estimate         SE          df    t.ratio  p.value
1    1 - 2  -18.89270  1.247007  1605.751  -15.15044        0
2    1 - 3   12.59295  1.049597  1606.204   11.99789        0
3    2 - 3   31.48565  1.391811  1603.545   22.62207        0
```

```
Time point differences between clusters

        Year: 0.5
  cluster   emmean       SE  df lower.CL upper.CL
1       1 28.21809 1.143933 332 25.96781 30.46836
2       2 45.19298 2.077505 332 41.10625 49.27972
3       3 17.77778 1.653325 332 14.52546 21.03009
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -16.97490 2.371626 332 -7.157494 1.644995e-11
2   1 - 3  10.44031 2.010489 332  5.192919 1.081809e-06
3   2 - 3  27.41520 2.655091 332 10.325522 5.418999e-13


        Year: 1
  cluster   emmean       SE  df  lower.CL upper.CL
1       1 26.46277 1.085721 334 24.327054 28.59848
2       2 44.66071 1.989312 334 40.747554 48.57387
3       3 12.82796 1.543674 334  9.791409 15.86451
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -18.19795 2.266308 334 -8.029776 3.367306e-13
2   1 - 3  13.63481 1.887252 334  7.224691 1.056277e-11
3   2 - 3  31.83276 2.517994 334 12.642111 2.552403e-13


        Year: 2
  cluster   emmean       SE  df  lower.CL upper.CL
1       1 28.07407 1.271934 338 25.572170 30.57598
2       2 50.35088 2.316105 338 45.795083 54.90667
3       3 12.75789 1.794047 338  9.228991 16.28680
  contrast  estimate       SE  df   t.ratio     p.value
1   1 - 2 -22.27680 2.642377 338 -8.430592 0.00000e+00
2   1 - 3  15.31618 2.199186 338  6.964475 5.16287e-11
3   2 - 3  37.59298 2.929666 338 12.831831 0.00000e+00


        Year: 3
  cluster   emmean       SE  df  lower.CL upper.CL
1       1 26.92701 1.476966 218 24.016046 29.83797
2       2 47.13889 2.881241 218 41.460234 52.81754
3       3 12.25000 2.495228 218  7.332141 17.16786
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -20.21188 3.237743 218 -6.242583 6.648785e-09
2   1 - 3  14.67701 2.899585 218  5.061761 2.634557e-06
3   2 - 3  34.88889 3.811524 218  9.153527 0.000000e+00


        Year: 4
  cluster   emmean       SE  df  lower.CL upper.CL
1       1 28.88785 1.909359 170 25.118743 32.65696
2       2 53.54286 3.338455 170 46.952691 60.13302
3       3 14.64516 3.547307 170  7.642719 21.64760
  contrast  estimate       SE  df   t.ratio      p.value
1   1 - 2 -24.65501 3.845899 170 -6.410727 4.124628e-09
2   1 - 3  14.24269 4.028528 170  3.535457 1.515091e-03
3   2 - 3  38.89770 4.871208 170  7.985226 5.552225e-13


        Year: 5
  cluster   emmean       SE  df  lower.CL upper.CL
```

```
1        1 29.38255 1.480256 247 26.467016 32.29808
2        2 49.02500 2.856933 247 43.397944 54.65206
3        3 12.18033 2.313476 247  7.623671 16.73698
  contrast  estimate       SE  df    t.ratio        p.value
1   1 - 2 -19.64245 3.217642 247 -6.104610 1.189088e-08
2   1 - 3  17.20222 2.746512 247  6.263297 4.978901e-09
3   2 - 3  36.84467 3.676171 247 10.022566 1.165734e-13


Predictive Capability    time_point    rmse relative_rmse
1:            2 17.68399    0.8314036
2:            5 16.99935    0.7950072
```
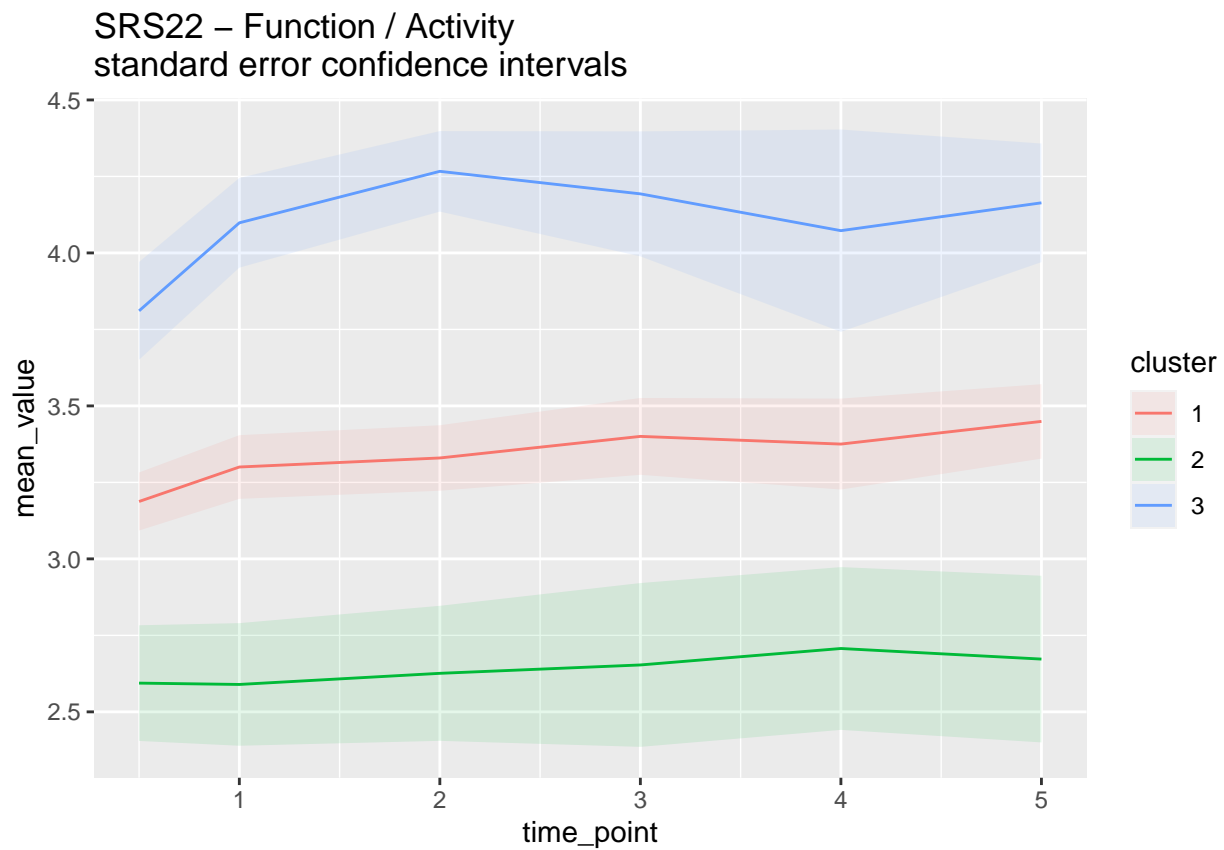
SRS22 – Function / Activity
standard error confidence intervals


```
Global differences between clusters
  cluster    emmean         SE         df lower.CL upper.CL
1       1 3.319749 0.03233421   612.3558 3.256250 3.383248
2       2 2.651948 0.05298246  1164.3285 2.547996 2.755899
3       3 4.088192 0.04275502   999.0401 4.004292 4.172092
  contrast   estimate         SE       df   t.ratio p.value
1   1 - 2  0.6678014 0.05752247 1524.994  11.60940       0
2   1 - 3 -0.7684431 0.04820582 1535.337 -15.94088       0
3   2 - 3 -1.4362445 0.06392829 1532.255 -22.46649       0


Time point differences between clusters
```

```
        Year: 0.5
   cluster   emmean        SE  df lower.CL upper.CL
1        1 3.187581 0.05218668 335 3.084926 3.290236
2        2 2.593966 0.09345492 335 2.410133 2.777798
3        3 3.810638 0.07340950 335 3.666237 3.955040
   contrast   estimate         SE  df    t.ratio      p.value
1   1 - 2  0.5936151 0.10703865 335   5.545802 1.780215e-07
2   1 - 3 -0.6230577 0.09006888 335  -6.917568 7.028844e-11
3   2 - 3 -1.2166728 0.11883929 335 -10.237968 1.014744e-13


        Year: 1
   cluster   emmean        SE  df lower.CL upper.CL
1        1 3.300266 0.05350659 335 3.195015 3.405517
2        2 2.589643 0.09803750 335 2.396796 2.782490
3        3 4.098404 0.07566975 335 3.949557 4.247252
   contrast   estimate         SE  df    t.ratio      p.value
1   1 - 2  0.7106231 0.11168843 335   6.362549 1.954103e-09
2   1 - 3 -0.7981383 0.09267614 335  -8.612123 1.013634e-13
3   2 - 3 -1.5087614 0.12384370 335 -12.182787 7.305268e-14


        Year: 2
   cluster   emmean        SE  df lower.CL upper.CL
1        1 3.329787 0.05418462 338 3.223206 3.436369
2        2 2.625965 0.09840509 338 2.432401 2.819528
3        3 4.266667 0.07582621 338 4.117516 4.415817
   contrast   estimate        SE  df    t.ratio      p.value
1   1 - 2  0.7038223 0.1123367 338   6.265293 3.395082e-09
2   1 - 3 -0.9368794 0.0931965 338 -10.052732 0.000000e+00
3   2 - 3 -1.6407018 0.1242303 338 -13.206933 0.000000e+00


        Year: 3
   cluster   emmean        SE  df lower.CL upper.CL
1        1 3.400355 0.06502101 227 3.272233 3.528477
2        2 2.653333 0.12363201 227 2.409720 2.896946
3        3 4.193000 0.10918884 227 3.977847 4.408153
   contrast   estimate        SE  df   t.ratio      p.value
1   1 - 2  0.7470213 0.1396875 227   5.347802 6.484957e-07
2   1 - 3 -0.7926454 0.1270824 227 -6.237256 6.455640e-09
3   2 - 3 -1.5396667 0.1649457 227 -9.334386 3.108624e-15


        Year: 4
   cluster   emmean        SE  df lower.CL upper.CL
1        1 3.375234 0.07979851 172 3.217723 3.532744
2        2 2.707143 0.13952520 172 2.431741 2.982545
3        3 4.072727 0.14369105 172 3.789102 4.356352
   contrast   estimate        SE  df   t.ratio      p.value
1   1 - 2  0.6680908 0.1607330 172   4.156526 1.499287e-04
2   1 - 3 -0.6974936 0.1643622 172 -4.243639 1.059765e-04
3   2 - 3 -1.3655844 0.2002858 172 -6.818179 4.492536e-10


        Year: 5
   cluster   emmean        SE  df lower.CL upper.CL
1        1 3.449333 0.06406120 249 3.323162 3.575504
```

```
2        2 2.672500 0.12405398 249 2.428171 2.916829
3        3 4.163710 0.09964256 249 3.967460 4.359959
   contrast    estimate        SE  df   t.ratio       p.value
1    1 - 2   0.7768333 0.1396182 249  5.563985 2.035231e-07
2    1 - 3  -0.7143763 0.1184588 249 -6.030591 1.758578e-08
3    2 - 3  -1.4912097 0.1591164 249 -9.371816 5.384582e-14


Predictive Capability   time_point      rmse relative_rmse
1:             2 0.7585325      0.8188106
2:             5 0.8310533      0.9121240
```

SRS22 – Pain
standard error confidence intervals
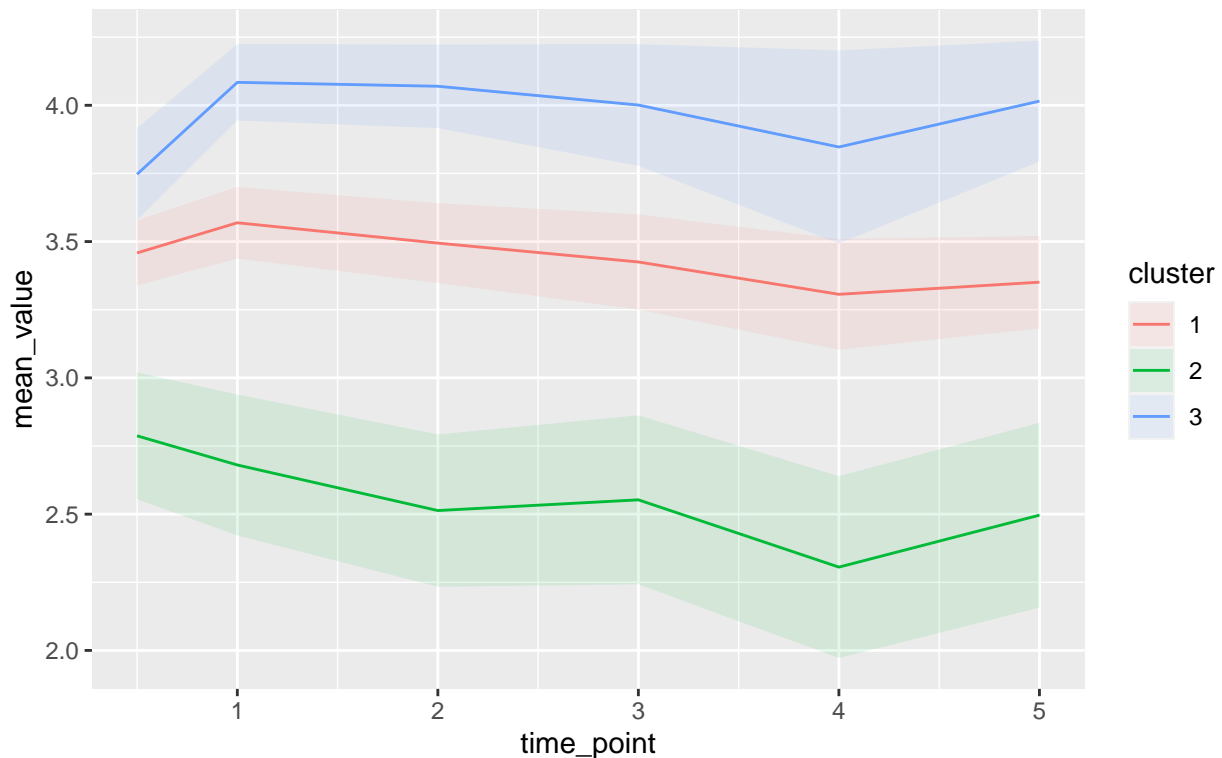

```
Global differences between clusters
   cluster   emmean         SE        df lower.CL upper.CL
1        1 3.453742 0.04177432  590.6752 3.371697 3.535786
2        2 2.620803 0.06574694 1191.4018 2.491810 2.749796
3        3 3.889766 0.05363257  978.3573 3.784518 3.995014
   contrast    estimate        SE       df    t.ratio       p.value
1    1 - 2   0.8329385 0.06973607 1615.418  11.944156 5.22471e-13
2    1 - 3  -0.4360241 0.05841160 1619.304  -7.464684 0.00000e+00
3    2 - 3  -1.2689627 0.07748587 1615.325 -16.376698 0.00000e+00


Time point differences between clusters
```

```
        Year: 0.5
  cluster   emmean         SE  df lower.CL upper.CL
1       1 3.458333 0.06201987 335 3.336336 3.580331
2       2 2.787414 0.11106401 335 2.568943 3.005885
3       3 3.747128 0.08724156 335 3.575517 3.918738
  contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2  0.6709195 0.1272072 335  5.274225 7.171453e-07
2   1 - 3 -0.2887943 0.1070400 335 -2.698005 1.999750e-02
3   2 - 3 -0.9597139 0.1412314 335 -6.795330 1.486766e-10


        Year: 1
  cluster   emmean         SE  df lower.CL upper.CL
1       1 3.568989 0.06374810 335 3.443592 3.694386
2       2 2.680357 0.11680250 335 2.450598 2.910116
3       3 4.084255 0.09015343 335 3.906917 4.261593
  contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2  0.8886322 0.1330663 335  6.678115 3.023104e-10
2   1 - 3 -0.5152660 0.1104149 335 -4.666632 1.320759e-05
3   2 - 3 -1.4038982 0.1475482 335 -9.514846 1.030287e-13


        Year: 2
  cluster   emmean         SE  df lower.CL upper.CL
1       1 3.494415 0.07064852 338 3.355449 3.633381
2       2 2.513158 0.12830529 338 2.260780 2.765535
3       3 4.069792 0.09886587 338 3.875322 4.264262
  contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2  0.9812570 0.1464700 338  6.699372 2.625895e-10
2   1 - 3 -0.5753768 0.1215141 338 -4.735062 9.619848e-06
3   2 - 3 -1.5566338 0.1619775 338 -9.610186 0.000000e+00


        Year: 3
  cluster   emmean         SE  df lower.CL upper.CL
1       1 3.425177 0.08393986 227 3.259776 3.590578
2       2 2.552564 0.15960463 227 2.238068 2.867060
3       3 4.001000 0.14095899 227 3.723245 4.278755
  contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2  0.8726132 0.1803317 227  4.838933 7.187576e-06
2   1 - 3 -0.5758227 0.1640589 227 -3.509852 1.562395e-03
3   2 - 3 -1.4484359 0.2129391 227 -6.802112 2.711426e-10


        Year: 4
  cluster   emmean         SE  df lower.CL upper.CL
1       1 3.306542 0.1017957 172 3.105612 3.507472
2       2 2.305714 0.1779866 172 1.954395 2.657034
3       3 3.846970 0.1833008 172 3.485161 4.208778
  contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2  1.0008278 0.2050405 172  4.881123 7.134688e-06
2   1 - 3 -0.5404276 0.2096701 172 -2.577514 2.892485e-02
3   2 - 3 -1.5412554 0.2554964 172 -6.032396 2.883918e-08


        Year: 5
  cluster   emmean         SE  df lower.CL upper.CL
1       1 3.351000 0.08383739 249 3.185879 3.516121
2       2 2.496250 0.16235040 249 2.176495 2.816005
```

```
3        3 4.015323 0.13040298 249 3.758489 4.272156
  contrast    estimate        SE  df   t.ratio        p.value
1   1 - 2  0.8547500 0.1827194 249  4.677939 1.416322e-05
2   1 - 3 -0.6643226 0.1550279 249 -4.285181 7.729764e-05
3   2 - 3 -1.5190726 0.2082369 249 -7.294926 1.199185e-11


Predictive Capability   time_point      rmse relative_rmse
1:              2 0.9470989      0.8690366
2:              5 1.0714066      0.9505050
```

SRS22 – Self image / Appearance
standard error confidence intervals
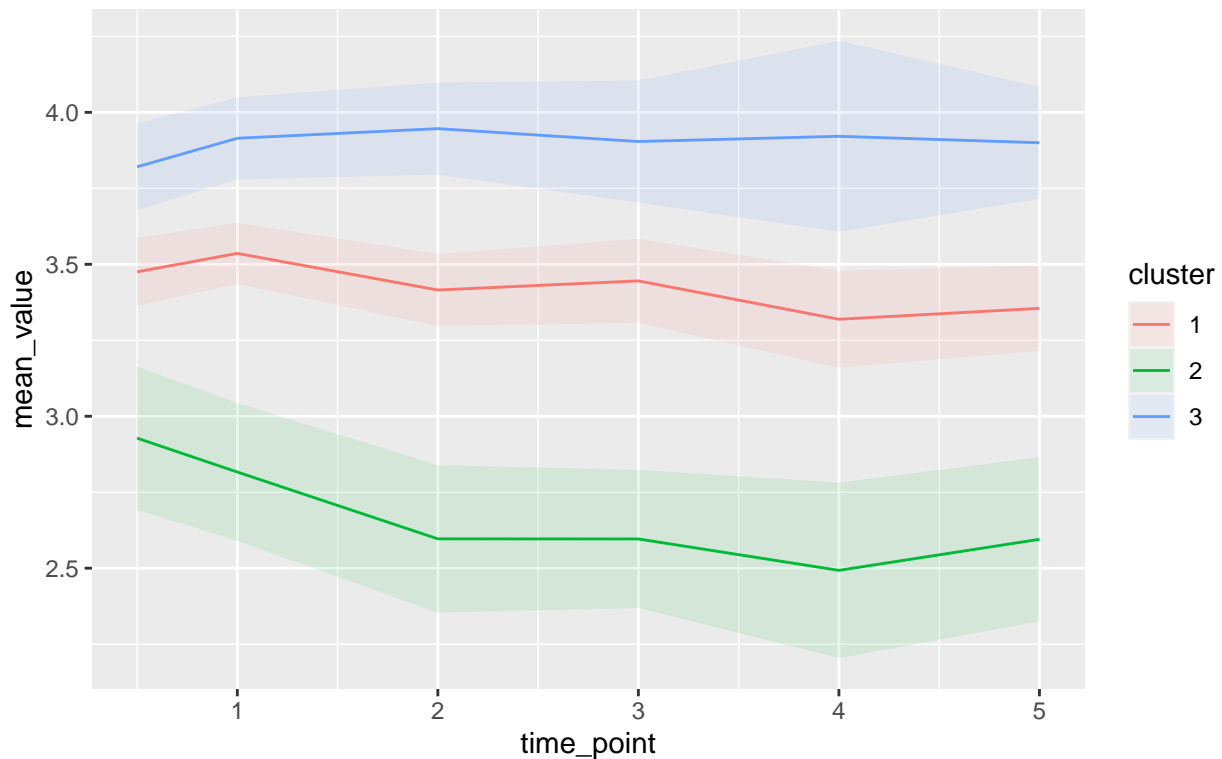

```
Global differences between clusters
  cluster    emmean         SE         df lower.CL upper.CL
1       1 3.424977 0.03488797   603.4503 3.356460 3.493494
2       2 2.737786 0.05619906 1180.0993 2.627525 2.848047
3       3 3.837238 0.04554943   992.6703 3.747853 3.926622
  contrast    estimate        SE        df    t.ratio p.value
1   1 - 2  0.6871910 0.06044215 1570.058  11.369400       0
2   1 - 3 -0.4122605 0.05063961 1576.877  -8.141068       0
3   2 - 3 -1.0994515 0.06716285 1573.286 -16.369936       0


Time point differences between clusters

        Year: 0.5
```

```
   cluster    emmean          SE  df lower.CL upper.CL
1        1 3.475108 0.05745999 335 3.362080 3.588135
2        2 2.927931 0.10289826 335 2.725523 3.130339
3        3 3.820745 0.08082731 335 3.661752 3.979738
  contrast    estimate          SE  df    t.ratio        p.value
1   1 - 2   0.5471765 0.11785458 335   4.642811 1.471844e-05
2   1 - 3  -0.3456372 0.09917008 335  -3.485297 1.610838e-03
3   2 - 3  -0.8928136 0.13084764 335  -6.823307 1.253497e-10


        Year: 1
  cluster    emmean          SE  df lower.CL upper.CL
1        1 3.535904 0.05277010 335 3.432102 3.639707
2        2 2.816429 0.09668806 335 2.626236 3.006621
3        3 3.914681 0.07462819 335 3.767882 4.061480
  contrast    estimate         SE  df    t.ratio        p.value
1   1 - 2   0.7194757 0.1101511 335   6.531716 7.244594e-10
2   1 - 3  -0.3787766 0.0914005 335  -4.144142 1.277957e-04
3   2 - 3  -1.0982523 0.1221391 335  -8.991819 1.010303e-13


        Year: 2
  cluster    emmean          SE  df lower.CL upper.CL
1        1 3.415426 0.06037943 338 3.296659 3.534192
2        2 2.596491 0.10965552 338 2.380798 2.812184
3        3 3.946354 0.08449525 338 3.780151 4.112557
  contrast    estimate         SE  df    t.ratio        p.value
1   1 - 2   0.8189343 0.1251799 338   6.542059 6.737886e-10
2   1 - 3  -0.5309286 0.1038514 338  -5.112386 1.595272e-06
3   2 - 3  -1.3498629 0.1384333 338  -9.750998 0.000000e+00


        Year: 3
  cluster    emmean          SE  df lower.CL upper.CL
1        1 3.445390 0.06714817 227 3.313077 3.577703
2        2 2.596154 0.12767664 227 2.344571 2.847737
3        3 3.904000 0.11276096 227 3.681808 4.126192
  contrast    estimate         SE  df    t.ratio        p.value
1   1 - 2   0.8492362 0.1442574 227   5.886950 4.205208e-08
2   1 - 3  -0.4586099 0.1312399 227  -3.494440 1.649314e-03
3   2 - 3  -1.3078462 0.1703419 227  -7.677772 1.433631e-12


        Year: 4
  cluster    emmean          SE  df lower.CL upper.CL
1        1 3.319159 0.08338337 172 3.154572 3.483745
2        2 2.492857 0.14579322 172 2.205083 2.780631
3        3 3.921212 0.15014621 172 3.624846 4.217579
  contrast    estimate         SE  df    t.ratio        p.value
1   1 - 2   0.8263017 0.1679537 172   4.919818 6.004674e-06
2   1 - 3  -0.6020532 0.1717460 172  -3.505487 1.676499e-03
3   2 - 3  -1.4283550 0.2092834 172  -6.824979 4.328270e-10


        Year: 5
  cluster emmean          SE  df lower.CL upper.CL
1        1  3.355 0.06878419 249 3.219527 3.490473
2        2  2.595 0.13320001 249 2.332658 2.857342
3        3  3.900 0.10698883 249 3.689282 4.110718
```

```
  contrast estimate        SE  df   t.ratio       p.value
1   1 - 2    0.760 0.1499117 249  5.069652 2.324619e-06
2   1 - 3   -0.545 0.1271923 249 -4.284852 7.740396e-05
3   2 - 3   -1.305 0.1708475 249 -7.638393 1.468714e-12

Predictive Capability   time_point      rmse relative_rmse
1:            2 0.8208956      0.8784679
2:            5 0.9136530      0.9799502
```

SRS22 – Mental health
standard error confidence intervals
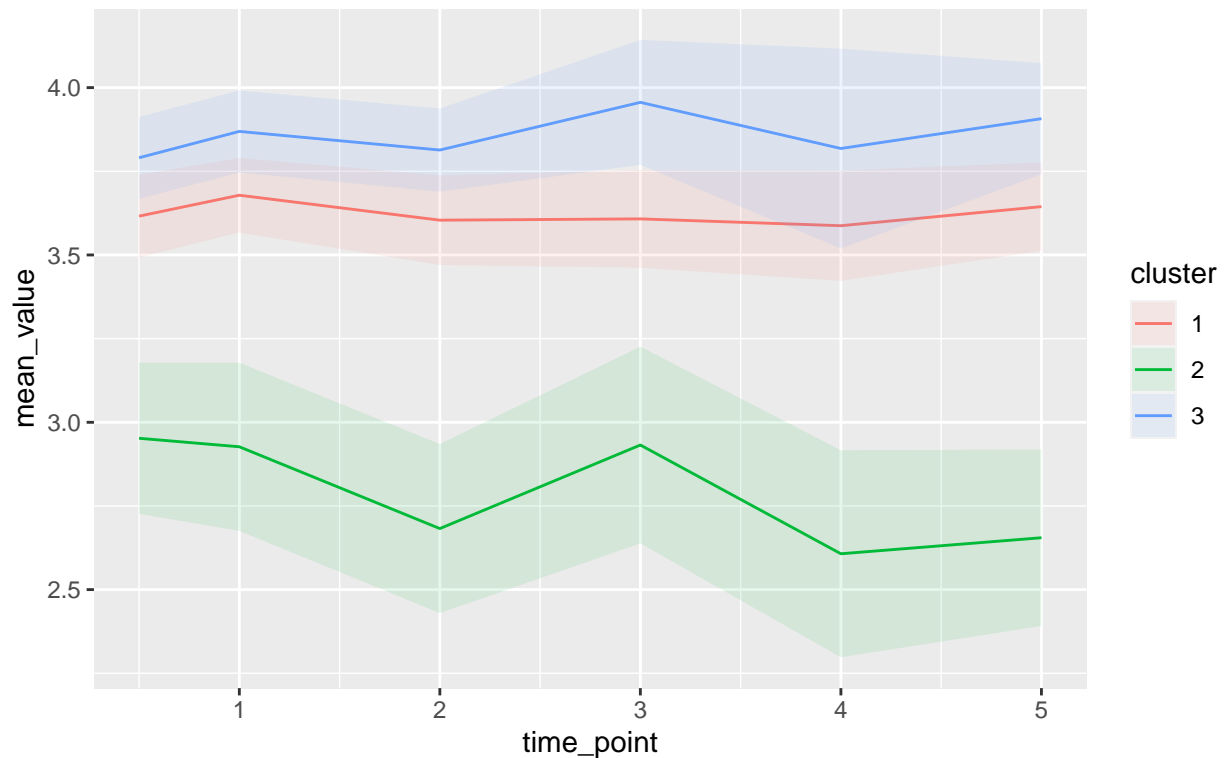

```
Global differences between clusters
  cluster   emmean        SE         df lower.CL upper.CL
1       1 3.601796 0.03552500   610.7790 3.532030 3.671562
2       2 2.858540 0.05803086 1167.7060 2.744684 2.972397
3       3 3.799120 0.04686484   998.1682 3.707155 3.891085
  contrast    estimate        SE       df   t.ratio       p.value
1   1 - 2  0.7432558 0.06289876 1533.984  11.81670 0.0000000000
2   1 - 3 -0.1973239 0.05270855 1543.571  -3.74368 0.0005509147
3   2 - 3 -0.9405797 0.06990076 1540.398 -13.45593 0.0000000000


Time point differences between clusters

        Year: 0.5
  cluster   emmean        SE  df lower.CL upper.CL
```

```
1       1 3.616022 0.05883582 335 3.500287 3.731756
2       2 2.952241 0.10536207 335 2.744987 3.159496
3       3 3.790426 0.08276264 335 3.627626 3.953225
  contrast   estimate        SE  df   t.ratio       p.value
1    1 - 2  0.6637801 0.1206765 335   5.500492 2.254709e-07
2    1 - 3 -0.1744040 0.1015446 335  -1.717511 2.001157e-01
3    2 - 3 -0.8381842 0.1339807 335  -6.256008 3.614513e-09


        Year: 1
  cluster  emmean         SE  df lower.CL upper.CL
1       1 3.678457 0.05613810 335 3.568030 3.788885
2       2 2.926786 0.10285908 335 2.724455 3.129117
3       3 3.869149 0.07939126 335 3.712981 4.025317
  contrast   estimate         SE df   t.ratio       p.value
1    1 - 2  0.7516717 0.11718138 335   6.414600 1.442905e-09
2    1 - 3 -0.1906915 0.09723404 335  -1.961160 1.235514e-01
3    2 - 3 -0.9423632 0.12993445 335  -7.252605 8.658851e-12


        Year: 2
  cluster  emmean         SE  df lower.CL upper.CL
1       1 3.603989 0.06318623 338 3.479702 3.728277
2       2 2.682456 0.11475296 338 2.456736 2.908176
3       3 3.813542 0.08842310 338 3.639613 3.987471
  contrast   estimate        SE df   t.ratio       p.value
1    1 - 2  0.9215332 0.1309990 338   7.034658 3.327538e-11
2    1 - 3 -0.2095523 0.1086791 338  -1.928175 1.323424e-01
3    2 - 3 -1.1310855 0.1448685 338  -7.807670 5.495604e-14


        Year: 3
  cluster  emmean         SE  df lower.CL upper.CL
1       1 3.607801 0.07187465 227 3.466175 3.749428
2       2 2.932051 0.13666364 227 2.662760 3.201343
3       3 3.956000 0.12069806 227 3.718168 4.193832
  contrast   estimate        SE df   t.ratio       p.value
1    1 - 2  0.6757501 0.1544115 227   4.376294 5.458431e-05
2    1 - 3 -0.3481986 0.1404777 227  -2.478675 3.691588e-02
3    2 - 3 -1.0239487 0.1823320 227  -5.615846 1.703298e-07


        Year: 4
  cluster  emmean         SE  df lower.CL upper.CL
1       1 3.587383 0.08539744 172 3.418821 3.755945
2       2 2.607143 0.14931475 172 2.312418 2.901868
3       3 3.818182 0.15377289 172 3.514657 4.121707
  contrast   estimate        SE df   t.ratio       p.value
1    1 - 2  0.9802403 0.1720105 172   5.698723 1.538858e-07
2    1 - 3 -0.2307986 0.1758944 172  -1.312144 3.903583e-01
3    2 - 3 -1.2110390 0.2143385 172  -5.650123 1.954102e-07


        Year: 5
  cluster  emmean         SE  df lower.CL upper.CL
1       1 3.644333 0.06485406 249 3.516601 3.772066
2       2 2.655000 0.12558934 249 2.407647 2.902353
3       3 3.907258 0.10087579 249 3.708579 4.105937
  contrast   estimate        SE  df   t.ratio       p.value
```

```
1    1 - 2  0.9893333 0.1413461 249  6.999366 7.126666e-11
2    1 - 3 -0.2629247 0.1199249 249 -2.192412 7.443631e-02
3    2 - 3 -1.2522581 0.1610857 249 -7.773862 6.538103e-13


Predictive Capability    time_point       rmse relative_rmse
1:            2 0.8779972      0.9296922
2:            5 0.8060538      0.9066665
```

SRS22 – SRS Subtotal score
standard error confidence intervals
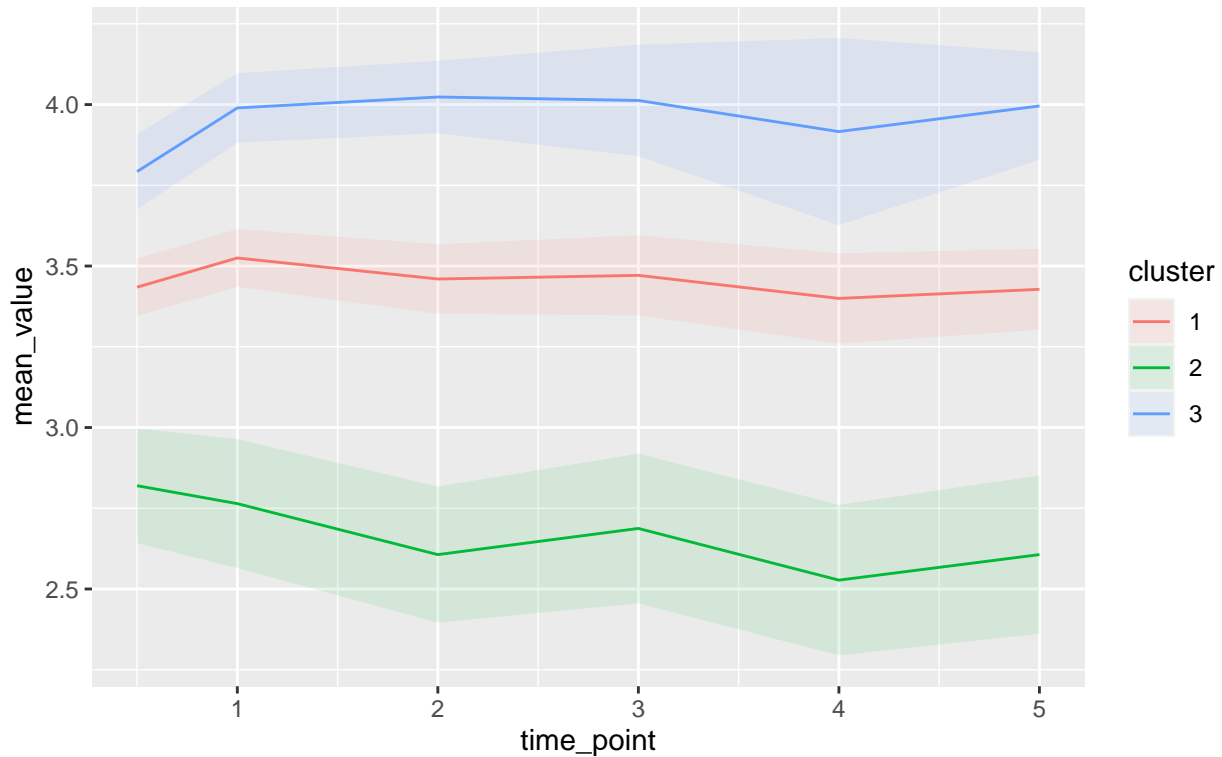

```
Global differences between clusters
  cluster    emmean         SE       df lower.CL upper.CL
1       1 3.449234 0.03075225  587.9348 3.388837 3.509632
2       2 2.721762 0.04817227 1192.4199 2.627250 2.816274
3       3 3.892741 0.03934892  974.8232 3.815522 3.969959
  contrast    estimate         SE       df    t.ratio      p.value
1   1 - 2  0.7274727 0.05094554 1623.230   14.27942 6.006307e-14
2   1 - 3 -0.4435064 0.04267024 1626.768  -10.39381 2.869927e-13
3   2 - 3 -1.1709790 0.05660907 1622.609  -20.68536 0.000000e+00



Time point differences between clusters


        Year: 0.5
  cluster    emmean         SE  df lower.CL upper.CL
1       1 3.434570 0.04539098 335 3.345283 3.523857
```

```
2        2 2.819828 0.08128530 335 2.659934 2.979722
3        3 3.792447 0.06385018 335 3.666849 3.918045
 contrast   estimate         SE  df   t.ratio       p.value
1   1 - 2  0.6147423 0.09310017 335   6.603020 4.741391e-10
2   1 - 3 -0.3578769 0.07834019 335  -4.568241 2.059809e-05
3   2 - 3 -0.9726192 0.10336414 335  -9.409639 1.018075e-13


        Year: 1
 cluster   emmean        SE  df lower.CL upper.CL
1       1 3.525053 0.04573226 335 3.435095 3.615012
2       2 2.764286 0.08379296 335 2.599459 2.929112
3       3 3.989574 0.06467518 335 3.862354 4.116795
 contrast   estimate         SE  df   t.ratio       p.value
1   1 - 2  0.7607675 0.09546046 335   7.969451 1.807443e-13
2   1 - 3 -0.4645213 0.07921059 335  -5.864383 3.240224e-08
3   2 - 3 -1.2252888 0.10584961 335 -11.575751 7.727152e-14


        Year: 2
 cluster   emmean        SE  df lower.CL upper.CL
1       1 3.459840 0.05217957 338 3.357203 3.562478
2       2 2.606491 0.09476371 338 2.420090 2.792892
3       3 4.023438 0.07302034 338 3.879806 4.167069
 contrast   estimate         SE  df    t.ratio       p.value
1   1 - 2  0.8533492 0.10817979 338    7.888249 0.000000e+00
2   1 - 3 -0.5635971 0.08974786 338   -6.279783 3.123509e-09
3   2 - 3 -1.4169463 0.11963331 338 -11.844078 0.000000e+00


        Year: 3
 cluster   emmean        SE  df lower.CL upper.CL
1       1 3.471206 0.06094333 227 3.351119 3.591293
2       2 2.687436 0.11587864 227 2.459101 2.915771
3       3 4.012800 0.10234125 227 3.811140 4.214460
 contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2  0.7837698 0.1309273 227   5.986299 2.490114e-08
2   1 - 3 -0.5415943 0.1191126 227  -4.546909 2.632151e-05
3   2 - 3 -1.3253641 0.1546014 227  -8.572782 7.216450e-15


        Year: 4
 cluster   emmean        SE  df lower.CL upper.CL
1       1 3.399720 0.07278614 172 3.256051 3.543389
2       2 2.527429 0.12726429 172 2.276228 2.778629
3       3 3.916364 0.13106406 172 3.657663 4.175065
 contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2  0.8722911 0.1466084 172   5.949803 4.388985e-08
2   1 - 3 -0.5166440 0.1499187 172  -3.446162 2.055222e-03
3   2 - 3 -1.3889351 0.1826855 172  -7.602876 5.427658e-12


        Year: 5
 cluster   emmean        SE  df lower.CL upper.CL
1       1 3.427881 0.06184509 250 3.306077 3.549685
2       2 2.606500 0.12016104 250 2.369843 2.843157
3       3 3.995645 0.09651567 250 3.805558 4.185733
 contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2  0.8213808 0.1351425 250   6.077887 1.354933e-08
```

```
2     1 - 3 -0.5677644 0.1146302 250 -4.953007 4.018948e-06
3     2 - 3 -1.3891452 0.1541232 250 -9.013215 2.444711e-13


Predictive Capability   time_point      rmse relative_rmse
1:            2 0.7420141      0.8742480
2:            5 0.7620210      0.8745142
```

SF36 – PCS
standard error confidence intervals
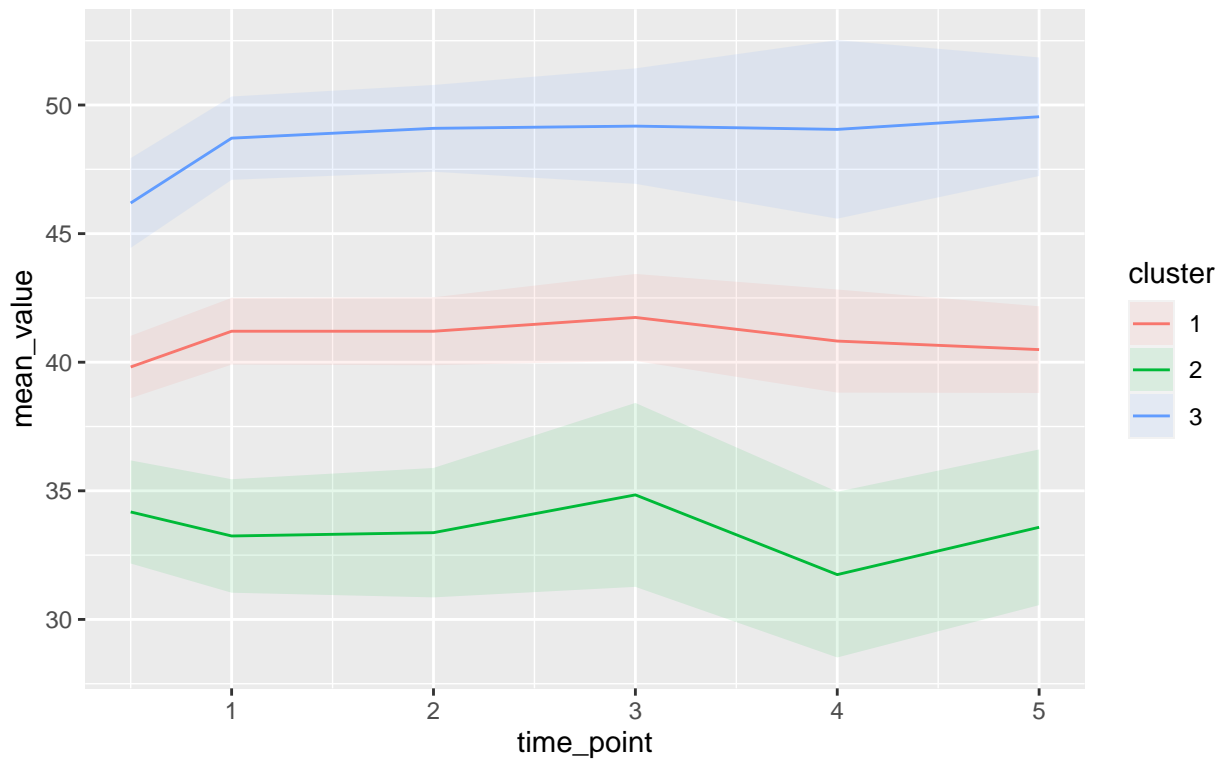

```
Global differences between clusters
  cluster    emmean        SE        df lower.CL upper.CL
1       1 40.84186 0.3998375  591.4608 40.05659 41.62714
2       2 33.78963 0.6404749 1180.7920 32.53304 35.04623
3       3 47.83573 0.5251403  979.9619 46.80520 48.86626
  contrast    estimate        SE       df   t.ratio p.value
1   1 - 2    7.052231 0.6850013 1564.203  10.29521       0
2   1 - 3   -6.993869 0.5791688 1562.062 -12.07570       0
3   2 - 3  -14.046100 0.7659225 1562.589 -18.33880       0


Time point differences between clusters

        Year: 0.5
  cluster    emmean        SE  df lower.CL upper.CL
1       1 39.81484 0.6081616 328 38.61845 41.01123
2       2 34.17807 1.0985961 328 32.01689 36.33925
```

50

```
3       3 46.18977 0.8841667 328 44.45042 47.92913
  contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2   5.636769 1.255697 328   4.488957 2.949275e-05
2   1 - 3  -6.374934 1.073132 328  -5.940496 2.173074e-08
3   2 - 3 -12.011703 1.410200 328  -8.517729 6.460388e-13


        Year: 1
  cluster    emmean        SE  df lower.CL upper.CL
1       1 41.20460 0.6330738 332 39.95926 42.44994
2       2 33.24429 1.1568609 332 30.96858 35.51999
3       3 48.71098 0.9025707 332 46.93550 50.48646
  contrast   estimate        SE  df    t.ratio       p.value
1   1 - 2   7.960313 1.318753 332    6.036243 1.264438e-08
2   1 - 3  -7.506379 1.102459 332   -6.808759 1.391851e-10
3   2 - 3 -15.466693 1.467297 332  -10.540941 5.407896e-13


        Year: 2
  cluster    emmean        SE  df lower.CL upper.CL
1       1 41.20358 0.6624185 334 39.90054 42.50662
2       2 33.37263 1.1998192 334 31.01248 35.73279
3       3 49.09355 0.9393161 334 47.24583 50.94127
  contrast   estimate        SE  df    t.ratio       p.value
1   1 - 2   7.830951 1.370534 334    5.713794 7.332737e-08
2   1 - 3  -7.889965 1.149397 334   -6.864440 9.805434e-11
3   2 - 3 -15.720917 1.523772 334  -10.317106 2.815526e-13


        Year: 3
  cluster    emmean        SE  df lower.CL upper.CL
1       1 41.74029 0.8360323 221 40.09267 43.38790
2       2 34.84171 1.6660822 221 31.55827 38.12516
3       3 49.18040 1.3939444 221 46.43328 51.92752
  contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2   6.898573 1.864076 221   3.700800 7.904111e-04
2   1 - 3  -7.440112 1.625433 221  -4.577312 2.335528e-05
3   2 - 3 -14.338686 2.172305 221  -6.600677 8.980779e-10


        Year: 4
  cluster    emmean        SE  df lower.CL upper.CL
1       1 40.82252 0.9894563 167 38.86907 42.77598
2       2 31.74194 1.8382630 167 28.11271 35.37116
3       3 49.05281 1.8093122 167 45.48074 52.62489
  contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2   9.080588 2.087639 167   4.349694 6.999116e-05
2   1 - 3  -8.230289 2.062192 167  -3.991040 2.885719e-04
3   2 - 3 -17.310877 2.579306 167  -6.711447 8.600106e-10


        Year: 5
  cluster    emmean        SE  df lower.CL upper.CL
1       1 40.49061 0.8257482 244 38.86411 42.11712
2       2 33.58205 1.6031494 244 30.42427 36.73983
3       3 49.54443 1.2818623 244 47.01950 52.06935
  contrast   estimate        SE  df   t.ratio       p.value
1   1 - 2   6.908561 1.803316 244   3.831032 4.752574e-04
2   1 - 3  -9.053814 1.524805 244  -5.937685 2.961883e-08
```

```
3    2 - 3 -15.962375 2.052622 244 -7.776576 5.920819e-13

Predictive Capability    time_point      rmse relative_rmse
1:           2 9.061647      0.8700628
2:           5 9.598497      0.8551197
```

SF36 – MCS
standard error confidence intervals
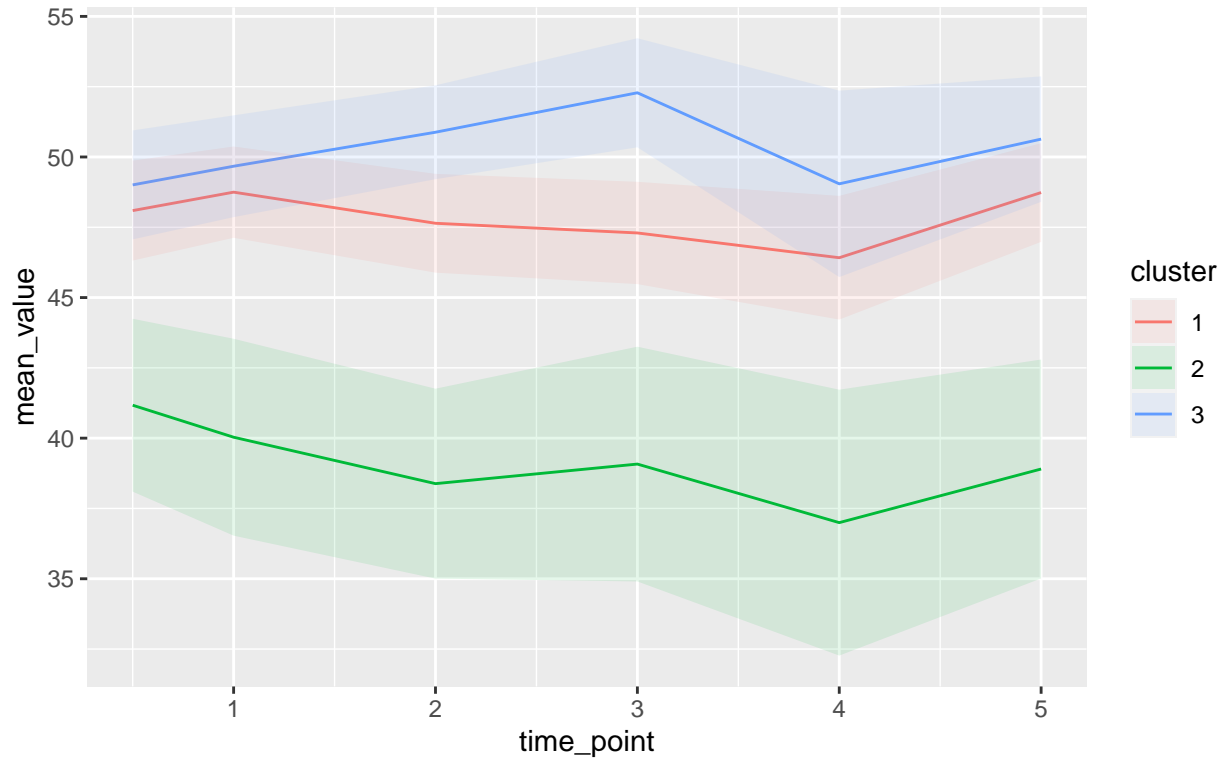

```
Global differences between clusters
  cluster   emmean        SE        df lower.CL upper.CL
1       1 47.74782 0.4620931  620.9416 46.84037 48.65528
2       2 39.49251 0.7904520 1105.3094 37.94156 41.04347
3       3 49.61164 0.6381216  984.4088 48.35941 50.86388
  contrast   estimate        SE       df   t.ratio    p.value
1   1 - 2   8.255309 0.8734669 1370.217   9.451199 0.00000000
2   1 - 3  -1.863819 0.7387457 1371.453  -2.522951 0.03151051
3   2 - 3 -10.119128 0.9773930 1383.051 -10.353182 0.00000000


Time point differences between clusters

        Year: 0.5
  cluster   emmean        SE  df lower.CL upper.CL
1       1 48.09247 0.8456468 328 46.42890 49.75605
2       2 41.17158 1.5275945 328 38.16646 44.17670
3       3 49.00716 1.2294310 328 46.58859 51.42572
```

```
   contrast  estimate        SE  df    t.ratio        p.value
1    1 - 2  6.920894  1.746042 328   3.9637611  0.0002665202
2    1 - 3 -0.914686  1.492186 328  -0.6129839  0.8131283118
3    2 - 3 -7.835580  1.960879 328  -3.9959534  0.0002344284


        Year: 1
  cluster   emmean        SE  df lower.CL upper.CL
1       1 48.74888 0.8111527 332 47.15323 50.34452
2       2 40.03375 1.4822771 332 37.11791 42.94959
3       3 49.67065 1.1564570 332 47.39575 51.94556
   contrast   estimate        SE  df    t.ratio       p.value
1    1 - 2  8.7151270  1.689708 332   5.1577703 1.287416e-06
2    1 - 3 -0.9217752  1.412573 332  -0.6525506 7.910521e-01
3    2 - 3 -9.6369022  1.880037 332  -5.1259116 1.506121e-06


        Year: 2
  cluster   emmean        SE  df lower.CL upper.CL
1       1 47.64257 0.8359296 333 45.99820 49.28694
2       2 38.38193 1.5140949 333 35.40353 41.36033
3       3 50.87978 1.1917814 333 48.53541 53.22415
   contrast   estimate        SE  df   t.ratio       p.value
1    1 - 2   9.260637  1.729526 333   5.354435 4.796284e-07
2    1 - 3  -3.237216  1.455720 333  -2.223790 6.867549e-02
3    2 - 3 -12.497853  1.926870 333  -6.486092 9.556067e-10


        Year: 3
  cluster   emmean        SE  df lower.CL upper.CL
1       1 47.29777 0.8897116 221 45.54437 49.05117
2       2 39.07857 1.7730567 221 35.58431 42.57283
3       3 52.28340 1.4834457 221 49.35989 55.20691
   contrast   estimate        SE  df   t.ratio       p.value
1    1 - 2   8.219198  1.983763 221   4.143235 1.439118e-04
2    1 - 3  -4.985630  1.729797 221  -2.882205 1.202776e-02
3    2 - 3 -13.204829  2.311783 221  -5.711967 1.072559e-07


        Year: 4
  cluster   emmean        SE  df lower.CL upper.CL
1       1 46.41664 1.122948 167 44.19963 48.63364
2       2 36.99581 2.086271 167 32.87694 41.11467
3       3 49.04437 2.053414 167 44.99038 53.09837
   contrast   estimate        SE  df   t.ratio       p.value
1    1 - 2   9.420829  2.369290 167   3.976224 0.0003053533
2    1 - 3  -2.627739  2.340410 167  -1.122769 0.5014153469
3    2 - 3 -12.048569  2.927291 167  -4.115945 0.0001780466


        Year: 5
  cluster   emmean        SE  df lower.CL upper.CL
1       1 48.73500 0.8789634 245 47.00371 50.46629
2       2 38.90308 1.7122585 245 35.53045 42.27570
3       3 50.63525 1.3691049 245 47.93853 53.33196
   contrast   estimate        SE  df   t.ratio       p.value
1    1 - 2   9.831923  1.924683 245   5.108333 1.953438e-06
2    1 - 3  -1.900246  1.626968 245  -1.167968 4.734671e-01
3    2 - 3 -11.732169  2.192322 245  -5.351480 5.993124e-07
```

```
Predictive Capability    time_point    rmse relative_rmse
1:            2 11.52643    0.9510360
2:            5 11.26299    0.9939571
```

Complications

Reinterventions
standard error confidence intervals
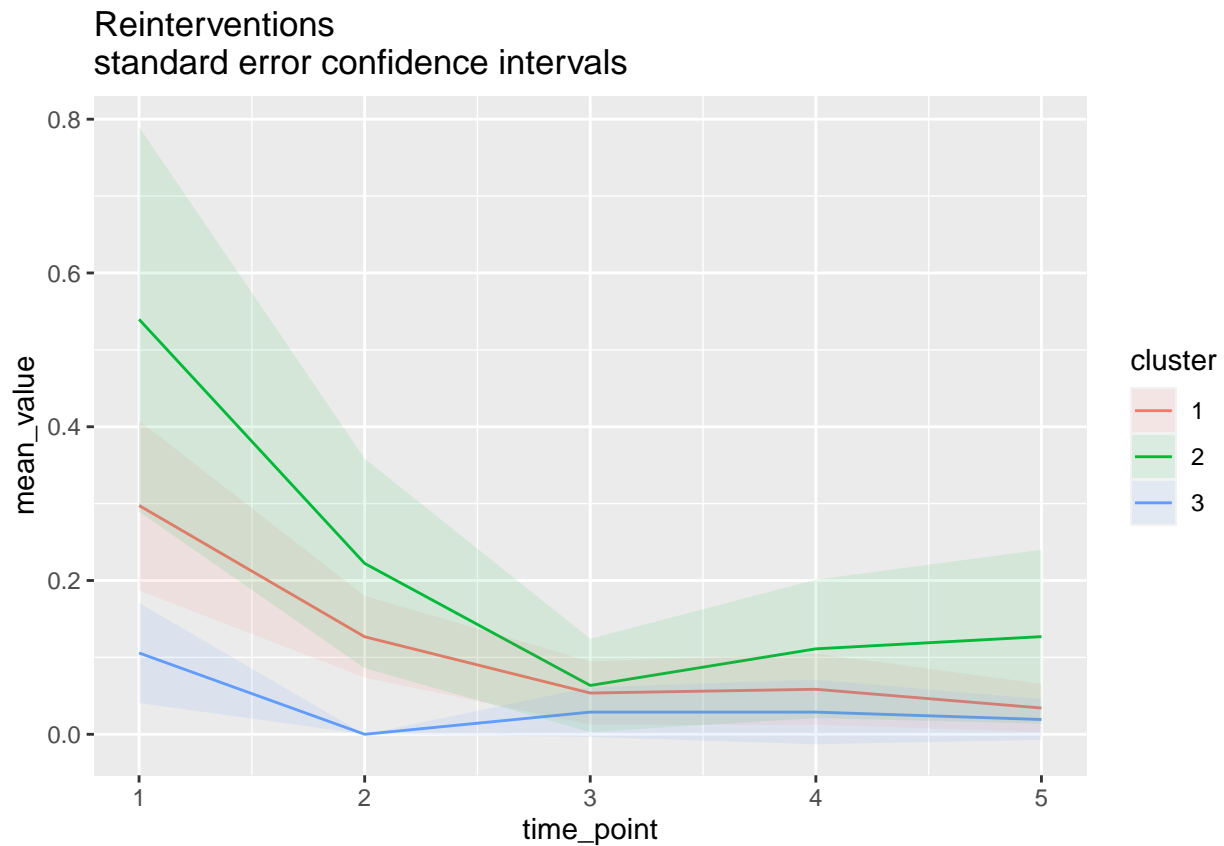

```
Global differences between clusters
  cluster     emmean         SE        df     lower.CL    upper.CL
1       1 0.11414634 0.01365449 544.6904   0.08732443 0.14096825
2       2 0.21269841 0.02464046 544.6904   0.16429644 0.26110038
3       3 0.03653846 0.01917584 544.6904  -0.00112919 0.07420611
  contrast     estimate         SE        df     t.ratio       p.value
1    1 - 2 -0.09855207 0.02817820 544.6904 -3.497458 1.472344e-03
2    1 - 3  0.07760788 0.02354934 544.6904  3.295544 3.000449e-03
3    2 - 3  0.17615995 0.03122945 544.6904  5.640828 8.195686e-08


Time point differences between clusters

        Year: 1
  cluster     emmean         SE  df     lower.CL  upper.CL
```

```
1        1 0.2975610 0.05247980 369   0.19436398 0.4007580
2        2 0.5396825 0.09466704 369   0.35352797 0.7258371
3        3 0.1057692 0.07368048 369  -0.03911707 0.2506555
   contrast   estimate         SE  df   t.ratio        p.value
1   1 - 2 -0.2421216 0.10824037 369 -2.236888 0.0664316616
2   1 - 3  0.1917917 0.09045961 369  2.120192 0.0871513188
3   2 - 3  0.4339133 0.11996109 369  3.617117 0.0009874612


        Year: 2
   cluster      emmean         SE  df   lower.CL   upper.CL
1        1 1.268293e-01 0.02560429 369   0.07648064 0.17717790
2        2 2.222222e-01 0.04618696 369   0.13139955 0.31304490
3        3 2.220446e-16 0.03594786 369  -0.07068836 0.07068836
   contrast    estimate         SE  df   t.ratio        p.value
1   1 - 2 -0.09539295 0.05280924 369 -1.806369 0.1688866667
2   1 - 3  0.12682927 0.04413421 369  2.873718 0.0119192076
3   2 - 3  0.22222222 0.05852764 369  3.796877 0.0005015959


        Year: 3
   cluster      emmean         SE  df    lower.CL    upper.CL
1        1 0.05365854 0.01820458 369   0.017860811 0.08945626
2        2 0.06349206 0.03283879 369  -0.001082592 0.12806672
3        3 0.02884615 0.02555882 369  -0.021413061 0.07910537
   contrast     estimate         SE  df    t.ratio   p.value
1   1 - 2 -0.009833527 0.03754721 369 -0.2618977 0.9628993
2   1 - 3  0.024812383 0.03137929 369  0.7907248 0.7089703
3   2 - 3  0.034645910 0.04161298 369  0.8325747 0.6830279


        Year: 4
   cluster      emmean         SE  df    lower.CL   upper.CL
1        1 0.05853659 0.02194617 369   0.01538133 0.10169184
2        2 0.11111111 0.03958817 369   0.03326438 0.18895784
3        3 0.02884615 0.03081194 369  -0.03174287 0.08943518
   contrast    estimate         SE  df    t.ratio   p.value
1   1 - 2 -0.05257453 0.04526431 369 -1.1615006 0.4770116
2   1 - 3  0.02969043 0.03782870 369  0.7848653 0.7125720
3   2 - 3  0.08226496 0.05016572 369  1.6398640 0.2302408


        Year: 5
   cluster      emmean         SE  df    lower.CL   upper.CL
1        1 0.03414634 0.01843455 369  -0.002103611 0.07039629
2        2 0.12698413 0.03325364 369   0.061593712 0.19237454
3        3 0.01923077 0.02588170 369  -0.031663362 0.07012490
   contrast    estimate         SE  df   t.ratio    p.value
1   1 - 2 -0.09283779 0.03802154 369 -2.4417157 0.03991837
2   1 - 3  0.01491557 0.03177570 369  0.4694018 0.88569543
3   2 - 3  0.10775336 0.04213867 369  2.5571137 0.02941975


Predictive Capability   time_point      rmse relative_rmse
1:            2 0.3655707      0.9793041
2:            5 0.2558659      0.9624035
```

Reinterventions Proportion
standard error confidence intervals
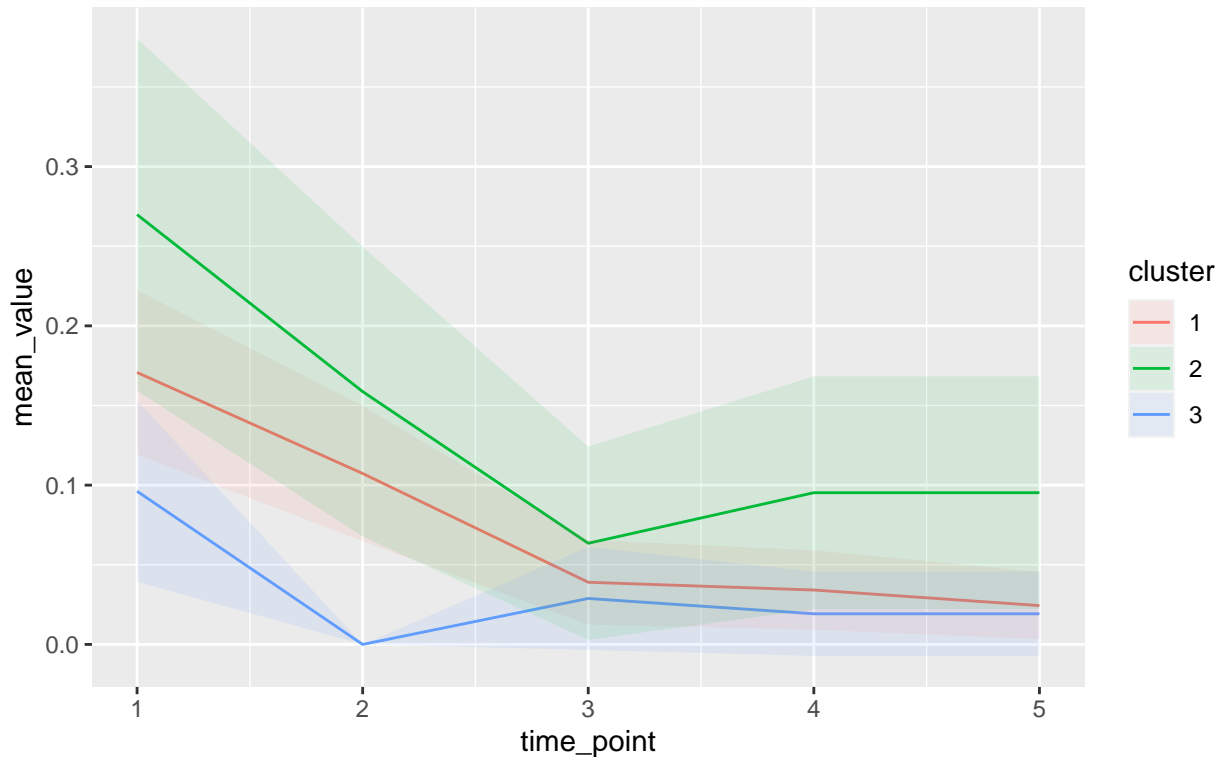
```
Global differences between clusters
  cluster     emmean          SE       df    lower.CL    upper.CL
1       1 0.07512195 0.007986547 544.6904  0.05943375  0.09081016
2       2 0.13650794 0.014412270 544.6904  0.10819750  0.16481837
3       3 0.03269231 0.011215997 544.6904  0.01066040  0.05472421
  contrast    estimate          SE       df   t.ratio       p.value
1   1 - 2 -0.06138599 0.01648150 544.6904 -3.724539  6.318940e-04
2   1 - 3  0.04242964 0.01377407 544.6904  3.080400  6.141201e-03
3   2 - 3  0.10381563 0.01826619 544.6904  5.683487  6.489092e-08


Time point differences between clusters

        Year: 1
  cluster     emmean         SE  df   lower.CL  upper.CL
1       1 0.17073171 0.02583155 369 0.11993620 0.2215272
2       2 0.26984127 0.04659691 369 0.17821248 0.3614701
3       3 0.09615385 0.03626692 369 0.02483808 0.1674696
  contrast    estimate         SE  df   t.ratio    p.value
1   1 - 2 -0.09910956 0.05327795 369 -1.860236 0.15184055
2   1 - 3  0.07457786 0.04452593 369  1.674931 0.21621059
3   2 - 3  0.17368742 0.05904711 369  2.941506 0.00970124


        Year: 2
```

```
  cluster       emmean          SE  df    lower.CL    upper.CL
1       1 1.073171e-01 0.01925705 369   0.06944976 0.14518439
2       2 1.587302e-01 0.03473732 369   0.09042222 0.22703810
3       3 5.551115e-17 0.02703647 369  -0.05316488 0.05316488
  contrast    estimate          SE  df    t.ratio     p.value
1   1 - 2 -0.05141309 0.03971795 369  -1.294455 0.399188628
2   1 - 3  0.10731707 0.03319344 369   3.233081 0.003809629
3   2 - 3  0.15873016 0.04401877 369   3.605966 0.001028868


        Year: 3
  cluster       emmean          SE  df    lower.CL    upper.CL
1       1 0.03902439 0.01377193 369   0.011943070 0.06610571
2       2 0.06349206 0.02484286 369   0.014640722 0.11234340
3       3 0.02884615 0.01933549 369  -0.009175421 0.06686773
  contrast    estimate          SE  df    t.ratio     p.value
1   1 - 2 -0.02446767 0.02840482 369  -0.8613915 0.6649825
2   1 - 3  0.01017824 0.02373873 369   0.4287607 0.9036739
3   2 - 3  0.03464591 0.03148061 369   1.1005475 0.5143319


        Year: 4
  cluster       emmean          SE  df    lower.CL    upper.CL
1       1 0.03414634 0.01367744 369   0.00725084 0.06104184
2       2 0.09523810 0.02467240 369   0.04672195 0.14375424
3       3 0.01923077 0.01920282 369  -0.01852992 0.05699146
  contrast    estimate          SE  df    t.ratio     p.value
1   1 - 2 -0.06109175 0.02820992 369  -2.1656123 0.07854011
2   1 - 3  0.01491557 0.02357585 369   0.6326632 0.80223134
3   2 - 3  0.07600733 0.03126461 369   2.4310980 0.04102818


        Year: 5
  cluster       emmean          SE  df     lower.CL    upper.CL
1       1 0.02439024 0.01273502 369  -0.0006520706 0.04943256
2       2 0.09523810 0.02297239 369   0.0500648676 0.14041132
3       3 0.01923077 0.01787968 369  -0.0159280861 0.05438962
  contrast     estimate          SE  df     t.ratio     p.value
1   1 - 2 -0.070847851 0.02626617 369  -2.6973045 0.01995519
2   1 - 3  0.005159475 0.02195140 369   0.2350408 0.97000734
3   2 - 3  0.076007326 0.02911038 369   2.6110047 0.02539874


Predictive Capability  time_point      rmse relative_rmse
1:          2 0.3196104      1.138321
2:          5 0.1878819      1.021703
```

Major Complications
standard error confidence intervals
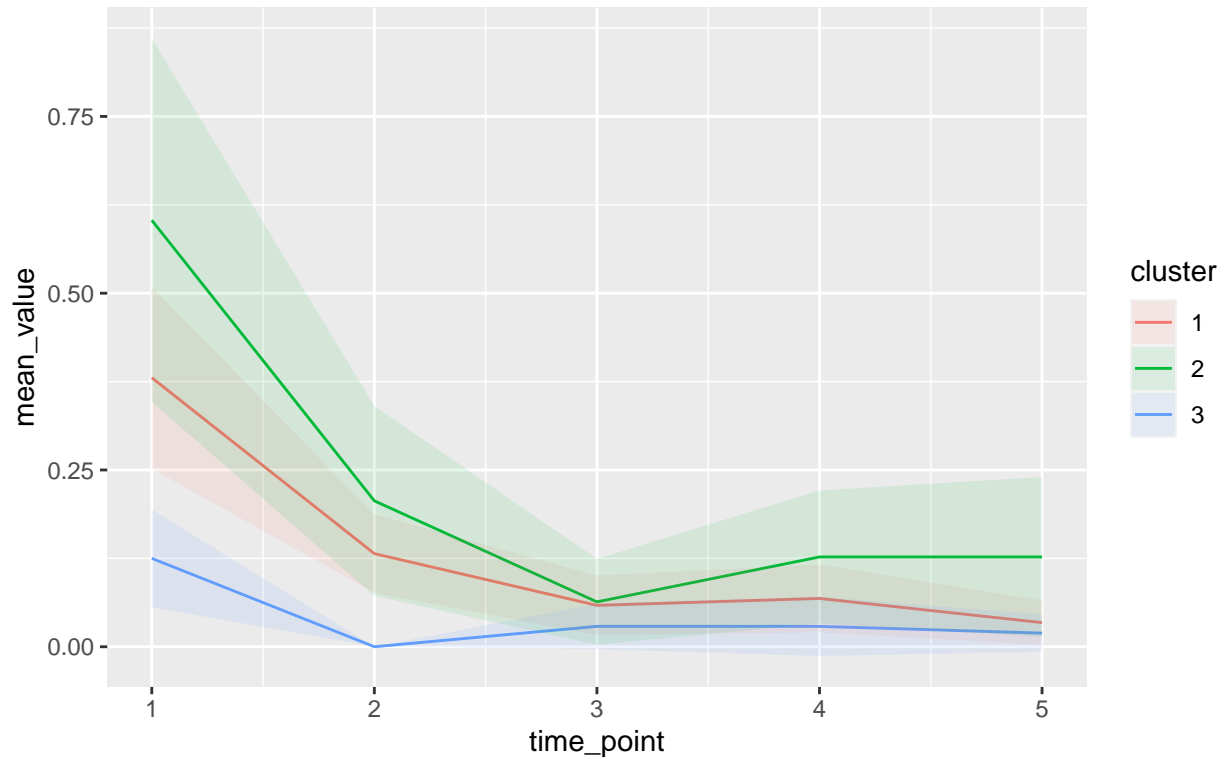

```
Global differences between clusters
  cluster     emmean          SE       df       lower.CL     upper.CL
1       1 0.13463415 0.01481579 544.6904   0.1055310675  0.16373723
2       2 0.22539683 0.02673610 544.6904   0.1728783323  0.27791532
3       3 0.04038462 0.02080672 544.6904  -0.0004866188  0.08125585
  contrast     estimate         SE       df      t.ratio      p.value
1   1 - 2 -0.09076268 0.03057472 544.6904  -2.968553 8.757698e-03
2   1 - 3  0.09424953 0.02555218 544.6904   3.688513 7.249401e-04
3   2 - 3  0.18501221 0.03388547 544.6904   5.459927 2.174798e-07


Time point differences between clusters

        Year: 1
  cluster    emmean         SE  df     lower.CL  upper.CL
1       1 0.3804878 0.05871431 369   0.26503118 0.4959444
2       2 0.6031746 0.10591333 369   0.39490519 0.8114440
3       3 0.1250000 0.08243359 369  -0.03709854 0.2870985
  contrast    estimate        SE  df   t.ratio     p.value
1   1 - 2 -0.2226868 0.1210991 369 -1.838880 0.158439061
2   1 - 3  0.2554878 0.1012061 369  2.524432 0.032117970
3   2 - 3  0.4781746 0.1342123 369  3.562824 0.001204817


        Year: 2
```

```
   cluster        emmean          SE  df    lower.CL   upper.CL
1        1 1.317073e-01 0.02615849 369   0.0802689  0.1831457
2        2 2.063492e-01 0.04718668 369   0.1135607  0.2991377
3        3 1.942890e-16 0.03672595 369  -0.0722184  0.0722184
   contrast    estimate          SE  df    t.ratio      p.value
1    1 - 2 -0.07464189 0.05395229 369  -1.383480  0.350601360
2    1 - 3  0.13170732 0.04508949 369   2.921020  0.010328780
3    2 - 3  0.20634921 0.05979446 369   3.450975  0.001800113


        Year: 3
   cluster     emmean          SE  df    lower.CL   upper.CL
1        1 0.05853659 0.01852412 369   0.02211050 0.09496267
2        2 0.06349206 0.03341521 369  -0.00221607 0.12920020
3        3 0.02884615 0.02600745 369  -0.02229526 0.07998757
   contrast      estimate          SE  df    t.ratio   p.value
1    1 - 2 -0.004955478 0.03820628 369  -0.1297032 0.9907685
2    1 - 3  0.029690432 0.03193009 369   0.9298574 0.6217473
3    2 - 3  0.034645910 0.04234341 369   0.8182126 0.6919705


        Year: 4
   cluster     emmean          SE  df    lower.CL   upper.CL
1        1 0.06829268 0.02268904 369   0.02367664 0.11290873
2        2 0.12698413 0.04092822 369   0.04650232 0.20746593
3        3 0.02884615 0.03185491 369  -0.03379378 0.09148609
   contrast    estimate          SE  df    t.ratio   p.value
1    1 - 2 -0.05869144 0.04679649 369  -1.254185 0.4221551
2    1 - 3  0.03944653 0.03910918 369   1.008626 0.5718717
3    2 - 3  0.09813797 0.05186381 369   1.892225 0.1423424


        Year: 5
   cluster     emmean          SE  df     lower.CL   upper.CL
1        1 0.03414634 0.01843455 369  -0.002103611 0.07039629
2        2 0.12698413 0.03325364 369   0.061593712 0.19237454
3        3 0.01923077 0.02588170 369  -0.031663362 0.07012490
   contrast    estimate          SE  df    t.ratio    p.value
1    1 - 2 -0.09283779 0.03802154 369  -2.4417157 0.03991837
2    1 - 3  0.01491557 0.03177570 369   0.4694018 0.88569543
3    2 - 3  0.10775336 0.04213867 369   2.5571137 0.02941975


Predictive Capability  time_point      rmse relative_rmse
1:              2 0.4650824      1.222458
2:              5 0.3217557      1.210239
```

Major Complications Proportion
standard error confidence intervals
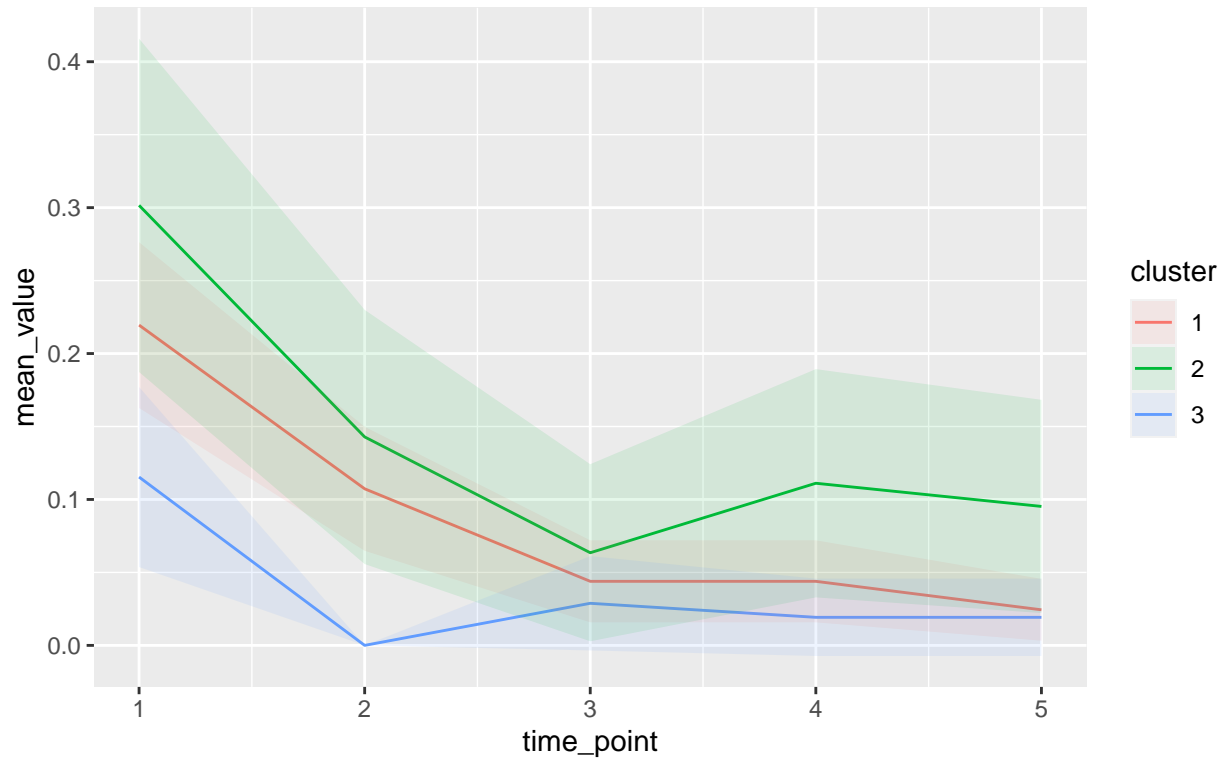

```
Global differences between clusters
  cluster    emmean          SE       df   lower.CL  upper.CL
1       1 0.08780488 0.008389622 544.6904 0.07132490 0.1042849
2       2 0.14285714 0.015139645 544.6904 0.11311790 0.1725964
3       3 0.03653846 0.011782059 544.6904 0.01339462 0.0596823
  contrast     estimate         SE       df    t.ratio      p.value
1  1 - 2 -0.05505226 0.01731331 544.6904 -3.179766 4.435652e-03
2  1 - 3  0.05126642 0.01446923 544.6904  3.543133 1.246752e-03
3  2 - 3  0.10631868 0.01918806 544.6904  5.540876 1.409458e-07


Time point differences between clusters

        Year: 1
  cluster   emmean         SE  df  lower.CL  upper.CL
1       1 0.2195122 0.02792944 369 0.16459135 0.2744330
2       2 0.3015873 0.05038125 369 0.20251692 0.4006577
3       3 0.1153846 0.03921232 369 0.03827697 0.1924923
  contrast     estimate         SE  df   t.ratio    p.value
1  1 - 2 -0.08207511 0.05760490 369 -1.424794 0.32916708
2  1 - 3  0.10412758 0.04814208 369  2.162922 0.07903012
3  2 - 3  0.18620269 0.06384259 369  2.916590 0.01046920


        Year: 2
```

```
   cluster        emmean         SE df    lower.CL   upper.CL
1        1  1.073171e-01 0.01901581 369   0.06992412 0.14471002
2        2  1.428571e-01 0.03430216 369   0.07540490 0.21030938
3        3 -1.249001e-16 0.02669778 369  -0.05249887 0.05249887
  contrast    estimate          SE  df   t.ratio     p.value
1    1 - 2 -0.03554007 0.03922039 369 -0.906163 0.636748170
2    1 - 3  0.10731707 0.03277762 369  3.274096 0.003319214
3    2 - 3  0.14285714 0.04346734 369  3.286540 0.003182331

        Year: 3
  cluster      emmean         SE  df    lower.CL   upper.CL
1        1 0.04390244 0.01420527 369   0.01596901 0.07183587
2        2 0.06349206 0.02562454 369   0.01310363 0.11388050
3        3 0.02884615 0.01994388 369  -0.01037176 0.06806407
  contrast    estimate         SE  df    t.ratio    p.value
1    1 - 2 -0.01958962 0.02929857 369 -0.6686204 0.7818622
2    1 - 3  0.01505629 0.02448567 369  0.6149020 0.8120641
3    2 - 3  0.03464591 0.03247114 369  1.0669754 0.5352072

        Year: 4
  cluster      emmean         SE  df    lower.CL   upper.CL
1        1 0.04390244 0.01489765 369   0.01460751 0.07319737
2        2 0.11111111 0.02687350 369   0.05826669 0.16395554
3        3 0.01923077 0.02091596 369  -0.02189867 0.06036021
  contrast    estimate         SE  df    t.ratio    p.value
1    1 - 2 -0.06720867 0.03072662 369 -2.1873111 0.07467723
2    1 - 3  0.02467167 0.02567912 369  0.9607676 0.60215776
3    2 - 3  0.09188034 0.03405382 369  2.6980920 0.01991066

        Year: 5
  cluster      emmean         SE  df      lower.CL   upper.CL
1        1 0.02439024 0.01273502 369 -0.0006520706 0.04943256
2        2 0.09523810 0.02297239 369  0.0500648676 0.14041132
3        3 0.01923077 0.01787968 369 -0.0159280861 0.05438962
  contrast      estimate         SE  df    t.ratio    p.value
1    1 - 2 -0.070847851 0.02626617 369 -2.6973045 0.01995519
2    1 - 3  0.005159475 0.02195140 369  0.2350408 0.97000734
3    2 - 3  0.076007326 0.02911038 369  2.6110047 0.02539874


Predictive Capability   time_point       rmse relative_rmse
1:           2 0.2778341       1.003890
2:           5 0.1989673       1.081985
```

Summary

Root Mean Square Error (in parenthesis Relative RMSE = RMSE/standard deviation(outcome))

```
                          outcome          2Y          5Y
 1:  Coronal Balance (C7PL to CSVL) 14.44 (0.93) 20.61 (1.19)
 2:                   Global Tilt 12.24 (0.88) 11.85 (0.79)
 3:        Lordosis (top of L1-S1) 14.76 (0.97) 15.59 (0.98)
```

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 4:            Major Complications  0.47 (1.22)   0.32 (1.21)
 5: Major Complications Proportion     0.28 (1)     0.2 (1.08)
 6:               ODI - Score (%) 17.68 (0.83)      17 (0.8)
 7:              Pelvic Incidence 11.73 (0.94)  11.64 (0.94)
 8:                  Pelvic Tilt  8.31 (0.88)   9.41 (0.95)
 9:                          RLL  12.72 (0.9)    14.7 (1.03)
10:                          RPV   6.79 (0.87)     8.21 (1)
11:                          RSA 10.12 (0.87)  10.51 (0.82)
12:               Reinterventions  0.37 (0.98)   0.26 (0.96)
13:    Reinterventions Proportion  0.32 (1.14)   0.19 (1.02)
14:                    SF36 - MCS 11.53 (0.95)  11.26 (0.99)
15:                    SF36 - PCS  9.06 (0.87)    9.6 (0.86)
16:     SRS22 - Function / Activity  0.76 (0.82)   0.83 (0.91)
17:          SRS22 - Mental health  0.88 (0.93)   0.81 (0.91)
18:                  SRS22 - Pain  0.95 (0.87)   1.07 (0.95)
19:    SRS22 - SRS Subtotal score  0.74 (0.87)   0.76 (0.87)
20: SRS22 - Self image / Appearance  0.82 (0.88)   0.91 (0.98)
21:                 Sacral Slope  10.3 (0.99)  11.28 (1.05)
22:               Sagittal Balance 44.68 (0.9)  48.26 (0.99)
23:              Sagittal T2-T12 14.83 (0.95)  17.31 (1.03)
24:               Sagittal T2-T5  10.93 (1.1)  12.87 (1.11)
25:              Sagittal T5-T12 13.24 (0.84)  14.19 (0.86)
26:    Static Major curve Cobb angle 17.59 (1.03)  16.86 (0.98)
27:            T1 Sagittal Tilt    4.1 (0.92)   5.12 (1.05)
28:        Thoracolumbar L2-T10   12.4 (0.97)  16.46 (1.12)
                         outcome          2Y            5Y
```

Global Contrasts

```
                                outcome estimate_1 - 2 p.value_1 - 2 estimate_1 - 3
 1:   Coronal Balance (C7PL to CSVL)          -2.46        0.06894            3.25
 2:                      Global Tilt          -4.59        0.00000           11.02
 3:          Lordosis (top of L1-S1)          -2.27        0.06085            4.85
 4:              Major Complications          -0.09        0.00876            0.09
 5:   Major Complications Proportion          -0.06        0.00444            0.05
 6:                  ODI - Score (%)         -18.89        0.00000           12.59
 7:                 Pelvic Incidence          -0.86        0.57583            4.33
 8:                     Pelvic Tilt          -2.88        0.00002            7.74
 9:                             RLL           2.86        0.00554           -7.58
10:                             RPV           2.46        0.00000           -6.14
11:                             RSA          -4.10        0.00000            8.93
12:                 Reinterventions          -0.10        0.00147            0.08
13:      Reinterventions Proportion          -0.06        0.00063            0.04
14:                      SF36 - MCS           8.26        0.00000           -1.86
15:                      SF36 - PCS           7.05        0.00000           -6.99
16:     SRS22 - Function / Activity           0.67        0.00000           -0.77
17:          SRS22 - Mental health           0.74        0.00000           -0.20
18:                   SRS22 - Pain           0.83        0.00000           -0.44
19:     SRS22 - SRS Subtotal score           0.73        0.00000           -0.44
20: SRS22 - Self image / Appearance           0.69        0.00000           -0.41
21:                   Sacral Slope           1.93        0.01488           -3.50
22:               Sagittal Balance         -19.52        0.00000           28.37
23:                 Sagittal T2-T12          -2.72        0.03577            4.45
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24:              Sagittal T2-T5          -0.95      0.35934          -0.94
25:             Sagittal T5-T12          -1.05      0.54842           5.06
26:  Static Major curve Cobb angle        5.07      0.00003          -8.49
27:             T1 Sagittal Tilt         -1.29      0.00035           1.13
28:          Thoracolumbar L2-T10        -0.47      0.86057           6.19
                          outcome estimate_1 - 2 p.value_1 - 2 estimate_1 - 3
    p.value_1 - 3 estimate_2 - 3 p.value_2 - 3
 1:       0.00149           5.71        0.00001
 2:       0.00000          15.61        0.00000
 3:       0.00000           7.12        0.00000
 4:       0.00072           0.19        0.00000
 5:       0.00125           0.11        0.00000
 6:       0.00000          31.49        0.00000
 7:       0.00000           5.19        0.00000
 8:       0.00000          10.61        0.00000
 9:       0.00000         -10.44        0.00000
10:       0.00000          -8.60        0.00000
11:       0.00000          13.03        0.00000
12:       0.00300           0.18        0.00000
13:       0.00614           0.10        0.00000
14:       0.03151         -10.12        0.00000
15:       0.00000         -14.05        0.00000
16:       0.00000          -1.44        0.00000
17:       0.00055          -0.94        0.00000
18:       0.00000          -1.27        0.00000
19:       0.00000          -1.17        0.00000
20:       0.00000          -1.10        0.00000
21:       0.00000          -5.43        0.00000
22:       0.00000          47.90        0.00000
23:       0.00000           7.16        0.00000
24:       0.24052           0.02        0.99978
25:       0.00000           6.12        0.00000
26:       0.00000         -13.56        0.00000
27:       0.00017           2.42        0.00000
28:       0.00000           6.66        0.00000
    p.value_1 - 3 estimate_2 - 3 p.value_2 - 3
```