Demographic and Longitudinal Phenotype Analyses

Analysis of demographic and longitudinal phenotype data

Setup

```
library(easypackages)
libraries("ggplot2","psych","here")
source(here("code","spaghettiPlot.R"))
options(stringsAsFactors=FALSE)

ndigits2use = 4

# function to grab intake or outcome timepoints from longitudinal data
findIntakeOutcomeData <- function(D, type2find, sublist) {
# D = data frame
# type2find = "intake" or "outcome"
# sublist = list of subjects to use
#

    result = data.frame(matrix(nrow=length(sublist), ncol = dim(D)[2]))
    colnames(result) = colnames(D)

    # loop over subjects and grab their data
    for (isub in 1:length(sublist)) {
      submask = is.element(D$subjectId,sublist[isub])
      tmp_data = subset(D,submask)

      if (dim(tmp_data)[1]!=0) {
          if (type2find=="intake"){
            result[isub,] = tmp_data[1,]
          } else if (type2find=="outcome"){
          result[isub,] = tmp_data[dim(tmp_data)[1],]
          }
      }
    }
    result$subjectId = sublist
    result
}# function findIntakeOutcomeData
```

Read in data

```
# read in longitudinal clinical data
lwdata_flat = read.csv(here("data","tidy","tidy_longpheno_flat.csv"))

# read in demographic data
labelfile = here("data","tidy","tidy_demographic_data.csv")
labels = read.csv(labelfile)
sublist = labels$subjectId
```

Descriptive statistics on demographic data

```
describeBy(labels, group="subgrp2")
```

```
##
##  Descriptive statistics by group
## group: Good
##                vars  n   mean    sd median trimmed    mad   min    max
## subjectId*        1 40    NaN    NA     NA     NaN     NA   Inf   -Inf
## Dx*               2 40    NaN    NA     NA     NaN     NA   Inf   -Inf
## subgrp2*          3 40    NaN    NA     NA     NaN     NA   Inf   -Inf
## scan_age          4 40  29.79  8.41  29.95   30.13   8.16 12.62  45.14
## sex*              5 40    NaN    NA     NA     NaN     NA   Inf   -Inf
## gex_age           6 40  26.47  8.31  26.46   26.28   8.06 12.62  42.25
## batch*            7 40   1.15  0.36   1.00    1.07   0.00  1.00   2.00
## exprColNames*     8 40 218.32 92.90 238.50  218.54 114.16 69.00 376.00
## RIN               9 37   8.24  1.28   8.50    8.45   0.44  2.60   9.60
## meanFD           10 40   0.11  0.23   0.05    0.06   0.03  0.02   1.49
## meanDVARS        11 40   8.81  2.85   8.17    8.45   1.47  5.26  23.04
##                 range  skew kurtosis    se
## subjectId*       -Inf    NA       NA    NA
## Dx*              -Inf    NA       NA    NA
## subgrp2*         -Inf    NA       NA    NA
## scan_age        32.53 -0.25    -0.67  1.33
## sex*             -Inf    NA       NA    NA
## gex_age         29.63  0.18    -0.90  1.31
## batch*           1.00  1.91     1.68  0.06
## exprColNames* 307.00 -0.09    -1.21 14.69
## RIN              7.00 -2.77     8.93  0.21
## meanFD           1.47  5.21    27.75  0.04
## meanDVARS       17.78  3.07    12.91  0.45
## ------------------------------------------------------------
## group: Poor
##                vars  n   mean     sd median trimmed    mad   min    max
## subjectId*        1 41    NaN     NA     NA     NaN     NA   Inf   -Inf
## Dx*               2 41    NaN     NA     NA     NaN     NA   Inf   -Inf
## subgrp2*          3 41    NaN     NA     NA     NaN     NA   Inf   -Inf
## scan_age          4 41  29.70   7.88  27.89   29.74   6.62 12.48  46.95
## sex*              5 41    NaN     NA     NA     NaN     NA   Inf   -Inf
## gex_age           6 41  25.46   7.23  25.13   25.19   5.06 12.16  41.82
## batch*            7 41   1.15   0.36   1.00    1.06   0.00  1.00   2.00
## exprColNames*     8 41 219.93 101.71 236.50  219.06 137.88 47.00 377.00
## RIN               9 39   8.28   1.47   8.80    8.57   0.59  2.40   9.50
## meanFD           10 41   0.07   0.08   0.05    0.05   0.03  0.02   0.45
## meanDVARS        11 41   8.61   2.57   8.17    8.28   1.74  4.84  19.05
##                 range  skew kurtosis    se
## subjectId*       -Inf    NA       NA    NA
## Dx*              -Inf    NA       NA    NA
## subgrp2*         -Inf    NA       NA    NA
## scan_age        34.47  0.08    -0.42  1.23
## sex*             -Inf    NA       NA    NA
## gex_age         29.67  0.37    -0.16  1.13
## batch*           1.00  1.89     1.60  0.06
## exprColNames* 330.00  0.03    -1.43 15.89
```

```
## RIN             7.10 -2.40     5.89  0.24
## meanFD          0.43  3.65    14.28  0.01
## meanDVARS      14.21  1.75     4.47  0.40
## ------------------------------------------------------------
## group: TD
##                vars  n   mean    sd median trimmed   mad   min    max
## subjectId*        1 37    NaN    NA     NA     NaN    NA   Inf   -Inf
## Dx*               2 37    NaN    NA     NA     NaN    NA   Inf   -Inf
## subgrp2*          3 37    NaN    NA     NA     NaN    NA   Inf   -Inf
## scan_age          4 37  26.20 10.21  23.91   25.71 12.62 12.12  45.37
## sex*              5 37    NaN    NA     NA     NaN    NA   Inf   -Inf
## gex_age           6 37  22.95  9.87  22.54   21.88 11.20 12.12  44.62
## batch*            7 37   1.16  0.37   1.00    1.08  0.00  1.00   2.00
## exprColNames*     8 37 203.81 78.79 193.00  196.24 57.82 92.00 388.00
## RIN               9 28   8.39  1.06   8.65    8.55  0.37  4.40   9.90
## meanFD           10 37   0.07  0.03   0.06    0.07  0.02  0.03   0.15
## meanDVARS        11 37   7.75  2.01   7.21    7.56  1.35  4.81  16.10
##                 range  skew kurtosis    se
## subjectId*       -Inf    NA       NA    NA
## Dx*              -Inf    NA       NA    NA
## subgrp2*         -Inf    NA       NA    NA
## scan_age        33.25  0.29    -1.21  1.68
## sex*             -Inf    NA       NA    NA
## gex_age         32.49  0.88    -0.34  1.62
## batch*           1.00  1.75     1.11  0.06
## exprColNames* 296.00  0.81     0.08 12.95
## RIN              5.50 -2.21     5.36  0.20
## meanFD           0.13  1.09     0.34  0.01
## meanDVARS       11.30  1.92     5.79  0.33
```

Descriptive statistics at the intake timepoint

```
intake_data = findIntakeOutcomeData(D = lwdata_flat,
                                    type2find = "intake",
                                    sublist=sublist)

intake_data = merge(x = intake_data,
                    y = labels[,c("subjectId","scan_age","gex_age")],
                    by.x = "subjectId",
                    by.y = "subjectId")

describeBy(intake_data, group = "subgrp2")
```

```
##
##  Descriptive statistics by group
## group: Good
##                        vars  n  mean    sd median trimmed   mad   min
## subjectId*                1 40   NaN    NA     NA     NaN    NA   Inf
## sex*                      2 40   NaN    NA     NA     NaN    NA   Inf
## Dx*                       3 40   NaN    NA     NA     NaN    NA   Inf
## subgrp2*                  4 40   NaN    NA     NA     NaN    NA   Inf
## vine_agemo                5 40 24.93  7.77  25.49   24.53  7.60 12.55
## vine_ComTotal_DomStd      6 40 81.05 11.69  80.50   80.38 11.12 60.00
```

```
## vine_DlyTotal_DomStd     7 40 88.15  9.78  86.00   87.78 10.38 69.00
## vine_SocTotal_DomStd     8 40 85.47  9.03  86.00   85.75  9.64 66.00
## vine_MtrTotal_DomStd     9 40 93.28  9.19  93.00   92.88  5.19 74.00
## vine_AdapBehav_DomStd   10 40 84.30  7.74  83.00   83.84  7.41 68.00
## ados_ageMo              11 40 25.12  7.79  25.61   24.70  7.92 12.62
## ados_CoSoTot            12 40 12.68  4.58  13.00   12.66  5.93  3.00
## ados_RRTot              13 40  3.83  2.01   4.00    3.72  1.48  0.00
## ados_CoSoTotRRTot       14 40 16.50  5.45  16.50   16.69  6.67  4.00
## mullen_ageMo            15 40 24.97  7.74  25.49   24.55  7.65 12.62
## mullen_VRT              16 40 46.33 10.57  44.50   45.72  9.64 25.00
## mullen_FMT              17 40 42.98 10.14  43.50   43.09  8.15 20.00
## mullen_RLT              18 40 34.10 11.88  34.50   33.00 14.08 20.00
## mullen_ELT              19 40 36.52 10.70  35.00   35.72  8.15 20.00
## mullen_ELC_Std          20 40 81.35 16.18  80.00   79.94 16.31 56.00
## scan_age                21 40 29.79  8.41  29.95   30.13  8.16 12.62
## gex_age                 22 40 26.47  8.31  26.46   26.28  8.06 12.62
##                          max range  skew kurtosis   se
## subjectId*              -Inf  -Inf    NA       NA   NA
## sex*                    -Inf  -Inf    NA       NA   NA
## Dx*                     -Inf  -Inf    NA       NA   NA
## subgrp2*                -Inf  -Inf    NA       NA   NA
## vine_agemo             41.79 29.24  0.31    -0.70 1.23
## vine_ComTotal_DomStd  109.00 49.00  0.41    -0.46 1.85
## vine_DlyTotal_DomStd  111.00 42.00  0.34    -0.77 1.55
## vine_SocTotal_DomStd  104.00 38.00 -0.20    -0.71 1.43
## vine_MtrTotal_DomStd  118.00 44.00  0.39     0.40 1.45
## vine_AdapBehav_DomStd 103.00 35.00  0.44    -0.30 1.22
## ados_ageMo             42.25 29.63  0.33    -0.70 1.23
## ados_CoSoTot           21.00 18.00 -0.05    -0.89 0.72
## ados_RRTot              8.00  8.00  0.25    -0.46 0.32
## ados_CoSoTotRRTot      25.00 21.00 -0.26    -0.66 0.86
## mullen_ageMo           41.79 29.17  0.32    -0.71 1.22
## mullen_VRT             69.00 44.00  0.38    -0.54 1.67
## mullen_FMT             69.00 49.00 -0.08     0.18 1.60
## mullen_RLT             72.00 52.00  0.77     0.62 1.88
## mullen_ELT             76.00 56.00  1.31     3.03 1.69
## mullen_ELC_Std        133.00 77.00  0.92     1.09 2.56
## scan_age               45.14 32.53 -0.25    -0.67 1.33
## gex_age                42.25 29.63  0.18    -0.90 1.31
## ------------------------------------------------------------
## group: Poor
##                        vars  n  mean    sd median trimmed   mad   min
## subjectId*                1 41   NaN    NA     NA     NaN    NA   Inf
## sex*                      2 41   NaN    NA     NA     NaN    NA   Inf
## Dx*                       3 41   NaN    NA     NA     NaN    NA   Inf
## subgrp2*                  4 41   NaN    NA     NA     NaN    NA   Inf
## vine_agemo                5 41 25.21  7.30  24.97   24.90  5.94 12.16
## vine_ComTotal_DomStd      6 41 73.59 15.45  69.00   72.55 11.86 49.00
## vine_DlyTotal_DomStd      7 41 85.12 12.49  83.00   84.76 11.86 62.00
## vine_SocTotal_DomStd      8 41 82.44 12.75  80.00   81.58 10.38 61.00
## vine_MtrTotal_DomStd      9 41 92.78 12.73  93.00   92.24 16.31 74.00
## vine_AdapBehav_DomStd    10 41 80.80 12.56  80.00   79.73 10.38 60.00
## ados_ageMo               11 41 25.46  7.35  25.17   25.14  5.94 12.39
## ados_CoSoTot             12 41 16.78  2.95  18.00   17.18  1.48  7.00
```

```
## ados_RRTot              13 41  4.78  1.94   5.00    4.82  1.48  1.00
## ados_CoSoTotRRTot       14 41 21.56  4.06  22.00   22.12  2.97  9.00
## mullen_ageMo            15 41 25.22  7.37  24.84   24.87  5.99 12.16
## mullen_VRT              16 41 37.44 10.27  37.00   37.42 10.38 20.00
## mullen_FMT              17 41 36.95 14.19  38.00   36.06 17.79 20.00
## mullen_RLT              18 41 23.12 10.10  20.00   22.64  4.45  1.00
## mullen_ELT              19 41 25.17 11.21  27.00   25.12  8.90  1.00
## mullen_ELC_Std          20 41 65.59 15.60  63.00   64.33 17.79 42.00
## scan_age                21 41 29.70  7.88  27.89   29.74  6.62 12.48
## gex_age                 22 41 25.46  7.23  25.13   25.19  5.06 12.16
##                          max range  skew kurtosis   se
## subjectId*              -Inf  -Inf    NA       NA   NA
## sex*                    -Inf  -Inf    NA       NA   NA
## Dx*                     -Inf  -Inf    NA       NA   NA
## subgrp2*                -Inf  -Inf    NA       NA   NA
## vine_agemo             41.53 29.37  0.40    -0.26 1.14
## vine_ComTotal_DomStd  128.00 79.00  1.06     1.78 2.41
## vine_DlyTotal_DomStd  125.00 63.00  0.68     0.76 1.95
## vine_SocTotal_DomStd  123.00 62.00  0.83     0.82 1.99
## vine_MtrTotal_DomStd  122.00 48.00  0.21    -1.08 1.99
## vine_AdapBehav_DomStd 127.00 67.00  1.17     2.59 1.96
## ados_ageMo             41.95 29.57  0.41    -0.22 1.15
## ados_CoSoTot           20.00 13.00 -1.27     1.37 0.46
## ados_RRTot              8.00  7.00 -0.24    -0.93 0.30
## ados_CoSoTotRRTot      27.00 18.00 -1.18     0.94 0.63
## mullen_ageMo           41.95 29.80  0.44    -0.19 1.15
## mullen_VRT             59.00 39.00  0.03    -0.75 1.60
## mullen_FMT             68.00 48.00  0.21    -1.11 2.22
## mullen_RLT             62.00 61.00  1.14     4.23 1.58
## mullen_ELT             61.00 60.00  0.42     1.45 1.75
## mullen_ELC_Std        120.00 78.00  1.02     1.58 2.44
## scan_age               46.95 34.47  0.08    -0.42 1.23
## gex_age                41.82 29.67  0.37    -0.16 1.13
## ------------------------------------------------------------
## group: TD
##                        vars  n   mean    sd median trimmed   mad   min
## subjectId*                1 35    NaN    NA     NA     NaN    NA   Inf
## sex*                      2 35    NaN    NA     NA     NaN    NA   Inf
## Dx*                       3 35    NaN    NA     NA     NaN    NA   Inf
## subgrp2*                  4 35    NaN    NA     NA     NaN    NA   Inf
## vine_agemo                5 35  19.54  8.45  14.92   18.53  3.51  9.59
## vine_ComTotal_DomStd      6 35 104.31 11.33 102.00  104.07 10.38 87.00
## vine_DlyTotal_DomStd      7 35 101.40 11.08 100.00  101.62 13.34 77.00
## vine_SocTotal_DomStd      8 35 104.03  9.03 104.00  104.00  8.90 82.00
## vine_MtrTotal_DomStd      9 35 101.09  8.07 102.00  101.17  5.93 84.00
## vine_AdapBehav_DomStd    10 35 103.09 10.09 102.00  102.97 11.86 82.00
## ados_ageMo               11 35  20.10  8.35  16.23   19.06  5.36 12.12
## ados_CoSoTot             12 35   1.86  1.56   2.00    1.72  1.48  0.00
## ados_RRTot               13 35   0.23  0.73   0.00    0.07  0.00  0.00
## ados_CoSoTotRRTot        14 35   2.09  1.65   2.00    1.97  1.48  0.00
## mullen_ageMo             15 35  19.50  8.45  14.92   18.49  3.75  9.59
## mullen_VRT               16 35  58.31  8.81  58.00   58.14  8.90 40.00
## mullen_FMT               17 35  58.74  9.43  59.00   58.83  7.41 38.00
## mullen_RLT               18 35  52.11  8.22  52.00   52.10 10.38 35.00
```

```
## mullen_ELT              19 35  55.34  8.93  56.00   55.10  7.41 41.00
## mullen_ELC_Std          20 35 112.17 13.27 113.00  112.31 13.34 83.00
## scan_age                21 35  25.12  9.39  23.79   24.75 12.42 12.12
## gex_age                 22 35  21.71  8.61  19.78   20.66  8.04 12.12
##                          max range  skew kurtosis   se
## subjectId*              -Inf  -Inf    NA       NA   NA
## sex*                    -Inf  -Inf    NA       NA   NA
## Dx*                     -Inf  -Inf    NA       NA   NA
## subgrp2*                -Inf  -Inf    NA       NA   NA
## vine_agemo             39.66 30.06  0.94    -0.36 1.43
## vine_ComTotal_DomStd  124.00 37.00  0.15    -1.03 1.92
## vine_DlyTotal_DomStd  121.00 44.00 -0.16    -0.95 1.87
## vine_SocTotal_DomStd  121.00 39.00 -0.06    -0.51 1.53
## vine_MtrTotal_DomStd  118.00 34.00 -0.20    -0.61 1.36
## vine_AdapBehav_DomStd 121.00 39.00  0.10    -0.99 1.71
## ados_ageMo             40.02 27.89  0.92    -0.41 1.41
## ados_CoSoTot            6.00  6.00  0.73    -0.21 0.26
## ados_RRTot              4.00  4.00  4.03    17.39 0.12
## ados_CoSoTotRRTot       6.00  6.00  0.51    -0.78 0.28
## mullen_ageMo           39.66 30.06  0.95    -0.35 1.43
## mullen_VRT             75.00 35.00  0.03    -0.60 1.49
## mullen_FMT             80.00 42.00  0.01     0.15 1.59
## mullen_RLT             66.00 31.00  0.03    -1.05 1.39
## mullen_ELT             73.00 32.00  0.21    -0.93 1.51
## mullen_ELC_Std        138.00 55.00 -0.15    -0.63 2.24
## scan_age               44.52 32.39  0.26    -1.25 1.59
## gex_age                44.52 32.39  0.93     0.02 1.46
```

Descriptive statistics at the outcome timepoint

```
outcome_data = findIntakeOutcomeData(D = lwdata_flat,
                                     type2find = "outcome",
                                     sublist=sublist)

outcome_data = merge(x = outcome_data,
                     y = labels[,c("subjectId","scan_age","gex_age")],
                     by.x = "subjectId",
                     by.y = "subjectId")

describeBy(outcome_data, group = "subgrp2")
```

```
##
##  Descriptive statistics by group
## group: Good
##                       vars  n  mean    sd median trimmed   mad   min
## subjectId*               1 40   NaN    NA     NA     NaN    NA   Inf
## sex*                     2 40   NaN    NA     NA     NaN    NA   Inf
## Dx*                      3 40   NaN    NA     NA     NaN    NA   Inf
## subgrp2*                 4 40   NaN    NA     NA     NaN    NA   Inf
## vine_agemo               5 40 36.58  6.48  35.61   36.44  6.19 22.93
## vine_ComTotal_DomStd     6 40 91.17 11.29  89.00   90.62 13.34 72.00
## vine_DlyTotal_DomStd     7 40 89.28 10.81  87.00   88.66 13.34 75.00
## vine_SocTotal_DomStd     8 40 86.85 11.90  86.00   86.34 14.08 65.00
```

```
## vine_MtrTotal_DomStd     9 40 91.08  9.61  91.00   91.09  9.64 74.00
## vine_AdapBehav_DomStd   10 40 87.58 10.13  86.50   86.97 12.60 72.00
## ados_ageMo              11 40 36.82  6.52  35.63   36.67  6.48 23.16
## ados_CoSoTot            12 40 12.90  3.34  13.00   12.84  2.97  7.00
## ados_RRTot              13 40  3.45  1.43   3.00    3.44  1.48  1.00
## ados_CoSoTotRRTot       14 40 16.35  3.75  16.00   16.06  2.97 10.00
## mullen_ageMo            15 40 36.53  6.46  35.45   36.37  6.19 22.93
## mullen_VRT              16 40 50.67 11.02  49.00   49.94  9.64 30.00
## mullen_FMT              17 40 42.90 10.69  44.00   42.78 11.12 20.00
## mullen_RLT              18 40 43.40  9.78  42.00   43.09  7.41 25.00
## mullen_ELT              19 40 46.00  9.17  43.50   45.28  5.19 28.00
## mullen_ELC_Std          20 40 91.95 15.61  89.50   90.69 11.86 68.00
## scan_age                21 40 29.79  8.41  29.95   30.13  8.16 12.62
## gex_age                 22 40 26.47  8.31  26.46   26.28  8.06 12.62
##                          max range  skew kurtosis   se
## subjectId*              -Inf  -Inf    NA       NA   NA
## sex*                    -Inf  -Inf    NA       NA   NA
## Dx*                     -Inf  -Inf    NA       NA   NA
## subgrp2*                -Inf  -Inf    NA       NA   NA
## vine_agemo             51.78 28.85  0.23    -0.13 1.02
## vine_ComTotal_DomStd  116.00 44.00  0.36    -0.63 1.79
## vine_DlyTotal_DomStd  111.00 36.00  0.40    -1.08 1.71
## vine_SocTotal_DomStd  112.00 47.00  0.34    -0.80 1.88
## vine_MtrTotal_DomStd  108.00 34.00 -0.11    -0.79 1.52
## vine_AdapBehav_DomStd 109.00 37.00  0.41    -0.98 1.60
## ados_ageMo             52.73 29.57  0.25    -0.08 1.03
## ados_CoSoTot           20.00 13.00  0.04    -0.79 0.53
## ados_RRTot              6.00  5.00  0.12    -0.79 0.23
## ados_CoSoTotRRTot      25.00 15.00  0.60    -0.24 0.59
## mullen_ageMo           51.78 28.85  0.26    -0.10 1.02
## mullen_VRT             77.00 47.00  0.54    -0.16 1.74
## mullen_FMT             67.00 47.00 -0.01    -0.32 1.69
## mullen_RLT             72.00 47.00  0.44     0.46 1.55
## mullen_ELT             76.00 48.00  0.92     1.45 1.45
## mullen_ELC_Std        133.00 65.00  0.79     0.16 2.47
## scan_age               45.14 32.53 -0.25    -0.67 1.33
## gex_age                42.25 29.63  0.18    -0.90 1.31
## ------------------------------------------------------------
## group: Poor
##                        vars  n  mean    sd median trimmed   mad   min
## subjectId*                1 41   NaN    NA     NA     NaN    NA   Inf
## sex*                      2 41   NaN    NA     NA     NaN    NA   Inf
## Dx*                       3 41   NaN    NA     NA     NaN    NA   Inf
## subgrp2*                  4 41   NaN    NA     NA     NaN    NA   Inf
## vine_agemo                5 41 37.01  6.38  36.80   37.18  5.11 19.75
## vine_ComTotal_DomStd      6 41 71.44 15.27  74.00   71.21 17.79 42.00
## vine_DlyTotal_DomStd      7 41 79.76 11.91  83.00   79.94  8.90 56.00
## vine_SocTotal_DomStd      8 41 75.20 10.35  76.00   75.00  8.90 57.00
## vine_MtrTotal_DomStd      9 41 84.98 10.80  85.00   84.55  8.90 56.00
## vine_AdapBehav_DomStd    10 41 74.34 11.52  75.00   74.27  8.90 47.00
## ados_ageMo               11 41 37.25  6.42  37.16   37.41  4.87 19.78
## ados_CoSoTot             12 41 15.88  2.84  16.00   15.88  4.45  8.00
## ados_RRTot               13 41  4.41  1.20   4.00    4.39  1.48  2.00
## ados_CoSoTotRRTot        14 41 20.29  3.15  20.00   20.27  2.97 14.00
```

```
## mullen_ageMo            15 41 37.00  6.41  36.80   37.17  5.11 19.75
## mullen_VRT              16 41 33.07 10.90  33.00   32.18 13.34 20.00
## mullen_FMT              17 41 31.98 10.09  31.00   31.27 16.31 20.00
## mullen_RLT              18 41 23.00  9.78  20.00   23.70 10.38  1.00
## mullen_ELT              19 41 20.05 11.50  22.00   20.39 13.34  1.00
## mullen_ELC_Std          20 41 61.63 12.25  60.00   61.48 11.86 37.00
## scan_age                21 41 29.70  7.88  27.89   29.74  6.62 12.48
## gex_age                 22 41 25.46  7.23  25.13   25.19  5.06 12.16
##                          max range  skew kurtosis   se
## subjectId*              -Inf  -Inf    NA       NA   NA
## sex*                    -Inf  -Inf    NA       NA   NA
## Dx*                     -Inf  -Inf    NA       NA   NA
## subgrp2*                -Inf  -Inf    NA       NA   NA
## vine_agemo             51.81 32.07 -0.30     0.96 1.00
## vine_ComTotal_DomStd  108.00 66.00  0.15    -0.56 2.38
## vine_DlyTotal_DomStd  111.00 55.00 -0.05     0.07 1.86
## vine_SocTotal_DomStd  104.00 47.00  0.28    -0.10 1.62
## vine_MtrTotal_DomStd  122.00 66.00  0.52     2.33 1.69
## vine_AdapBehav_DomStd 104.00 57.00  0.00     0.19 1.80
## ados_ageMo             53.03 33.25 -0.23     0.98 1.00
## ados_CoSoTot           21.00 13.00 -0.25    -0.40 0.44
## ados_RRTot              8.00  6.00  0.36     0.45 0.19
## ados_CoSoTotRRTot      26.00 12.00  0.12    -1.02 0.49
## mullen_ageMo           51.81 32.07 -0.28     0.89 1.00
## mullen_VRT             56.00 36.00  0.43    -0.90 1.70
## mullen_FMT             54.00 34.00  0.29    -1.02 1.58
## mullen_RLT             38.00 37.00 -0.48    -0.18 1.53
## mullen_ELT             39.00 38.00 -0.32    -1.21 1.80
## mullen_ELC_Std         89.00 52.00  0.22    -0.71 1.91
## scan_age               46.95 34.47  0.08    -0.42 1.23
## gex_age                41.82 29.67  0.37    -0.16 1.13
## ------------------------------------------------------------
## group: TD
##                        vars  n   mean    sd median trimmed   mad   min
## subjectId*                1 35    NaN    NA     NA     NaN    NA   Inf
## sex*                      2 35    NaN    NA     NA     NaN    NA   Inf
## Dx*                       3 35    NaN    NA     NA     NaN    NA   Inf
## subgrp2*                  4 35    NaN    NA     NA     NaN    NA   Inf
## vine_agemo                5 35  30.42  5.18  29.86   30.47  4.92 14.98
## vine_ComTotal_DomStd      6 35 103.97 11.21 101.00  103.34 10.38 86.00
## vine_DlyTotal_DomStd      7 35 103.37 13.21 100.00  102.55 13.34 85.00
## vine_SocTotal_DomStd      8 35 105.11 10.82 103.00  104.66 11.86 90.00
## vine_MtrTotal_DomStd      9 35 100.77  9.52 100.00  100.52 10.38 88.00
## vine_AdapBehav_DomStd    10 35 103.71 11.80 101.00  103.24 13.34 86.00
## ados_ageMo               11 35  31.18  5.39  30.32   31.10  4.38 16.59
## ados_CoSoTot             12 35   1.91  1.88   1.00    1.69  1.48  0.00
## ados_RRTot               13 35   0.09  0.28   0.00    0.00  0.00  0.00
## ados_CoSoTotRRTot        14 35   2.00  1.88   1.00    1.79  1.48  0.00
## mullen_ageMo             15 35  30.42  5.20  29.86   30.46  4.92 14.98
## mullen_VRT               16 35  61.83  9.63  62.00   61.83  8.90 43.00
## mullen_FMT               17 35  55.54  9.24  54.00   55.24 10.38 38.00
## mullen_RLT               18 35  54.94  8.37  55.00   55.10  7.41 39.00
## mullen_ELT               19 35  55.49  8.93  57.00   55.55 11.86 41.00
## mullen_ELC_Std           20 35 113.80 12.94 116.00  113.90 14.83 90.00
```

```
## scan_age                 21 35  25.12  9.39  23.79   24.75 12.42 12.12
## gex_age                  22 35  21.71  8.61  19.78   20.66  8.04 12.12
##                           max range  skew kurtosis   se
## subjectId*               -Inf  -Inf    NA       NA   NA
## sex*                     -Inf  -Inf    NA       NA   NA
## Dx*                      -Inf  -Inf    NA       NA   NA
## subgrp2*                 -Inf  -Inf    NA       NA   NA
## vine_agemo              39.66 24.67 -0.27     0.56 0.88
## vine_ComTotal_DomStd   135.00 49.00  0.61    -0.19 1.90
## vine_DlyTotal_DomStd   129.00 44.00  0.56    -1.06 2.23
## vine_SocTotal_DomStd   125.00 35.00  0.38    -1.23 1.83
## vine_MtrTotal_DomStd   117.00 29.00  0.25    -1.29 1.61
## vine_AdapBehav_DomStd 127.00 41.00  0.39    -1.28 2.00
## ados_ageMo              42.35 25.76  0.00     0.06 0.91
## ados_CoSoTot             7.00  7.00  0.94    -0.01 0.32
## ados_RRTot               1.00  1.00  2.83     6.21 0.05
## ados_CoSoTotRRTot        7.00  7.00  0.88    -0.14 0.32
## mullen_ageMo            39.66 24.67 -0.27     0.54 0.88
## mullen_VRT              80.00 37.00  0.03    -0.71 1.63
## mullen_FMT              80.00 42.00  0.32    -0.21 1.56
## mullen_RLT              72.00 33.00 -0.10    -0.81 1.42
## mullen_ELT              71.00 30.00 -0.14    -1.27 1.51
## mullen_ELC_Std         138.00 48.00 -0.11    -1.12 2.19
## scan_age                44.52 32.39  0.26    -1.25 1.59
## gex_age                 44.52 32.39  0.93     0.02 1.46
```

Chi-square test on sex by subgroup

```
tab2use = table(labels$sex, labels$subgrp2)
res = chisq.test(tab2use)
knitr::kable(tab2use)
```

	Good	Poor	TD
F	10	7	16
M	30	34	21

```
res
```

```
##
##  Pearson's Chi-squared test
##
## data:  tab2use
## X-squared = 6.8763, df = 2, p-value = 0.03212
```

ANOVA on age at MRI scan

```
# scan age
mod2use = lm(scan_age ~ subgrp2, data = labels)
anova(mod2use)
```

```
## Analysis of Variance Table
```

```
##
## Response: scan_age
##            Df Sum Sq Mean Sq F value Pr(>F)
## subgrp2     2  318.8 159.380  2.0387 0.1349
## Residuals 115 8990.3  78.177
```

ANOVA on meanFD

```
mod2use = lm(meanFD ~ subgrp2, data = labels)
anova(mod2use)
```

```
## Analysis of Variance Table
##
## Response: meanFD
##            Df  Sum Sq  Mean Sq F value Pr(>F)
## subgrp2     2 0.04643 0.023217  1.1206 0.3296
## Residuals 115 2.38269 0.020719
```

ANOVA on meanDVARS

```
mod2use = lm(meanDVARS ~ subgrp2, data = labels)
anova(mod2use)
```

```
## Analysis of Variance Table
##
## Response: meanDVARS
##            Df Sum Sq Mean Sq F value Pr(>F)
## subgrp2     2  24.37  12.187  1.9313 0.1496
## Residuals 115 725.65   6.310
```

ANOVA on age at blood sample

```
# gex age
mod2use = lm(gex_age ~ subgrp2, data = labels)
anova(mod2use)
```

```
## Analysis of Variance Table
##
## Response: gex_age
##            Df Sum Sq Mean Sq F value Pr(>F)
## subgrp2     2  251.2 125.596  1.7423 0.1797
## Residuals 115 8289.8  72.085
```

ANOVA on RIN

```
mod2use = lm(RIN ~ subgrp2, data = labels)
anova(mod2use)
```

```
## Analysis of Variance Table
##
```

```
## Response: RIN
##             Df  Sum Sq Mean Sq F value Pr(>F)
## subgrp2      2   0.342 0.17111  0.1007 0.9043
## Residuals 101 171.654 1.69955
```

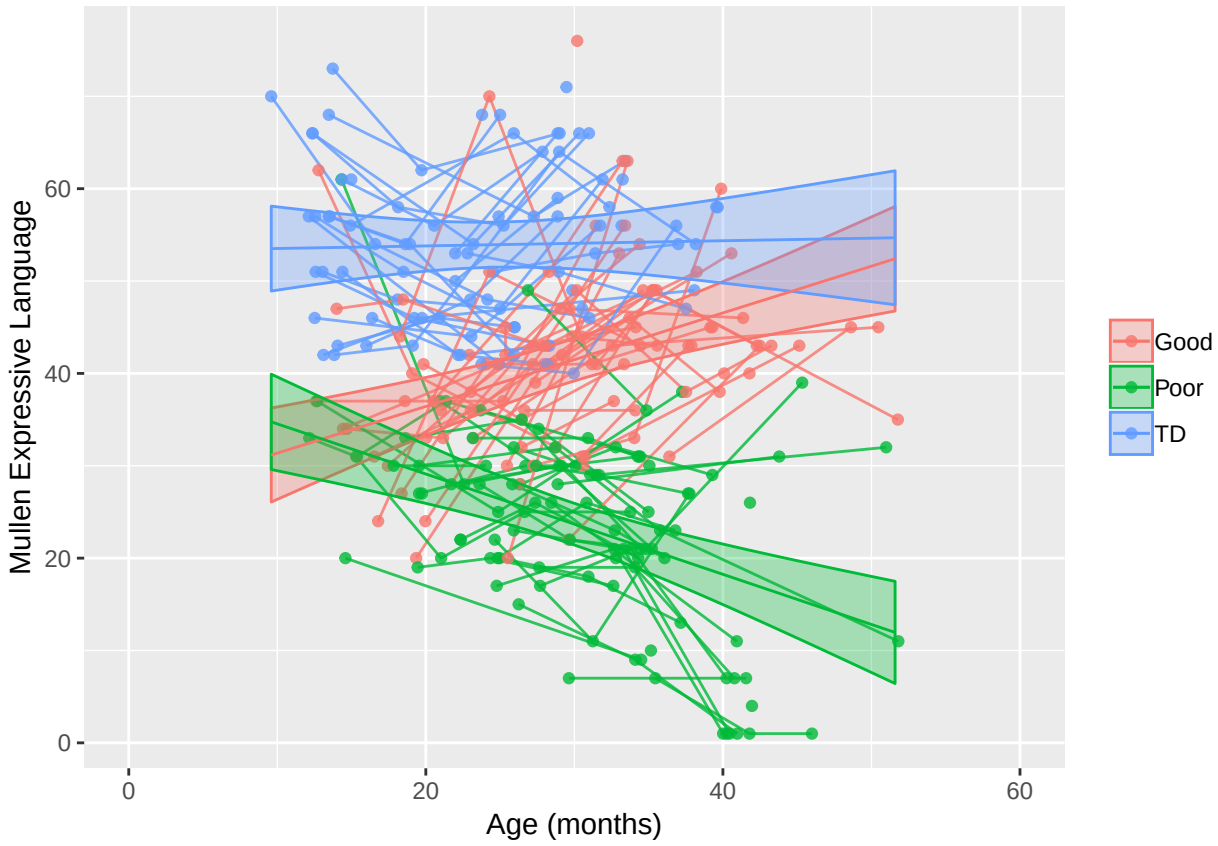
Mullen EL trajectory

```
plot_xlim = c(0,60)

fname2save = NULL
p2 = spaghettiPlot(df = lwdata_flat,
                   x_var = "mullen_ageMo",
                   y_var = "mullen_ELT",
                   subgrp_var = "subgrp2",
                   xLabel = "Age (months)",
                   yLabel = "Mullen Expressive Language",
                   modelType = "linear",
                   fname2save = fname2save,
                   plot_dots = TRUE,
                   plot_lines = TRUE,
                   ci_band = TRUE,
                   pi_band = FALSE,
                   dot_alpha = 8/10,
                   line_alpha = 8/10,
                   band_alpha = 3/10,
                   xLimits = plot_xlim,
                   yLimits = NULL)
anova(p2$lme_model)
```

```
##                       numDF denDF  F-value p-value
## (Intercept)               1   172 3281.946  <.0001
## mullen_ageMo              1   172   11.656   8e-04
## subgrp2                   2   113  157.792  <.0001
## mullen_ageMo:subgrp2      2   172   20.217  <.0001
```

```
p2$p
```



Mullen EL - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_ELT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Expressive Language",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                      numDF denDF   F-value p-value
## (Intercept)              1   113 2024.0359  <.0001
```

```
## mullen_ageMo             1   113   39.8851  <.0001
## subgrp2                  1    74  257.9090  <.0001
## mullen_ageMo:subgrp2     1   113   11.0625  0.0012
```

Mullen EL - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_ELT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Expressive Language",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                       numDF denDF  F-value p-value
## (Intercept)               1   109 3850.190  <.0001
## mullen_ageMo              1   109    0.174  0.6775
## subgrp2                   1    73   69.464  <.0001
## mullen_ageMo:subgrp2      1   109    4.630  0.0336
```

Mullen EL - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_ELT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Expressive Language",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

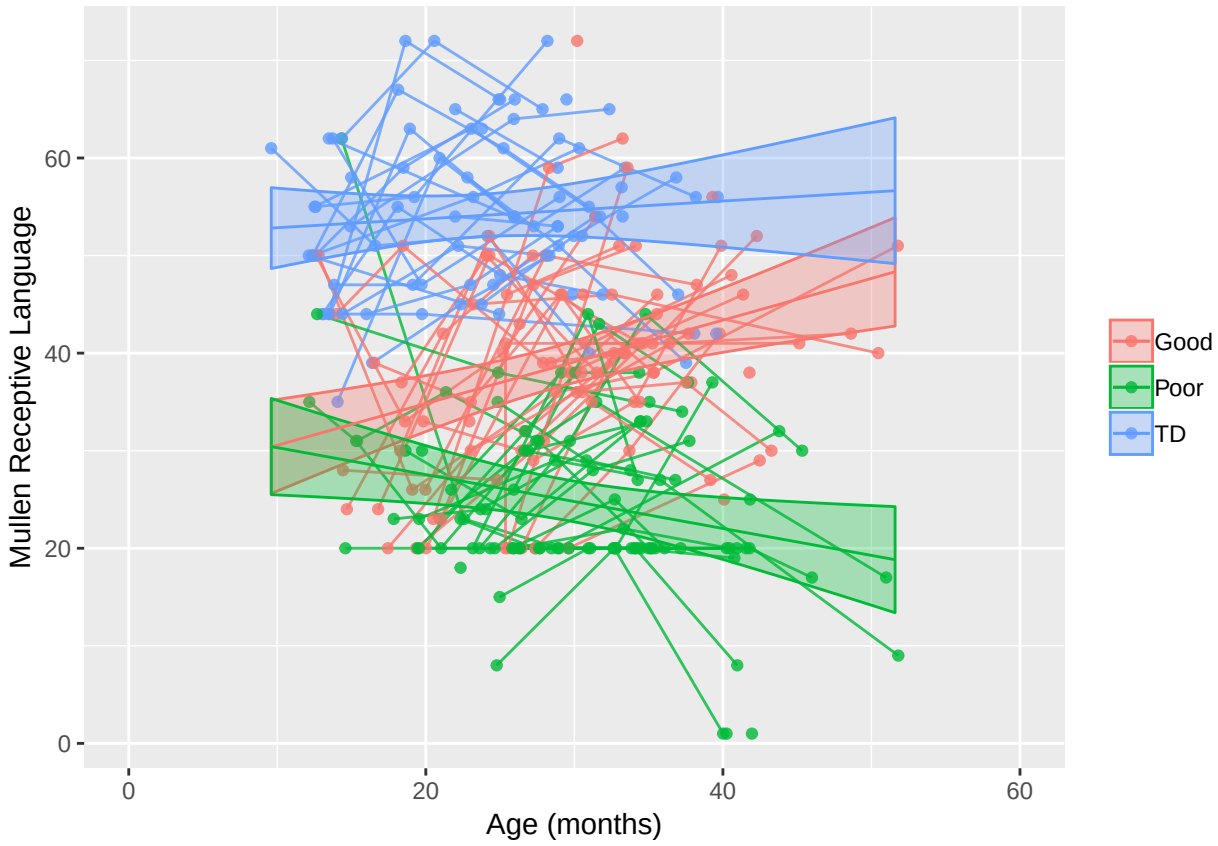
```
##                       numDF denDF   F-value p-value
## (Intercept)               1   122 1633.0668  <.0001
## mullen_ageMo              1   122    0.4210  0.5176
## subgrp2                   1    79  110.0302  <.0001
## mullen_ageMo:subgrp2      1   122   36.4114  <.0001
```

Mullen RL trajectory

```
fname2save = NULL
p3 = spaghettiPlot(df = lwdata_flat,
                   x_var = "mullen_ageMo",
                   y_var = "mullen_RLT",
                   subgrp_var = "subgrp2",
                   xLabel = "Age (months)",
                   yLabel = "Mullen Receptive Language",
                   modelType = "linear",
                   fname2save = fname2save,
                   plot_dots = TRUE,
                   plot_lines = TRUE,
                   ci_band = TRUE,
                   pi_band = FALSE,
                   dot_alpha = 8/10,
                   line_alpha = 8/10,
                   band_alpha = 3/10,
                   xLimits = plot_xlim,
                   yLimits = NULL)
anova(p3$lme_model)
```

```
##                       numDF denDF  F-value p-value
## (Intercept)               1   172 3940.156  <.0001
## mullen_ageMo              1   172   14.191   2e-04
## subgrp2                   2   113  177.665  <.0001
## mullen_ageMo:subgrp2      2   172    9.552   1e-04
```

```
p3$p
```



Mullen RL - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_RLT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Receptive Language",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                      numDF denDF   F-value p-value
## (Intercept)              1   113 2753.0452  <.0001
```

```
## mullen_ageMo             1   113   32.1775  <.0001
## subgrp2                  1    74  346.4340  <.0001
## mullen_ageMo:subgrp2     1   113    4.1855  0.0431
```

Mullen RL - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_RLT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Receptive Language",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                       numDF denDF  F-value p-value
## (Intercept)               1   109 3722.598  <.0001
## mullen_ageMo              1   109    0.107  0.7444
## subgrp2                   1    73  108.897  <.0001
## mullen_ageMo:subgrp2      1   109    3.485  0.0646
```

Mullen RL - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_RLT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Receptive Language",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

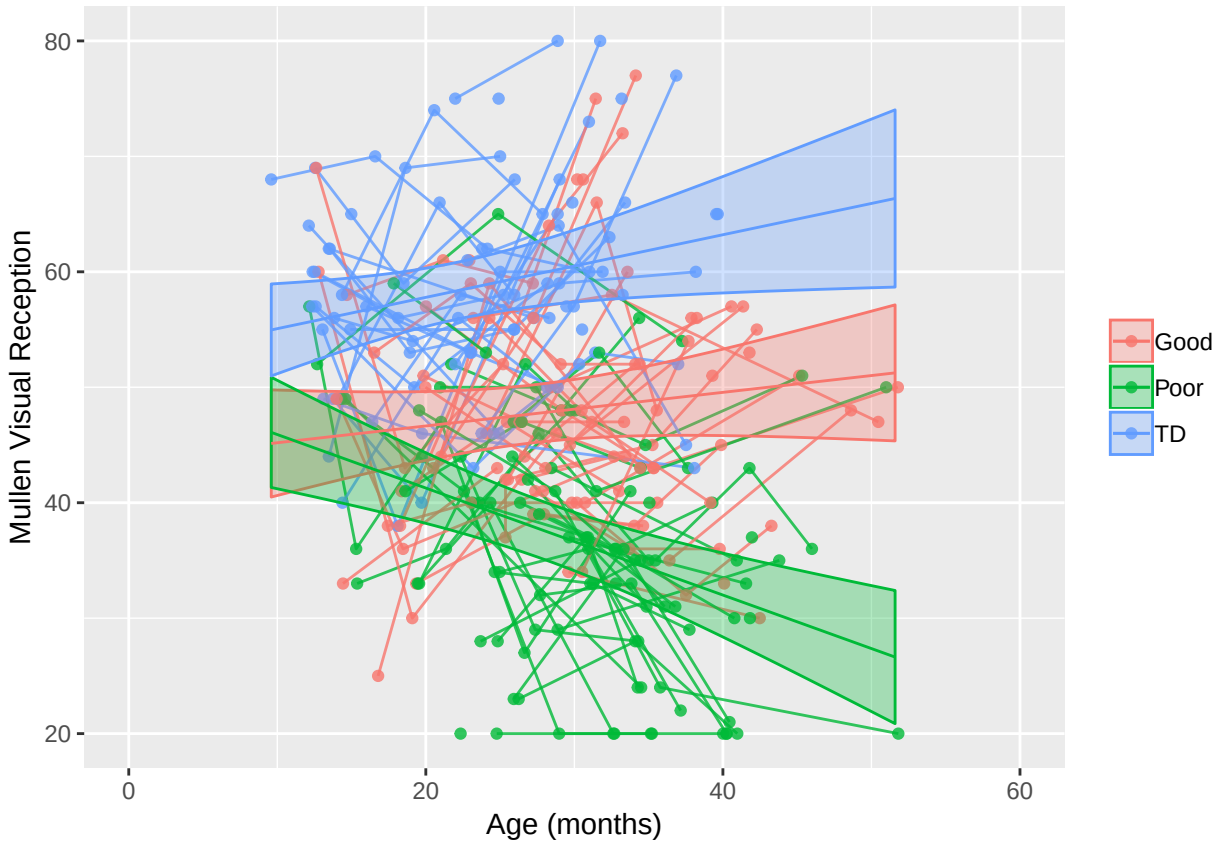
```
##                       numDF denDF   F-value p-value
## (Intercept)               1   122 1773.7876  <.0001
## mullen_ageMo              1   122    0.4747  0.4922
## subgrp2                   1    79   82.8545  <.0001
## mullen_ageMo:subgrp2      1   122   15.6651  0.0001
```

Mullen VR trajectory

```
fname2save = NULL
p4 = spaghettiPlot(df = lwdata_flat,
                   x_var = "mullen_ageMo",
                   y_var = "mullen_VRT",
                   subgrp_var = "subgrp2",
                   xLabel = "Age (months)",
                   yLabel = "Mullen Visual Reception",
                   modelType = "linear",
                   fname2save = fname2save,
                   plot_dots = TRUE,
                   plot_lines = TRUE,
                   ci_band = TRUE,
                   pi_band = FALSE,
                   dot_alpha = 8/10,
                   line_alpha = 8/10,
                   band_alpha = 3/10,
                   xLimits = plot_xlim,
                   yLimits = NULL)
anova(p4$lme_model)
```

```
##                       numDF denDF  F-value p-value
## (Intercept)               1   172 4375.491  <.0001
## mullen_ageMo              1   172    9.313  0.0026
## subgrp2                   2   113   64.932  <.0001
## mullen_ageMo:subgrp2      2   172   11.684  <.0001
```

```
p4$p
```



Mullen VR - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_VRT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Visual Reception",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                      numDF denDF   F-value p-value
## (Intercept)              1   113 3152.4818  <.0001
```

```
## mullen_ageMo             1   113   20.3477  <.0001
## subgrp2                  1    74  124.5595  <.0001
## mullen_ageMo:subgrp2     1   113   20.3821  <.0001
```

Mullen VR - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_VRT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Visual Reception",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                       numDF denDF  F-value p-value
## (Intercept)               1   109 3688.649  <.0001
## mullen_ageMo              1   109    0.036  0.8495
## subgrp2                   1    73   42.833  <.0001
## mullen_ageMo:subgrp2      1   109    0.759  0.3856
```

Mullen VR - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_VRT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Visual Reception",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

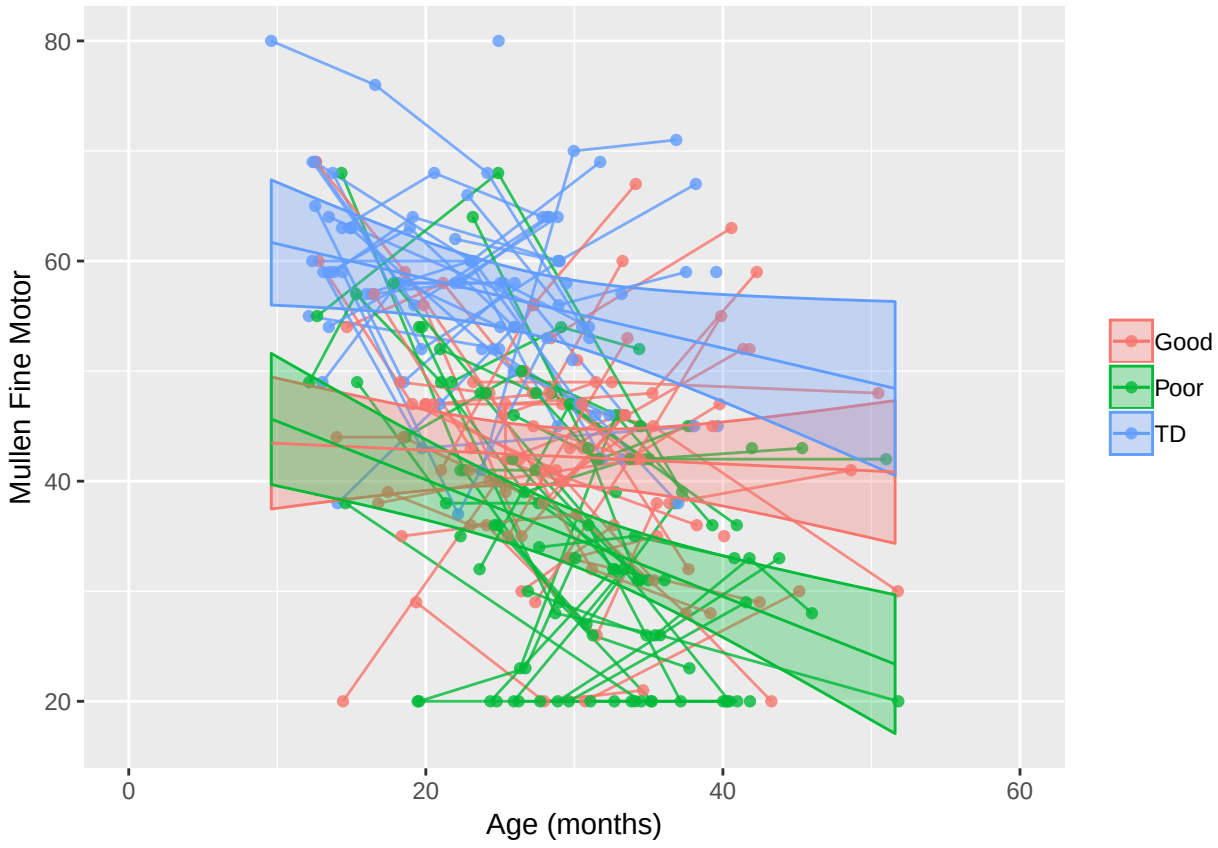
```
##                       numDF denDF   F-value p-value
## (Intercept)               1   122 2135.4719  <.0001
## mullen_ageMo              1   122    4.2869  0.0405
## subgrp2                   1    79   29.6819  <.0001
## mullen_ageMo:subgrp2      1   122   15.3252  0.0001
```

Mullen FM trajectory

```
fname2save = NULL
p5 = spaghettiPlot(df = lwdata_flat,
                   x_var = "mullen_ageMo",
                   y_var = "mullen_FMT",
                   subgrp_var = "subgrp2",
                   xLabel = "Age (months)",
                   yLabel = "Mullen Fine Motor",
                   modelType = "linear",
                   fname2save = fname2save,
                   plot_dots = TRUE,
                   plot_lines = TRUE,
                   ci_band = TRUE,
                   pi_band = FALSE,
                   dot_alpha = 8/10,
                   line_alpha = 8/10,
                   band_alpha = 3/10,
                   xLimits = plot_xlim,
                   yLimits = NULL)
anova(p5$lme_model)
```

```
##                       numDF denDF  F-value p-value
## (Intercept)               1   172 3234.230  <.0001
## mullen_ageMo              1   172   29.553  <.0001
## subgrp2                   2   113   56.443  <.0001
## mullen_ageMo:subgrp2      2   172    2.980  0.0534
```

```
p5$p
```



Mullen FM - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_FMT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Fine Motor",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                    numDF denDF   F-value p-value
## (Intercept)            1   113 2129.4100  <.0001
```

```
## mullen_ageMo             1   113   48.0224  <.0001
## subgrp2                  1    74  101.4430  <.0001
## mullen_ageMo:subgrp2     1   113    1.2713  0.2619
```

Mullen FM - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_FMT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Fine Motor",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                       numDF denDF  F-value p-value
## (Intercept)               1   109 3482.348  <.0001
## mullen_ageMo              1   109   10.373  0.0017
## subgrp2                   1    73   67.170  <.0001
## mullen_ageMo:subgrp2      1   109    1.543  0.2169
```

Mullen FM - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "mullen_ageMo",
                  y_var = "mullen_FMT",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Mullen Fine Motor",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                       numDF denDF   F-value p-value
## (Intercept)               1   122 1498.7637  <.0001
## mullen_ageMo              1   122    6.8570  0.0099
## subgrp2                   1    79   15.8318  0.0002
## mullen_ageMo:subgrp2      1   122    5.0849  0.0259
```

Vineland Communication trajectory

```
fname2save = NULL
p6 = spaghettiPlot(df = lwdata_flat,
                   x_var = "vine_agemo",
                   y_var = "vine_ComTotal_DomStd",
                   subgrp_var = "subgrp2",
                   xLabel = "Age (months)",
                   yLabel = "Vineland Communication",
                   modelType = "linear",
                   fname2save = fname2save,
                   plot_dots = TRUE,
                   plot_lines = TRUE,
                   ci_band = TRUE,
                   pi_band = FALSE,
                   dot_alpha = 8/10,
                   line_alpha = 8/10,
                   band_alpha = 3/10,
                   xLimits = plot_xlim,
                   yLimits = NULL)
anova(p6$lme_model)
```

```
##                     numDF denDF  F-value p-value
## (Intercept)             1   172 9364.749  <.0001
## vine_agemo              1   172    0.242  0.6234
## subgrp2                 2   113   98.875  <.0001
## vine_agemo:subgrp2      2   172   13.447  <.0001
```

```
p6$p
```

Vineland Communication - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_ComTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Communication",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                   numDF denDF  F-value p-value
## (Intercept)           1   113 4999.857  <.0001
```

```
## vine_agemo             1   113   10.629  0.0015
## subgrp2                1    74  148.705  <.0001
## vine_agemo:subgrp2     1   113    0.720  0.3978
```

Vineland Communication - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_ComTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Communication",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                    numDF denDF  F-value p-value
## (Intercept)            1   109 9544.539  <.0001
## vine_agemo             1   109    1.797  0.1828
## subgrp2                1    73   89.267  <.0001
## vine_agemo:subgrp2     1   109   16.495  0.0001
```

Vineland Communication - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_ComTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Communication",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

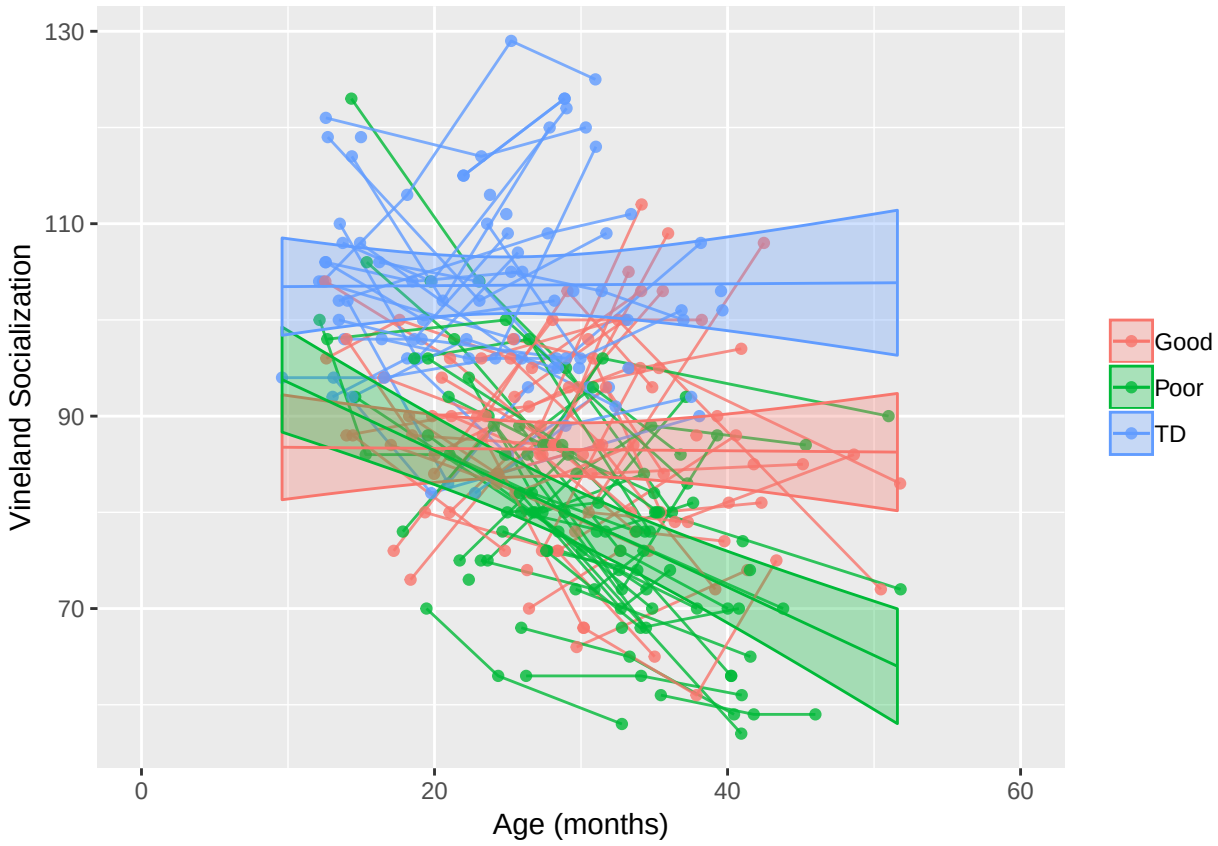
```
##                     numDF denDF  F-value p-value
## (Intercept)             1   122 5815.862  <.0001
## vine_agemo              1   122    2.769  0.0987
## subgrp2                 1    79   36.077  <.0001
## vine_agemo:subgrp2      1   122   20.109  <.0001
```

Vineland Socialization trajectory

```
fname2save = NULL
p7 = spaghettiPlot(df = lwdata_flat,
                   x_var = "vine_agemo",
                   y_var = "vine_SocTotal_DomStd",
                   subgrp_var = "subgrp2",
                   xLabel = "Age (months)",
                   yLabel = "Vineland Socialization",
                   modelType = "linear",
                   fname2save = fname2save,
                   plot_dots = TRUE,
                   plot_lines = TRUE,
                   ci_band = TRUE,
                   pi_band = FALSE,
                   dot_alpha = 8/10,
                   line_alpha = 8/10,
                   band_alpha = 3/10,
                   xLimits = plot_xlim,
                   yLimits = NULL)
anova(p7$lme_model)
```

```
##                     numDF denDF   F-value p-value
## (Intercept)             1   172 11913.739  <.0001
## vine_agemo              1   172    28.817  <.0001
## subgrp2                 2   113    64.343  <.0001
## vine_agemo:subgrp2      2   172    11.041  <.0001
```

```
p7$p
```



Vineland Socialization - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_SocTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Socialization",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                   numDF denDF  F-value p-value
## (Intercept)           1   113 7700.000  <.0001
```

```
## vine_agemo             1   113   38.900  <.0001
## subgrp2                1    74  117.875  <.0001
## vine_agemo:subgrp2     1   113   17.944  <.0001
```

Vineland Socialization - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_SocTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Socialization",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                    numDF denDF  F-value p-value
## (Intercept)            1   109 9136.616  <.0001
## vine_agemo             1   109    3.857  0.0521
## subgrp2                1    73   64.846  <.0001
## vine_agemo:subgrp2     1   109    0.515  0.4745
```

Vineland Socialization - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_SocTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Socialization",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

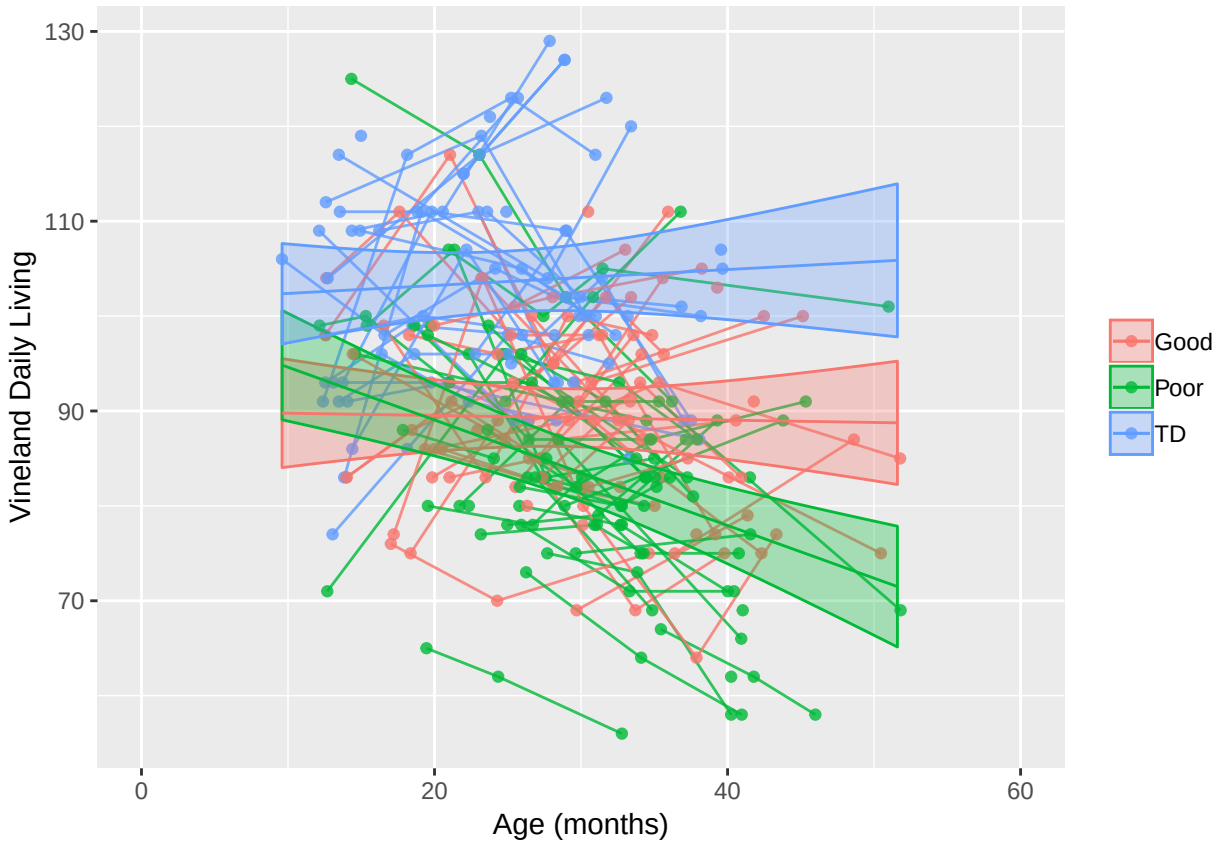
```
##                     numDF denDF  F-value p-value
## (Intercept)             1   122 7640.169  <.0001
## vine_agemo              1   122   13.797   3e-04
## subgrp2                 1    79   14.407   3e-04
## vine_agemo:subgrp2      1   122   15.092   2e-04
```

Vineland Daily Living trajectory

```
fname2save = NULL
p8 = spaghettiPlot(df = lwdata_flat,
                   x_var = "vine_agemo",
                   y_var = "vine_DlyTotal_DomStd",
                   subgrp_var = "subgrp2",
                   xLabel = "Age (months)",
                   yLabel = "Vineland Daily Living",
                   modelType = "linear",
                   fname2save = fname2save,
                   plot_dots = TRUE,
                   plot_lines = TRUE,
                   ci_band = TRUE,
                   pi_band = FALSE,
                   dot_alpha = 8/10,
                   line_alpha = 8/10,
                   band_alpha = 3/10,
                   xLimits = plot_xlim,
                   yLimits = NULL)
anova(p8$lme_model)
```

```
##                     numDF denDF   F-value p-value
## (Intercept)             1   172 10470.861  <.0001
## vine_agemo              1   172    14.593  0.0002
## subgrp2                 2   113    37.161  <.0001
## vine_agemo:subgrp2      2   172     6.915  0.0013
```

```
p8$p
```



Vineland Daily Living - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_DlyTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Daily Living",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                   numDF denDF  F-value p-value
## (Intercept)           1   113 6510.344  <.0001
```

```
## vine_agemo             1   113   17.119   1e-04
## subgrp2                1    74   61.672  <.0001
## vine_agemo:subgrp2     1   113   11.480   1e-03
```

Vineland Daily Living - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_DlyTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Daily Living",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                    numDF denDF  F-value p-value
## (Intercept)            1   109 8030.416  <.0001
## vine_agemo             1   109    1.623  0.2054
## subgrp2                1    73   40.679  <.0001
## vine_agemo:subgrp2     1   109    0.806  0.3713
```

Vineland Daily Living - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_DlyTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Daily Living",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

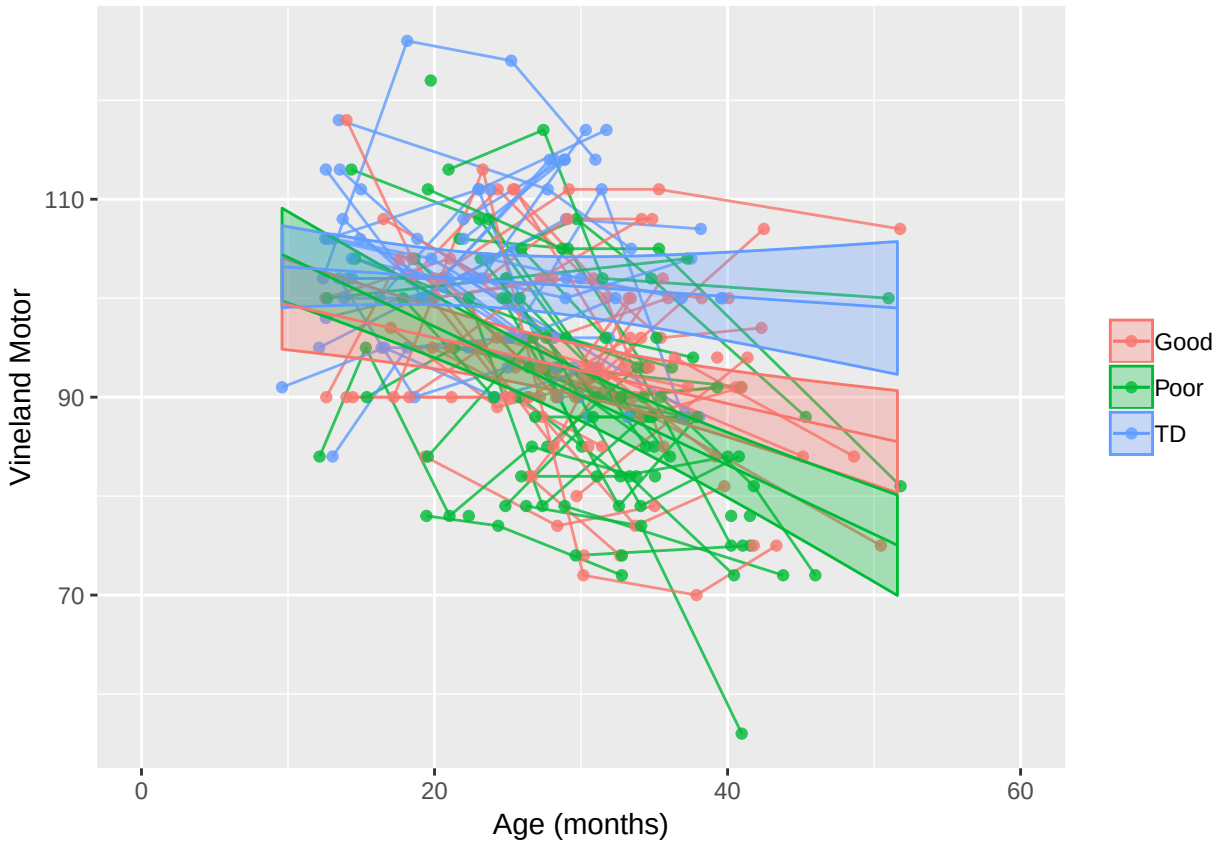
```
##                     numDF denDF  F-value p-value
## (Intercept)             1   122 6868.838  <.0001
## vine_agemo              1   122    8.810  0.0036
## subgrp2                 1    79    7.407  0.0080
## vine_agemo:subgrp2      1   122    8.719  0.0038
```

Vineland Motor trajectory

```
fname2save = NULL
p9 = spaghettiPlot(df = lwdata_flat,
                   x_var = "vine_agemo",
                   y_var = "vine_MtrTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Motor",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p9$lme_model)
```

```
##                     numDF denDF   F-value p-value
## (Intercept)             1   172 15563.259  <.0001
## vine_agemo              1   172    59.493  <.0001
## subgrp2                 2   113    11.849  <.0001
## vine_agemo:subgrp2      2   172     8.320   4e-04
```

```
p9$p
```



Vineland Motor - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_MtrTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Motor",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                   numDF denDF  F-value p-value
## (Intercept)           1   113 9650.565  <.0001
```

```
## vine_agemo             1   113   50.865  <.0001
## subgrp2                1    74   22.186  <.0001
## vine_agemo:subgrp2     1   113   18.007  <.0001
```

Vineland Motor - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_MtrTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Motor",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                    numDF denDF   F-value p-value
## (Intercept)            1   109 13453.684  <.0001
## vine_agemo             1   109    17.292  0.0001
## subgrp2                1    73    16.965  0.0001
## vine_agemo:subgrp2     1   109     2.329  0.1299
```

Vineland Motor - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_MtrTotal_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Motor",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

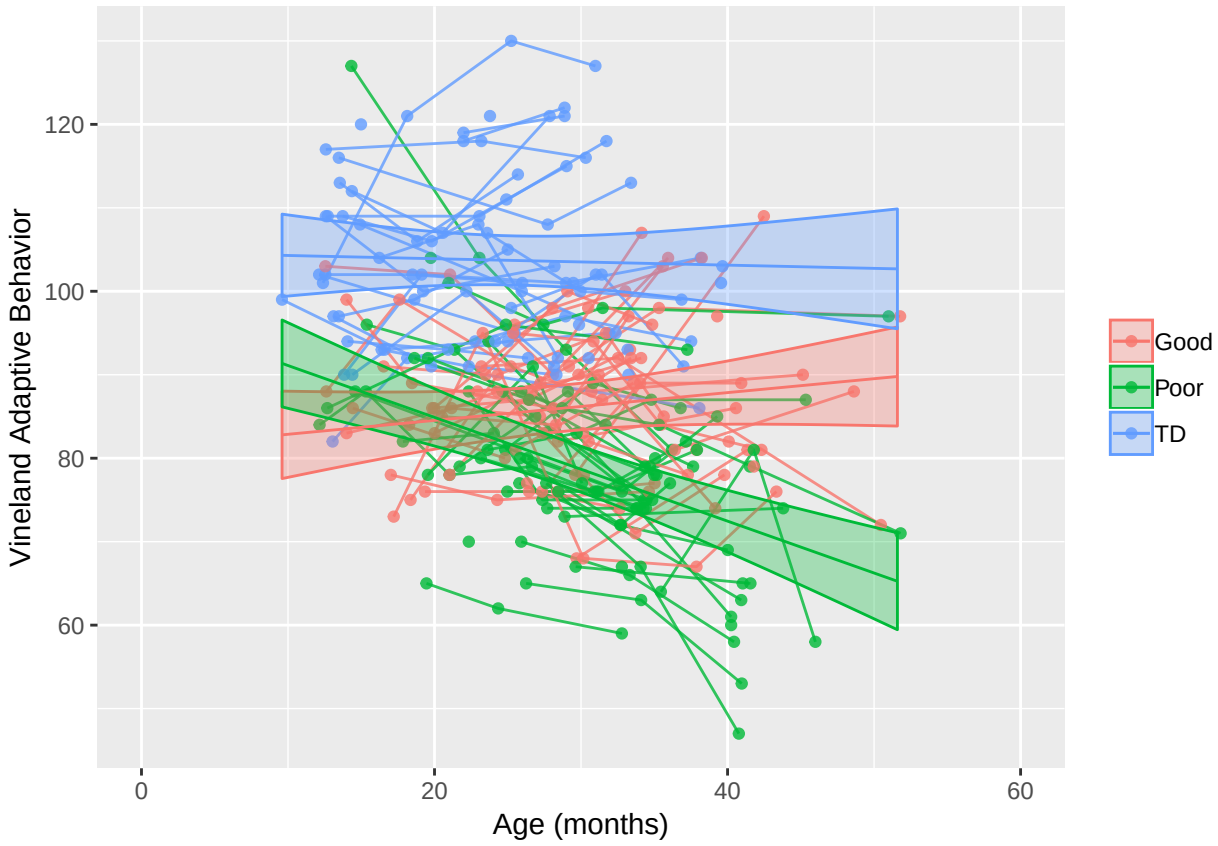
```
##                     numDF denDF  F-value p-value
## (Intercept)             1   122 9025.338  <.0001
## vine_agemo              1   122   48.146  <.0001
## subgrp2                 1    79    1.818  0.1814
## vine_agemo:subgrp2      1   122    6.488  0.0121
```

Vineland Adaptive Behavior trajectory

```
fname2save = NULL
p10 = spaghettiPlot(df = lwdata_flat,
                    x_var = "vine_agemo",
                    y_var = "vine_AdapBehav_DomStd",
                    subgrp_var = "subgrp2",
                    xLabel = "Age (months)",
                    yLabel = "Vineland Adaptive Behavior",
                    modelType = "linear",
                    fname2save = fname2save,
                    plot_dots = TRUE,
                    plot_lines = TRUE,
                    ci_band = TRUE,
                    pi_band = FALSE,
                    dot_alpha = 8/10,
                    line_alpha = 8/10,
                    band_alpha = 3/10,
                    xLimits = plot_xlim,
                    yLimits = NULL)
anova(p10$lme_model)
```

```
##                     numDF denDF   F-value p-value
## (Intercept)             1   172 11747.689  <.0001
## vine_agemo              1   172    17.291   1e-04
## subgrp2                 2   113    70.622  <.0001
## vine_agemo:subgrp2      2   172    12.431  <.0001
```

```
p10$p
```



Vineland Adaptive Behavior - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_AdapBehav_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Adaptive Behavior",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                   numDF denDF  F-value p-value
## (Intercept)           1   113 6895.113  <.0001
```

```
## vine_agemo             1   113   30.349  <.0001
## subgrp2                1    74  109.685  <.0001
## vine_agemo:subgrp2     1   113   12.706   5e-04
```

Vineland Adaptive Behavior - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_AdapBehav_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Adaptive Behavior",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                    numDF denDF  F-value p-value
## (Intercept)            1   109 8907.768  <.0001
## vine_agemo             1   109    0.474  0.4926
## subgrp2                1    73   77.135  <.0001
## vine_agemo:subgrp2     1   109    0.694  0.4065
```

Vineland Adaptive Behavior - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "vine_agemo",
                  y_var = "vine_AdapBehav_DomStd",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "Vineland Adaptive Behavior",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

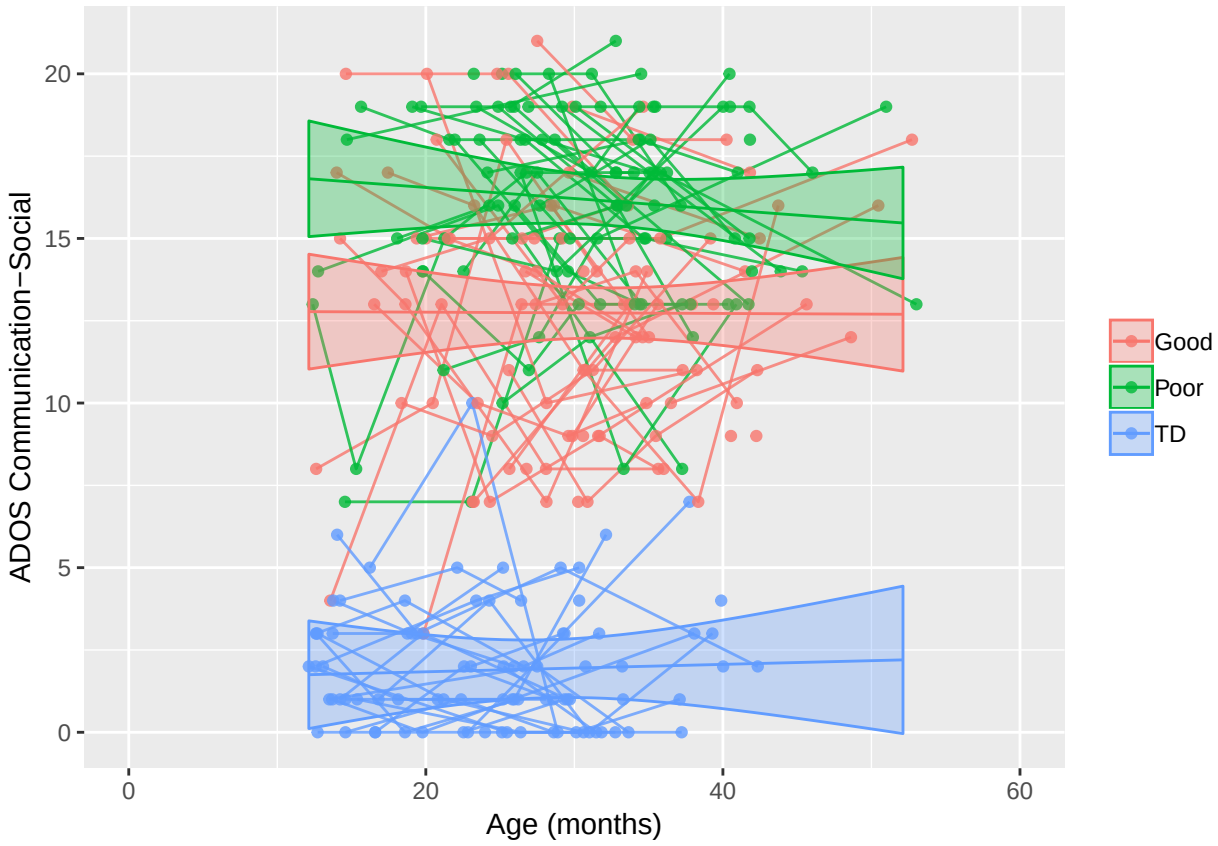
```
##                     numDF denDF  F-value p-value
## (Intercept)             1   122 8243.749  <.0001
## vine_agemo              1   122    7.355  0.0077
## subgrp2                 1    79   15.842  0.0002
## vine_agemo:subgrp2      1   122   20.605  <.0001
```

ADOS Social-Communication trajectory

```
fname2save = NULL
p = spaghettiPlot(df = lwdata_flat,
                  x_var = "ados_ageMo",
                  y_var = "ados_CoSoTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Communication-Social",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                     numDF denDF   F-value p-value
## (Intercept)             1   172 2359.3059  <.0001
## ados_ageMo              1   172   18.0252  <.0001
## subgrp2                 2   113  303.2900  <.0001
## ados_ageMo:subgrp2      2   172    0.3190  0.7273
```

```
p$p
```



ADOS Social-Communication - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "ados_ageMo",
                  y_var = "ados_CoSoTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Communication-Social",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                   numDF denDF   F-value p-value
## (Intercept)           1   113 1874.3664  <.0001
```

```
## ados_ageMo             1   113   33.2769  <.0001
## subgrp2                1    74  862.5059  <.0001
## ados_ageMo:subgrp2     1   113    0.7523  0.3876
```

ADOS Social-Communication - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "ados_ageMo",
                  y_var = "ados_CoSoTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Communication-Social",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                    numDF denDF  F-value p-value
## (Intercept)            1   109 731.8233  <.0001
## ados_ageMo             1   109  16.9792  0.0001
## subgrp2                1    73 317.4491  <.0001
## ados_ageMo:subgrp2     1   109   0.0111  0.9164
```

ADOS Social-Communication - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "ados_ageMo",
                  y_var = "ados_CoSoTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Communication-Social",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

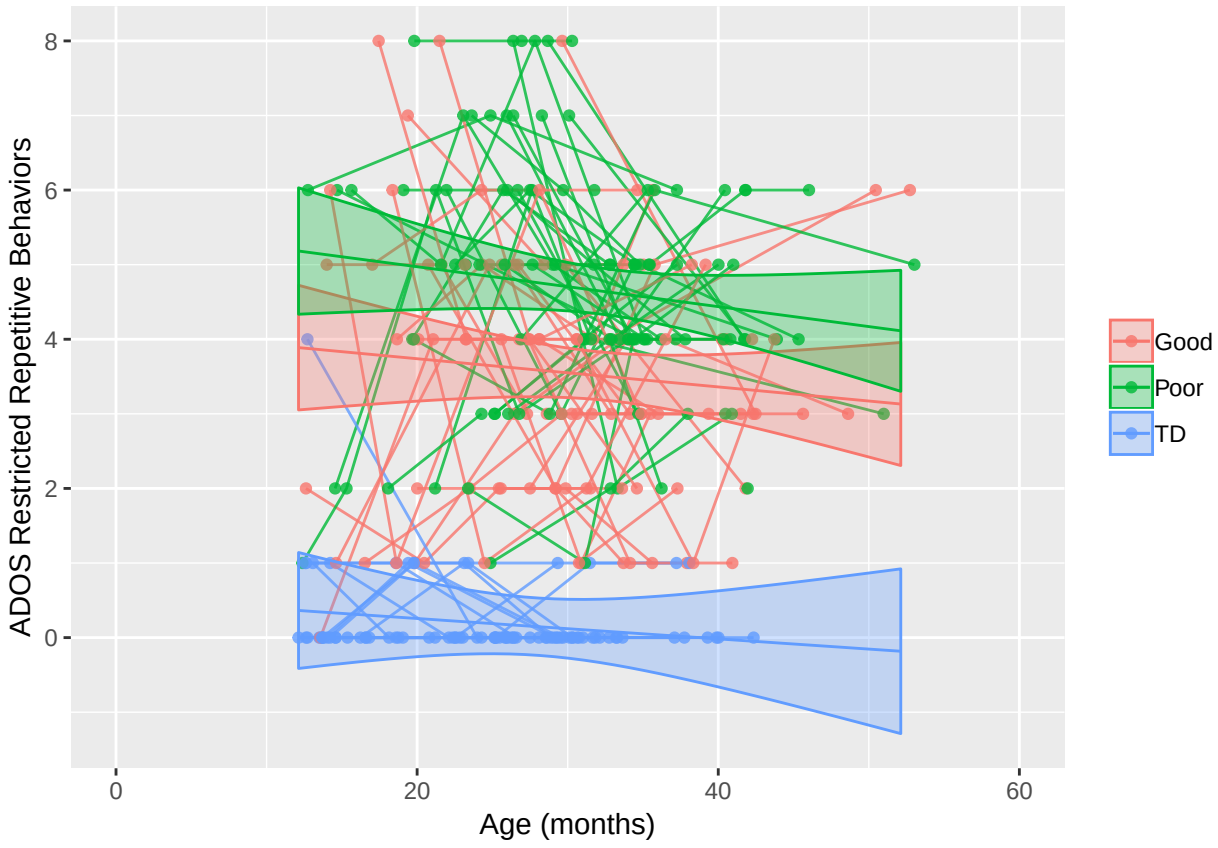
```
##                     numDF denDF   F-value p-value
## (Intercept)             1   122 2386.8523  <.0001
## ados_ageMo              1   122    0.3716  0.5432
## subgrp2                 1    79   32.3795  <.0001
## ados_ageMo:subgrp2      1   122    0.4039  0.5263
```

ADOS RRB trajectory

```
fname2save = NULL
p = spaghettiPlot(df = lwdata_flat,
                  x_var = "ados_ageMo",
                  y_var = "ados_RRTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Restricted Repetitive Behaviors",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                     numDF denDF   F-value p-value
## (Intercept)             1   172 1019.8378  <.0001
## ados_ageMo              1   172    5.7976  0.0171
## subgrp2                 2   113  165.9659  <.0001
## ados_ageMo:subgrp2      2   172    0.1045  0.9008
```

```
p$p
```



ADOS RRB - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "ados_ageMo",
                  y_var = "ados_RRTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Restricted Repetitive Behaviors",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                   numDF denDF  F-value p-value
## (Intercept)           1   113 664.9935  <.0001
```

```
## ados_ageMo             1   113  12.2156  0.0007
## subgrp2                1    74 380.4118  <.0001
## ados_ageMo:subgrp2     1   113   0.2320  0.6310
```

ADOS RRB - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "ados_ageMo",
                  y_var = "ados_RRTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Restricted Repetitive Behaviors",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                    numDF denDF  F-value p-value
## (Intercept)            1   109 357.7468  <.0001
## ados_ageMo             1   109   4.8277  0.0301
## subgrp2                1    73 233.5445  <.0001
## ados_ageMo:subgrp2     1   109   0.1365  0.7125
```

ADOS RRB - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "ados_ageMo",
                  y_var = "ados_RRTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Restricted Repetitive Behaviors",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

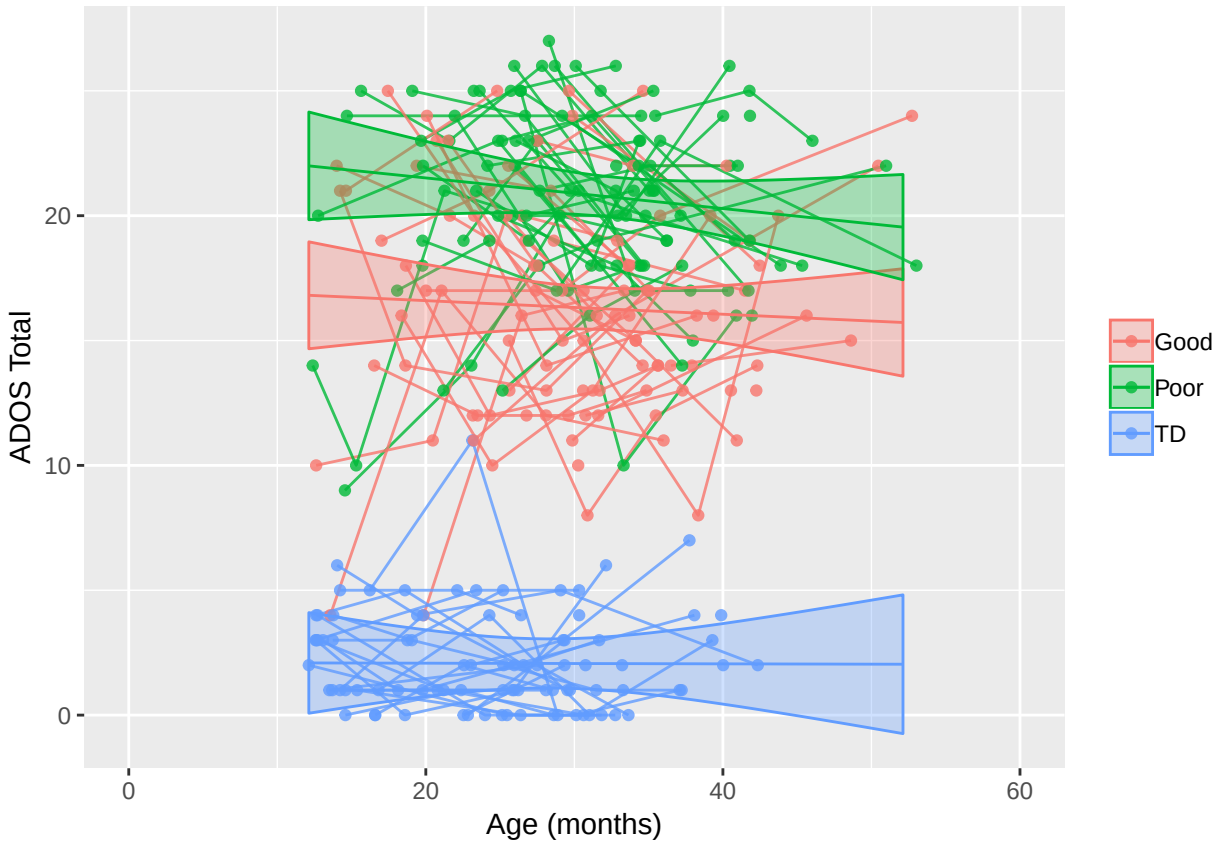
```
##                     numDF denDF  F-value p-value
## (Intercept)             1   122 985.6580  <.0001
## ados_ageMo              1   122   1.8220  0.1796
## subgrp2                 1    79  18.9914  <.0001
## ados_ageMo:subgrp2      1   122   0.0681  0.7945
```

ADOS CoSo RR Total trajectory

```
fname2save = NULL
p1 = spaghettiPlot(df = lwdata_flat,
                   x_var = "ados_ageMo",
                   y_var = "ados_CoSoTotRRTot",
                   subgrp_var = "subgrp2",
                   xLabel = "Age (months)",
                   yLabel = "ADOS Total",
                   modelType = "linear",
                   fname2save = fname2save,
                   plot_dots = TRUE,
                   plot_lines = TRUE,
                   ci_band = TRUE,
                   pi_band = FALSE,
                   dot_alpha = 8/10,
                   line_alpha = 8/10,
                   band_alpha = 3/10,
                   xLimits = plot_xlim,
                   yLimits = NULL)
anova(p1$lme_model)
```

```
##                     numDF denDF  F-value p-value
## (Intercept)             1   172 3223.494  <.0001
## ados_ageMo              1   172   23.075  <.0001
## subgrp2                 2   113  428.524  <.0001
## ados_ageMo:subgrp2      2   172    0.333  0.7174
```

```
p1$p
```



ADOS CoSo RR Total - TD vs ASD Poor

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Poor")
p = spaghettiPlot(df = tmp_data,
                  x_var = "ados_ageMo",
                  y_var = "ados_CoSoTotRRTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Total",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                   numDF denDF   F-value p-value
## (Intercept)           1   113 2625.5585  <.0001
```

```
## ados_ageMo             1   113   53.0554  <.0001
## subgrp2                1    74 1230.7989  <.0001
## ados_ageMo:subgrp2     1   113    0.7857  0.3773
```

ADOS CoSo RR Total - TD vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="TD" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "ados_ageMo",
                  y_var = "ados_CoSoTotRRTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Total",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                    numDF denDF  F-value p-value
## (Intercept)            1   109 970.7358  <.0001
## ados_ageMo             1   109  18.6356  <.0001
## subgrp2                1    73 451.6558  <.0001
## ados_ageMo:subgrp2     1   109   0.0631  0.8022
```

ADOS CoSo RR Total - ASD Poor vs ASD Good

```
fname2save = NULL
tmp_data = subset(lwdata_flat,lwdata_flat$subgrp2=="Poor" | lwdata_flat$subgrp2=="Good")
p = spaghettiPlot(df = tmp_data,
                  x_var = "ados_ageMo",
                  y_var = "ados_CoSoTotRRTot",
                  subgrp_var = "subgrp2",
                  xLabel = "Age (months)",
                  yLabel = "ADOS Total",
                  modelType = "linear",
                  fname2save = fname2save,
                  plot_dots = TRUE,
                  plot_lines = TRUE,
                  ci_band = TRUE,
                  pi_band = FALSE,
                  dot_alpha = 8/10,
                  line_alpha = 8/10,
                  band_alpha = 3/10,
```

```
                  xLimits = plot_xlim,
                  yLimits = NULL)
anova(p$lme_model)
```

```
##                     numDF denDF  F-value p-value
## (Intercept)             1   122 3206.285  <.0001
## ados_ageMo              1   122    1.120  0.2921
## subgrp2                 1    79   46.493  <.0001
## ados_ageMo:subgrp2      1   122    0.262  0.6099
```